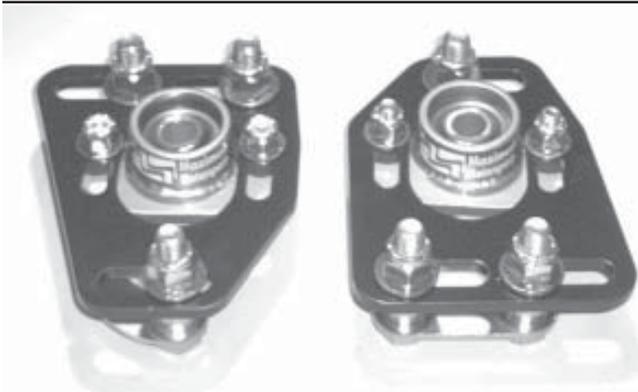


## *MM Caster/Camber Plates - 1979-89 Mustang (MMCC7989)*



*Read all instructions before beginning work. Following instructions in the proper sequence will ensure the best and easiest installation.*

Thank you for purchasing Maximum Motorsports' Caster/Camber Plates. Our Caster/Camber Plates are designed to maximize the performance of your Mustang's front suspension. You will find many features that set our Caster/Camber Plates apart from the rest:

- The camber adjustment slots in the MM plates, when used in conjunction with the factory camber adjustment slots, allow the widest range of camber adjustment possible.
- High grade Teflon® lined spherical bearings are used at the strut top mounting point. Urethane bushings do not provide positive location, and induce bending loads on the strut that reduce the strut's lifespan and may even break the strut shaft.
- Plates are spaced well above the strut tower top to restore bump travel for lowered cars.
- High grade alloy steel allows our plates to be thin and fatigue proof. Aluminum plates must be very thick and will un-necessarily reduce bump travel and hood clearance.
- Lifetime warranty against main plate bending.

***IMPORTANT:*** *The bearing used in our Caster/Camber Plates is swaged together with Teflon® in between the race and ball. This provides a very tight tolerance fit that prevents dirt from entering the bearing. The Teflon® reduces friction and minimizes wear over the lifespan of the bearing. The tight*

*tolerances will not allow easy movement of the bearing center by hand. If the center of the bearing must be rotated, use the strut shaft as a lever to facilitate movement. DO NOT ATTEMPT TO LUBRICATE THE BEARING. Any oil or grease will attract dirt and damage the Teflon®, voiding your warranty.*

1. Jack up front of vehicle and place firmly on jack stands.
2. Remove front wheels.
3. Place a floor jack under the control arm and jack up until **slightly** loaded.
4. Remove the strut shaft top mounting nut. Save the strut top nut, it will be used later.

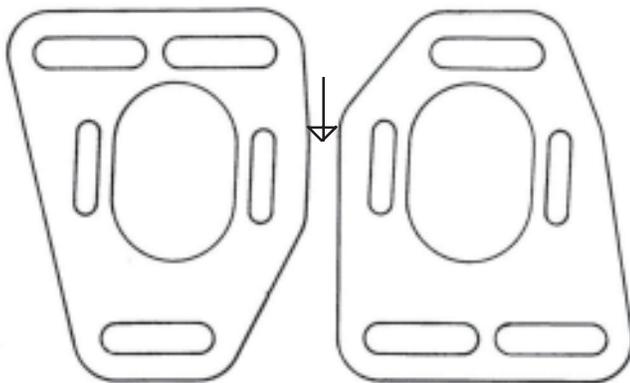
NOTE: It may be easier to initially loosen the nut with air tools.

5. Remove the three nuts that hold the factory strut mount in place. If present, drill and remove the pop rivet that retains the top mounting plate. Discard the top mounting plate.
6. Carefully lower the jack to bring the strut shaft down through the strut tower center hole, but **do not** completely unload the jack: the spring may become dislodged, causing injury and/or damage.
7. From the top of the strut tower, remove and discard the thrust washer, the top rubber bushing and the crush sleeve from the strut shaft.
8. Collapse the strut shaft down into the strut body far enough to remove the factory bottom plate and dust boot. Discard the factory bottom plate. Save the dust boot.
9. Relax the strut shaft. Through the strut tower center hole, remove and discard the OEM bumpstop from the strut shaft.
10. Cut and remove the steel band clamp securing the plastic dust boot tube to the molded rubber/steel top mount. Separate the dust boot tube from the rubber/steel top mount. Discard the rubber/steel top mount, but save the dust boot tube.

- Slip the dust boot back over the strut body. Lubricate the MM urethane bumpstop and slide it over the strut shaft with the conical portion facing upward. It is easiest to attach the MM bumpstop and dust boot tube to one another later in the installation.

NOTE: The factory dust boot and MM bumpstop are NOT used in coil-over applications. If using Bilstein struts, the MM bumpstops and the factory dust boots are not used. Bilstein struts have internal bumpstops and their own dust boots. For replacement dust boots for Bilstein struts, you can order a Service-6 kit from MM for conventional spring applications, or a Service-7 kit for coil over applications.

- Install the MM Bottom Plates beneath the strut towers with the 1/2" bolts protruding upwards through the factory mounting slots and hole. Make sure the Bottom Plate slides freely in the adjusting slots of the strut tower. If not, file the slots until they do.
- Install 1/2" washers over the 1/2" bolts of the Bottom Plate. These washers will rest directly on top of the car's strut tower.
- Install the 1/2" inside diameter spacers over the 1/2" bolts of the Bottom Plate.
- Identify the driver's side and passenger's side Main Plates. The large center slot will be biased towards the rear of the car for increased positive caster adjustment.



Passenger's Side      Driver's Side

Top View, Front of Car

- Install the Bearing Plates onto the Main Plates. The Bearing Plates have a long-straight edge and a short-beveled edge. Assemble a Bearing Plate onto the bottom of each Main Plate, so that the short beveled edge will be toward the rear of the car. The short-beveled edge is designed for Main Plate bolt clearance at the back of the caster adjustment slot. Failure to orient the Bearing Plates correctly will limit your range of caster adjustment.
- Place a 3/8 Grade 8 washer over each stud of the Bearing Plate, and secure with a 3/8 Nylock nut. Do not tighten the nuts at this time.



- Install the appropriate Main Plate - Bearing Plate assembly over the studs of the Bottom Plate on the car.

19. Install the 1/2" Grade 8 washers and the 1/2" nylock nuts on the bolts of the Bottom Plate.
20. Install the strut shaft through the spherical bearing of the caster camber plates with four of the supplied 16mm inside diameter spacers per side (two short and two long). Use the guidelines below to determine the correct combination of spacers to put above and below the spherical bearing. Use the same spacer configuration on each side of the car.

NOTE: For MM Coil Over applications, consult your Coil-Over Instructions for correct spacer arrangement.

**Important** - At least one spacer above the caster camber plate spherical bearing is required to allow proper movement. Failure to do so will result in limited bearing articulation and possible damage to the bearing and/or the strut!

For cars at stock ride height:

- Install 2 long spacers and 1 short spacer below the spherical bearing. Install 1 short spacer above the spherical bearing. There should be a total of 4 spacers per side.



For lowered cars:

- Install 1 short spacer below the spherical bearing. Install 2 long and 1 short spacer above the spherical bearing. There should be a total of 4 spacers per side.



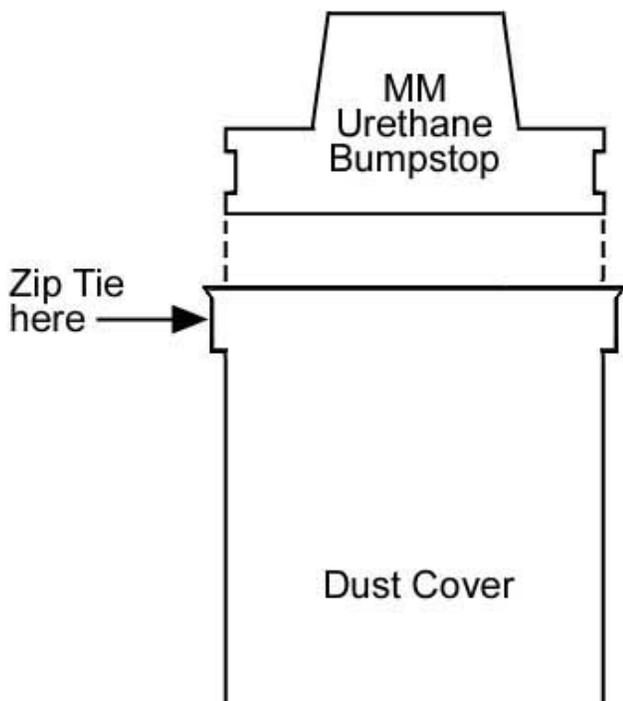
Carefully close the hood to check for interference between the top of the strut shaft and the hood. You can check hood clearance by carefully closing the hood with putty or Play Dough on top of the strut shaft. The thickness of the smashed putty will indicate exactly how much hood clearance there is. If hood clearance is less than 1/8", reposition the strut shaft spacers to lower the strut shaft relative to the spherical bearing. If the hood hits the strut shaft, rearrange the spacers to lower the strut shaft. This can be accomplished by moving a spacer from above the bearing to below the bearing, thus making the spacer stack below the bearing taller. Repeat this process until there is adequate hood to strut shaft clearance. Remember that the hood to strut shaft clearance will change after the alignment is set. Re-check this hood clearance after your Mustang is aligned!

21. Reinstall the strut shaft top mounting nuts. Torque the nuts to your strut manufacturer's specification.

NOTE: Various strut manufacturers have unique lengths for the top threaded portion of the strut shaft. You may need to omit a spacer to fully engage the nut on the strut shaft.

22. Temporarily tighten the caster/camber plate adjusting nuts: the two 3/8" lock nuts for caster and the three 1/2" lock nuts for camber.

23. Slide the MM urethane bumpstop up as far as it will go. Slip the dust boot up and onto the bumpstop. Secure it with a zip tie.



24. Pull the bumpstop/dust boot assembly down the strut shaft slightly so that it will not interfere with the sliding portions of the Caster/Camber plates while the alignment is being performed.
25. Reinstall wheels and carefully lower the vehicle to the ground.
26. Torque the lug nuts to factory specification.
27. Have your car professionally aligned.

NOTE: Because camber and caster can be adjusted independently with the MM plates, you can adjust one, lock it down, and then adjust the other. Always double check all camber and caster measurements after any adjustment of even one parameter. *Remember that **any time you make any change in camber, caster, or ride height, you must readjust the toe setting.***

28. Ford's production tolerances on the position of the large center hole of the strut tower can cause interference when the camber or caster is adjusted towards the limit of travel. If you are adjusting towards the extreme limits of camber and/or caster, check the clearance between the strut shaft and the edge of the large center hole. Check not only with the wheels pointed straight ahead, but also while turning the steering from lock to lock. You may enlarge the center hole with a file or die grinder.

29. Caster and camber settings change the strut shaft's position relative to the hood. Double check hood clearance with the car on the ground, while turning the steering from full lock to full lock. If necessary, reposition the strut shaft spacers to lower the strut shaft relative to the spherical bearing.

30. When the alignment is complete, torque the caster/camber plate adjusting nuts:

Two 3/8" caster nuts      32 ft/lb

Three 1/2" camber nuts    65 ft/lb

### **ALIGNMENT RECOMMENDATIONS**

If you wish, you can simply have your car aligned to Ford's specifications, or you can improve handling with an alignment that is oriented towards performance driving.

Mustangs respond very favorably to increased positive caster. The greater the amount of positive caster, the greater the increase in negative camber for the more heavily loaded outside front tire.

For street-driven Mustangs, our recommendation for the caster setting depends on which K-member is used.

- Stock K-members: Set to as much positive caster as possible. On most 1979-93 Mustangs this will be around 3° to 4°.
- MM K-members: Set caster to 5° to 6°.
- Stock K-members with MM forward-offset front control arms: Set to as much positive caster as possible, up to a maximum of 6°.

For race cars:

- Stock K-members: Set to as much positive caster as possible.
- MM K-members: Set caster to 6° to 8°.

It is typical for alignment shops to set the passenger side caster to a slightly greater amount than the driver side setting. For street-driven cars, a difference of 1/4° to 1/2° will help counter the effect of road crown, and prevent the car from pulling towards the right on most roads.

Unlike camber, there are many variables that affect the caster. For example, if the car has any rake, the measured amount of caster will be less than if the car was level. Changes in ride height will affect the measured amount of caster. Different technicians using different alignment equipment will measure caster at varying amounts. Unlike camber, the number of degrees that caster is set to does not have to be exact. As long as caster is in the desired range, and the difference from one side to the other is not greater than  $1/2^\circ$ , it is fine.

On the other hand, camber should be set very carefully.

Street-driven cars:  $3/4^\circ$  negative,  $\pm 1/4^\circ$ . Keep a close watch on tire wear patterns, and adjust camber to reduce poor wear, if necessary.

- Race cars: Depends greatly upon the track, driver, etc. Usually set around  $3^\circ$  negative as a starting point. Adjustments should be made after checking tire temperatures and wear patterns.

Toe setting.

- Street-driven cars should be set at toe-in for straight-line stability. They can be set to the factory specification of  $0.5^\circ$  negative (toed-in). We recommend a toe-in setting of  $1/8"$ , overall.
- Competition cars are typically set up with some amount of toe-out, for quicker turn-in response and increased front grip.

Remember that any time any change is made to the camber setting, the toe setting will be affected, and must be readjusted.

It is a good idea to always keep a record of the alignment settings. Inspect the tires frequently for uneven tread wear patterns. If uneven tire wear becomes evident, have the alignment adjusted. With a record of the previous alignment it will be easier to diagnose the problem and make alignment adjustments to improve tire wear.

## **BUMPSTEER**

Bumpsteer is the term for the toe setting of a wheel changing as the suspension moves up and down over bumps, or with body roll while cornering.

There is a widespread myth that the tie-rod should be kept parallel to the ground to avoid bumpsteer. **THIS IS NOT TRUE!** What IS required is for the tie-rod to be kept parallel to the lower control arm. That way, as the suspension moves, the arc of the ball joint and the arc of the tie-rod end do not transfer any steering input to the spindle. As the car is lowered, the tie-rod end and the lower control arm move together, staying parallel. If offset steering rack bushings are installed on a stock-geometry K-member, the tie rod end and the lower control arm will no longer be parallel. Installing offset rack bushings will INCREASE the amount of bumpsteer.

Ford engineers have actually done a very good job at minimizing bumpsteer for a typical street-driven car. Specifically, the bumpsteer was designed to cause the front wheels to toe out during bump. This is a roll understeer condition; the outside loaded tire will turn to the outside of a corner as the body rolls. A car that has a basic tendency towards understeer is more stable and predictable. That predictability makes for a safer street car.

Competition cars using stock K-member geometry can benefit by fine-tuning the amount of bumpsteer with an adjustable tie rod end kit. The MM Adjustable Tie-rod End Kits provide an assortment of spacers, in  $.015"$  increments, to help position the-rod end at exactly the correct height. Adjusting bumpsteer on a particular Mustang also allows correcting for individual differences in suspension geometry caused by production tolerances.

Offset rack bushings DO have a use, and are beneficial if the inner control arm pivots have been moved from the stock location. On MM K-members the pivots have been moved upwards from the stock height. In this case, raising the steering rack will help match the geometry of the raised inner control arm pivots, and reduce the required height of the bumpsteer spacer stack at the spindle.

If offset steering rack bushings are used, they should be made of aluminum. *Polyurethane offset bushings do not work.* The urethane has too much "give", making it impossible to get the rack mounting bolts tight enough to prevent the rack bushings from rotating during hard cornering.

## **This Kit Includes the Following Hardware:**

<b><u>Qty:</u></b>	<b><u>Description:</u></b>
12	1/2" SAE Flat Washers, G8
6	Main Plate Spacers
4	3/8" SAE Flat Washers, G8
4	3/8-16 Nylock Nuts
6	1/2-13 Nylock Nuts
2	Bumpstops
2	14" Black cable ties
2	Bearing Plate Assemblies
2	Bottom Plate Assemblies
1	Main Plate, Passenger
1	Main Plate, Driver
4	Strut Shaft Spacers, Long
4	Strut Shaft Spacers, Short

