

## SHOP NOTES King Midget Maintenance and Restoration



The King Midget front end is somewhat unique, combining front suspension and steering kingpins into a single assembly. Wonderfully simple, but maintenance is vital.

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### I - 1 Front Suspension and Steering *by John White II*

This time in Tech Tips, we'll look at the King Midget front suspension and steering set up. Bob has pretty much covered front end alignment on the King Midget, so I figured I would try and go into the finer points of making your King Midget front end work as well as the factory design will allow.

First off to make the settings Bob talked about mean anything, as much play as possible needs to be removed from the tie rod ends and other areas of the front end.

Let's begin with the tie rods ends themselves. There were two types used. The Model 2 and 1957—maybe some '58s—had open tie rod joints. See Figure 1.



FIGURE 1

The ball in these joints has a screwdriver slot in the ball end of the joint. It screws into the threads on the steering arms and once adjusted for play, is locked by a jam nut. In between the joint and the arm is a neoprene rubber washer. Make sure this washer is in good condition, over time they degrade, harden, etc. New ones are available from Midget Motors Supply. In adjusting these tie rod ends you want to tighten the screw as much as possible, but not so tight as to allow the joint to bind.

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The Model 3 from 1958 on uses a similar type joint, see Figure 2, but it is capped and has a spring inside the little cover to preload the joint.



FIGURE 2

About the only service these require is to make sure the rubber washer between the joint and the arm is in good condition. Rarely, a spring will go bad. This can be replaced by cutting the tack welds on the cap and replacing the spring and re-tacking the cap back on. Kits for repairing these were available. Check for availability from Midget Motors.

Much talk has centered around the upper and lower suspension tubes themselves. They can wear out-of-round over time. There is an adjustment nut at the lower end of upper tubing at the rear for taking up some of this play. See Figure 3.



FIGURE 3

You can try to tighten this if your tubes seem to have a lot of play in them. The main thing is you do not want to over-tighten so much as to cause binding in the up and down motion or when turning right or left. If your tubes are worn out-of-round, you will find that when you tighten the nut enough to take out the play straight ahead, it will bind when trying to turn right and left. Bob asked me about a simple fix for this problem. The news isn't good. About your only option is to replace the tubing with new. This requires being able to get at the upper tube to cut the welds and being able to re-weld in the new upper and replace the lower tubing. I may do a future article on doing just that if there is interest. The main thing is to keep the lower tubes filled with 90# weight gear oil or 30# motor oil. They are supposed to drip and make a mess on your garage floor. That's how your Midget marks its territory ... LOL.

I will throw in one non-stock upgrade that you can help your stock King Midget front end, the addition of a steering stabilizer. It won't cure all your ills. Mainly a steering stabilizer helps dampen feedback from imperfections in the road surface and such. I've

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driven some King Midgets that handle perfectly fine without the need of a stabilizer. I do have one installed on both my Model 2 and the '57 King Midget. I'm not sure if either car actually needed one, but while I had them stripped down to the frame I thought that was the time to add one.

I like to use the VW steering stabilizer for the Super Beetle. I usually get mine from J.C Whitney, part number ZX886373P. These may also be available from local auto parts suppliers that handle parts for older Volkswagens. I like this type because it features a rubber mounting eye at the one end for mounting to a bracket on the frame. See Figure 4.

The other end also has a smaller eye. I usually split the collar and remove this end and weld on a threaded end that I can mount a good quality 3/8" ball-end-joint. See figure 5.



FIGURE 4



FIGURE 5

This might be overkill on my part but I like to make allowances to minimize binding between the tie rod tube and the stabilizer. I also make my mounting ears to match the angle of the front upper shock tubes. That way the stabilizer sweeps in the same plane as the up and down movement of suspension. I usually just weld the ears on for mounting but I'm sure a bracket could be made and bolted on the frame. I've seen many stabilizers mounted other ways that seem to work fine also. On the tie rod tube I have made clamp-on brackets to bolt the other end and also have welded an ear on for mounting. On Model 2 cars you can weld the ear on.

The tie rod ends on these cars are both right hand thread at the ends, this means to make toe in or out adjustments you need to unbolt one tie rod end from the steering arm. On Model 3 cars the tie rod ends are right and left hand threaded so you can just loosen the lock nuts on each end and turn the tie rod tube to change toe-in. On these you would be better off making a clamping type fastener for connection of the stabilizer end. Having this end clamped to the tie rod will allow you to loosen the clamp when adjusting for toe-in, then retightening it in its proper place when finished making the adjustment. If I remember right, I used a piece of 1/2" pipe nipple to make the clamp end for the tie rod tube. I split it down its length on one side and then welded ears on it with bolts to make it tighten around the tube. See figure 5 above.

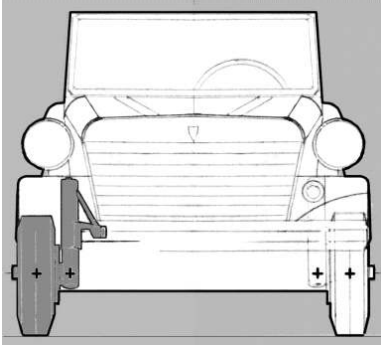
The tubing size for the tie rod tube is .680 diameter, a piece of 1/2" pipe nipple is a bit bigger so you need to remove about 1/8" wide slot. Check it with the tie rod tube before you weld on the ears to see if you have enough material removed. You will probably have to squeeze it together a bit in the vise to get it to shape. To install your finished clamp you will need to unfasten and screw off one tie rod end to slide the clamp on the tie rod tube.

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I'll finish up with a bit on the steering box itself. Many talk of having play in their steering boxes. A certain amount of play is normal for this type of box, it is known as gear lash. Many old cars had play in the steering box. It is part of the "flavor" of driving an old car. If you feel yours has too much play though, you might try disassembling it, mounting the steering plate in a vise up close to where the steering column mounts on to the pinion. Then using a piece of heavy tubing or rod, insert it in the piece of tubing where the pinion runs and "bend" to force the pinion and steering gear closer together. This would remove some gear lash between the gears. I have never tried this myself. It was offered to me as a suggestion on how to tighten the box if need be. You can try this at your own risk. ■

**Note:** One trick I do on the front suspension, and I don't know if it does a damn thing or not, is before tightening the nut on the spring at the top of the upper tube, I turn the right wheel toward the driver's side of the car and tighten the nut, and turn the driver's side wheel toward the passenger side and tighten that nut. In other words they'd be pigeon-toed. My thought has been it "loads" the tie rod ends and helps remove any slop that might be present. Is there anything to it? Who knows. John White II

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### Midgets That Might Have Been

## I-2 The Front End That Might Have Been *by Bob V.*

Maybe we can agree that the front end design of the King Midget is a bit less than perfect. But even so, let's try to remember it *is* pretty darned clever. Like so many aspects of Midget Motors' design, it combines into a simple and inexpensive package everything you really need to get your King Midget down the road.

But as with other aspects of the design, compromises were made, and there was room for continuing development. Let's look at the problem.

In the top sketch, we see the basics of the design. The tube shown at the left fits inside an upper and slides up and down with the spring inside absorbing the bumps. Oil lubricates the innards and provides the damping characteristics. The lower tube is welded to the front spindle and has an arm connected to the steering gear. So this tube swivels to serve as the kingpin. Neat.

A problem: The two tubes sliding together absorb a lot of friction and they can wear. Later model Kings have an adjustment that can be cinched up to keep the bottom tight, and it's important to do so, and maintaining lubrication is also vital. But the top can still wear egg-

shaped, and the *more* it wears, the *faster* it wears. Taller and thinner struts would help, as would better steel and improved tolerances. Dick Pryer's new front end addresses the tolerance problems nicely. Unfortunately, that system raises the front end about an inch, compromising the original look of the car.

But what we're looking at here is the basic design, and the "fat" struts combined with brake drums create a fundamental problem. In the top-right drawing, you can see the "plus" signs indicating how far the wheels cantilever out from the kingpin pivot—about four inches. Ideally, that pivot point should be centered in the wheel, and while considerable compromise is acceptable, four inches is really too far. Consider the next drawing down. There I've arbitrarily moved the strut inward by another 20 percent. Now imagine that wheel hitting a pothole, dip or simply a bit of excess vibration (surely not on a King Midget!). You can see that the forces backing up through the steering gear would make your hair curl. If that's not yet clear, imagine that strut moved clear over to the center of the car and trying to control the steering from there! The greater the distance between those plus signs, the greater the steering challenges.

Number 17 of this series (February 2001) proposed a redesign of the Model 2 aimed at solving its design problems without making the car larger. It stayed with two-wheel

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mechanical brakes using larger drums and larger rear wheels, making the front wheels smaller, since they carry so little load and contribute little to braking. The third sketch at the left above shows how such a change might have resulted in significant handling improvements as well.

The front wheel and tire illustrated are about 10 percent smaller, and the strut/kingpin is the familiar Midget Motors design, but about half the diameter. In application, the frame rails could be a bit wider apart, but for illustration purposes here, I left the frame unchanged. Note that the distance between the two pluses is now *reduced* by about 20 percent. This relatively small difference would, I believe, have reduced significantly the steering problems that plague some King Midgets—particularly cars lacking careful maintenance. The addition of tempered steel tubing and closer tolerances would also have helped, at modest cost.

Apparently Dale Orcutt and Claud Dry were aware of the challenge and were working on a solution. An all-new prototype was designed during the '60s but never saw production. The photograph at right is from one of those prototypes, currently owned by Joe Blosser.

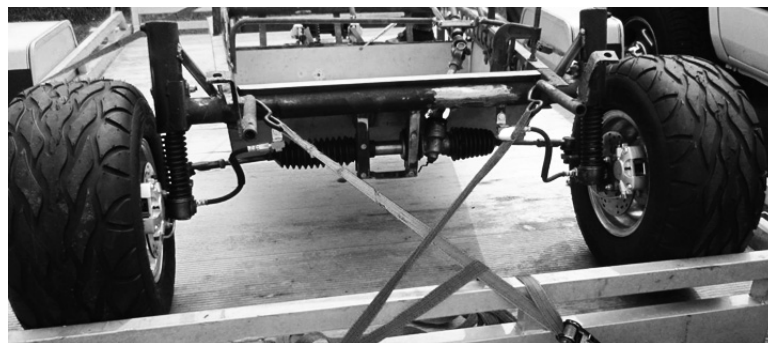
This setup uses a taller but skinnier wheel and tire, along with a much taller and skinnier strut—essentially the changes described above. In this case, the brake drum is recessed into a much deeper wheel, so four-wheel brakes can be used.



In addition to those changes, this design also placed the steering arm at the top of the swiveling strut instead of the bottom, reducing wear. More importantly, the strut used a long control arm at the bottom. Perhaps all these changes were needed for the considerably heavier car envisioned, but they added considerable cost and complexity

In a lighter King Midget, or even the Model 3, the more modest changes I've suggested would probably have done the job. And reduced, rather than increasing cost. ▣

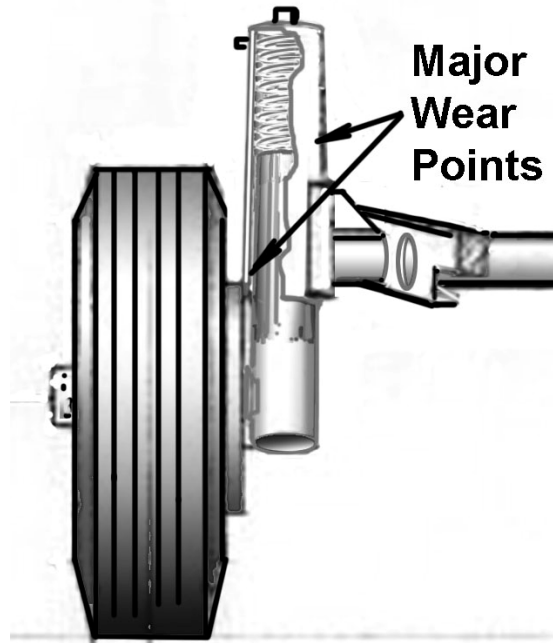
**Note:** At right is a real-world test of the theory. These tires and wheels on Gary Guy's M3 were installed by Paul Gerhardt. He did every trick in the book to try and make the car handle reasonably well. At speeds above 40 MPH, it is highly unstable.



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**I - 3 Tech Talk—Front Struts** *By Bob Vahsholtz, helped by Jim Daniels*

KM owners have had so much trouble with their front struts that Dick Pryer made a brisk business of making precision replacement struts. That is until he ran out of the tubes he was using and also wore himself to a frazzle putting them together.



The sketch above shows how Midget Motors' innovative and very simple system works. A tower strut welded to the front axle and frame contains a smaller tube having a snug fit, which slides up and down inside against a coil spring, providing suspension. It also pivots, serving as the king-pin. Air is compressed and released inside as the system bounces, providing shock absorber action.

It's not a perfect setup, but it's very simple, easy to build and works fine if properly aligned and well lubricated.

And there's the rub. The owner's manual is very vague on how to lubricate and how much. There are little plugs at the top of those struts, which you unscrew and shoot in some oil with a squirt gun.

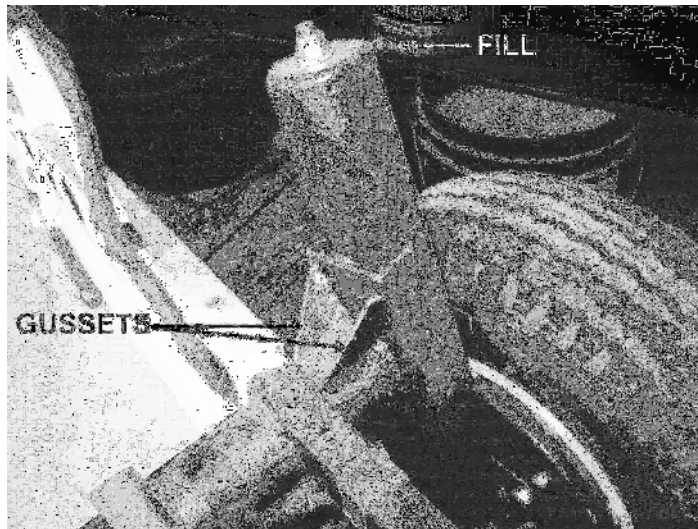
How much? Not clear. Lots more than you might think. If your garage floor is oil-free, you probably need to top up. You'll surely know your struts need oil if they're dry. They should always have a wet film of oil after a short drive. There's supposed to be a substantial quantity of oil inside, and as the shocks bounce up and down, the oil splashes around and some runs down the outside and inside of the tubes, keeping everything nice and slick. Regular old motor oil is fine as a lubricant.

If you don't lube adequately, your struts wear out quickly, sliding steel-on-steel. Most of that motion happens up and down while driving straight ahead, so the struts wear "egg-shaped" and get loose and wobbly. Your front end "toes out" and drives lousy, even after properly oiling. What to do?

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Early Model 2s had no adjustment to compensate for wear, and they were particularly vulnerable to the dreaded egg-shaped-strut problem. Newer M2s and all M3s have a slot in the bottom of the strut at the rear with a strap across it and a nut that can cinch the bottom of the outside tube tighter against the inside tube. With the struts well oiled and the front end jacked up, tighten that nut until the tubes are locked together, and then back off until the tubes are just able to move freely against each other. Then keep it lubed and away you go.

That's if you're lucky and the car has low mileage or has been well maintained. But that tightening cannot fully cope with struts that are egg-shaped. You'll find they may be nice and free while the wheels are pointed straight forward, but bind when you turn. That's not good, and you need it set free enough so the car steers easily. If the struts have worn too badly, you're just plain out of luck. As of this time, no replacement struts are available. You might get some made, but you need both the inside and the outside tubes as a matched set, and replacing them is a heroic undertaking.



Jim Daniels is a clever fellow and he came up with a solution. On his lathe, he turned a collar that fits onto the bottom of the outside tube, with an inner offset that fits the inside tube. Then he split that piece in two vertically and machined-in screws that can bolt the two halves back together. Those cinch the halves tight against the outer strut while providing a clean, round new wear surface for the inner strut.

Jim suggests making the collar plenty tight and using shims as needed to adjust for good fit. That fix got his front end back in shape and it has worked well.

The top end of the strut might also be worn, but much less likely, since it gets more oil and is up out of the dirt. If your front end is *really* wobbly, a similar fix might be tried on the top end of the strut.

Speaking as your Editor, let me assure you I'm no mechanic or engineer, but I'd guess most of you don't have shops equipped with a metal lathe. It seems to me that the problem with the "factory" solution is, it tightens mainly at just one point, whereas the "Daniels Collar" trick creates a whole new round sleeve.

Let me suggest an approach for someone more competent than me (and with worse struts

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than mine) to try.

Remove the inner strut and spring exposing the outer tube, still mounted on the car. Find a round piece of steel pipe or shaft that just fits snug inside the outer tube. Check against that round tube and see if the inside of the strut is egg shaped. If it is, use that inner pipe as an anvil and with many small blows, tap the outer tube back tight against the pipe. Don't smack it hard—you don't want to stretch the steel.

Once you have it as round as you can manage, clean off all the oil inside and be sure the inner surface is nice and smooth. Use files, emery cloth or whatever to be sure there are no lumps. Then cut another slot in the front like the one the factory put in the back and rig up a similar mechanism for tightening and reassemble the strut. If done carefully, it seems to me this might have much the same effect as Jim's approach, but be approachable by shade-tree mechanics.

If someone has the courage to give it a try, I'd like to print the results here. Keep it clean though. This is a family publication. □

**Note:** Skip Weaver has made replacement tubes in recent years. Paul Gerhardt now offers his version of the front end setup pioneered by Dick Pryer. Bob V.

### I - 4 Taking Charge of Your Front End *by Bob V.*

About 45 years ago I bought a used 1953 Studebaker Champion Loewy hardtop—to my mind the best styled car of the century. Marge and I both loved it. Its teeny six was weak, but the handling was great and we drove that Stude until it wore out. Ten years later, I had an opportunity to buy its near-twin, a low-mileage '54 coupe. I told Marge we'd use it as our second car and keep it forever. Lousy plan. We both hated driving it. The poor thing used up garage space for 15 years until I relented and sold it.

The point of this little story? Old cars are fun, but don't expect too much of them. This is especially true of cars like the Studebaker that used obsolete technology when new. And your poor little King Midget, fresh from the factory, made a '54 Studebaker's technology look like a brand new 2006 BMW. The fact that you can still urge your fifty-year-old King Midget down the road should be cause for celebration.

The King Midget front suspension gets a lot of criticism, and some of it is deserved. Like the whole car, it is a design compromise that Dry and Orcutt made to keep costs rock-bottom. Given proper care, it worked quite satisfactorily. Yet if you look at the number of new front-end setups Dick Pryer is selling, the cars that have steering dampers bolted on, and the number of owners putting up with lousy handling, you just know something is wrong up front.

One problem is too many cars got little or no care and one reason was, the owner's manual is confusing. Up until 1967 they were more of a lightly disguised sales booklet than a set of operating instructions. The big yellow book of 1967 and later was much

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improved but still deficient in many ways.

When I did my restoration ten years ago, I had all the manuals. My car had 8,500 miles, was in decent operating condition, and I did all the prescribed maintenance. And when I was done, my '64 drove just dandy, as King Midgets go. That is until last fall when I took someone for a ride to show off and instead, demonstrated a full-blown case of the King Midget Dance while tootling straight down the road at a modest speed. Embarrassing.

After the exchange of many emails with John and Hal, along with studying up on how front ends are supposed to work, it dawned on me that my 1996 efforts might have been inadequate. I've only put 300 miles on the car, but a decade has passed. Far more importantly, I've learned a lot. I went out to the barn and redid the whole front suspension maintenance drill. Let's walk through it step-by-step.

### **Check the Tires**

Tire pressure is basic. Unfortunately, the old Service Manual that came with Model 2s mentions "low air pressure" tires but does not say *how* low. The fronts carry little air because they are so lightly loaded. My early M3 manual called for 8-10 lbs front and 18-20 for the rear. Those numbers were modified by hand, apparently at the factory, to 10 lbs for front and 20-22 for rear. The newer yellow *Parts and Repair Manual* notes on page four that the front tire pressure should be 8-10 pounds and the rears 20 to 22 pounds. On page 41 of that same manual is a lube chart, a version of which was printed in some of the previous small manuals. It calls for the same front air pressure but 16-18 psi for the rears. It seems they increased the suggested tire pressure shortly after introducing the Model 3, so I believe it would be a good idea to use the lower pressures on M2s and the higher for M3. I had not checked the air in my tires since installing new ones two or three years ago. Shame on me. The fronts were down to less than five pounds each and the rears had only about 12. That's enough to bugger the handling without going any further! So I aired the fronts to 10, the rears to 22 and moved on.

### **Wheel Balance**

The manuals don't speak much on this issue. One says the tires are so spiffy they don't need balancing. I disagree; at least with today's tires. Mine required significant weights to bring them into balance. In a future issue we'll talk about techniques for balancing. It's not a big trick.

### **Camber**

The old teeny manual breezily notes wheel alignment was done at the factory and toe-in is easily adjusted. It does not say what the toe-in should be nor suggest any maintenance on the shock/spindles other than keeping them filled with oil. On page 10 the new manual notes the adjustment on the bottom of the front shock tube should be such that there's "no excess motion" but "not tight enough to cause any bind" and suggests the adjustment be made with weight on the front wheels. That's how I did it in 1996.

This time I first measured the camber. Using a carpenter's square set against a front wheel, I measured the distance from the edge of the square to the wheel's rim, both top and bottom. Though the manual doesn't say so, the camber should be about one degree positive—the top of the tire leaning outward a bit. I found the left front—the driver's side—had zero camber and the right, one-degree *negative* (two degrees from where it

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should be). Uh-oh.

I jacked up the front end leaving both wheels dangling. That makes it easier to check if the struts are properly tightened at the bottom. It's also a good time to add oil to the struts. One of mine was low, indicated by the film of oil being dull as opposed to shiny. The oil tends to slosh out of the front shock tubes, keeping your garage floor well lubricated. You have to replace it. Just remove the little plugs near the top and shoot in some oil. Some manuals say "fill to level" and if you do, your floor will be a mess. Others say ¼ pint or half-an-oil-can of 30 w (or 90 weight gear lube). Best thing is to give 'em a few squirts fairly regularly and be sure those struts are nice and shiny black all the time! If you slip on the oily floor, maybe you're overdoing it.

Next grab a front wheel and shake it back and forth. You're actually checking two things; the wheel bearings and the wear of the struts. If anything feels loose in this test, first check the wheel bearings. Remove the dust cap (a broad bladed flat screwdriver can pry it off). On the right front wheel take out the cotter pin and tighten the castle nut until the wheel no longer turns freely. Then loosen it a notch at a time until it *does* spin freely and the hole lines. Put the cotter pin back in place. (This would be a good opportunity to pack the wheel bearings and be sure they're in good shape.) The driver's side bearing check is similar except that wheel has the speedometer drive, a spring wire thing that fits inside the dust cap, and set screws to lock the setting instead of a castle nut. A good time to lubricate your speedometer cable, though I forgot to do mine.

If the bearings are snug and spin smooth but you still feel slack when you yank on the tire, the strut probably needs adjustment—especially if your check of the camber indicated zero or negative.

The adjustment of the camber is vitally important. First, it will help your handling. More importantly, it will preserve the life of your struts. Once that thing gets loose and wobbly, the strut quickly wears "egg-shaped" at the top and bottom of both tubes. Replacement is the only proper fix at that point—quite a chore. Keep it adjusted and keep it oiled.

With the front wheels still dangling, cinch up the bottom of the strut (early Model 2s did not have this adjustment) until it's tight. This is where I blew it ten years ago. I got the adjustment nut "tight," but because its threads were rusty and the weight was on the car, I didn't get it tight enough. When it's cinched up tight, you won't be able to lift the wheel up and down. That's too tight, but provides a starting point for proper adjustment. Back the nut off a half-turn or so until you can move the wheel up and down on the strut (this assumes good lubrication—don't try to make this adjustment with a dry strut). If you can move it up and down a bit, let your jack down and put the weight of the front end onto the wheel. It should settle down on the strut nicely and if it doesn't, you've set it too tight. Try again, loosening a bit. When she squished down properly taking the car's weight, jack it back up and see if the spring's pressure pushes the wheel down to the floor. I first set mine tight enough that the strut would squish down with the car's weight, but not extend when I jacked it back up. Then I released the nut just a little more, which resulted in free movement both up and down, but still snug.

When all this is working as well as can be managed, with the weight off the front end, grab a tire and turn the wheels full left and full right. Try it with both wheels and the

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steering wheel. If it binds at all in doing so, you have the dreaded “egg-shaped” strut problem. All you can do is loosen the strut a bit more until the binding is relieved, unless you want to undertake rebuilding of the strut or replacing it.

One other option that has been tried on three cars we know of is tying the bottom of the two front struts together with a rod or cable to keep them from spreading, as Jim Berg has done. If you try it, be sure to provide adjustment because the precise length is important.

My front end gave no sign of egg-shape and my camber turned out one degree positive on both wheels. Neat!

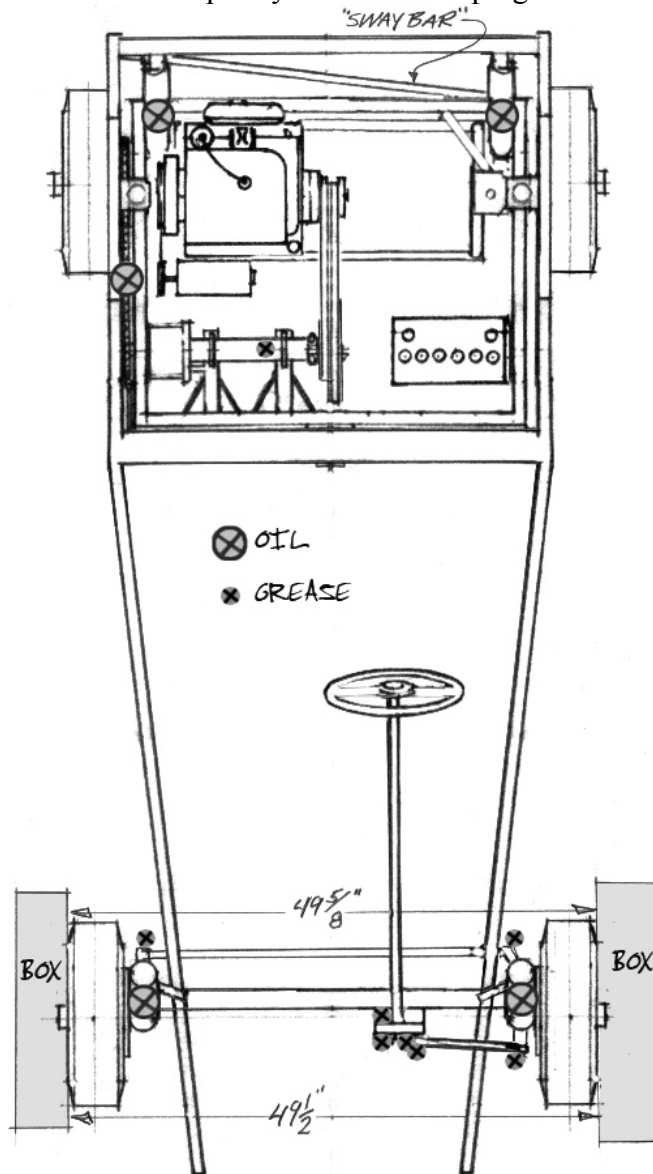
If in rechecking your camber after the above adjustments, you find it's still off but the struts are good, your frame or strut attachments may be bent a bit. You can probably live with that as long as it's not more than a couple of degrees. But if you're doing a body-off restoration, that would be a good time to put it right.

### Toe-In

The “new” manual calls for setting the toe-in by measuring the center-to-center of the front tires and the back, with front being “toed-in” by 1/8 inch. Ten years ago, I set out to accomplish this, working alone, having never aligned a front end in my life. I screwed it up. First of all, I have this touch of dyslexia and have plenty of trouble keeping track of which way to turn a standard nut, never mind the left-hand threads on one end of the tie rod. Second, if you've tried gauging that alignment, it's very difficult to measure the center-to-center distance with any kind of accuracy. The floor pan is in the way, it takes two people to hold both ends of the tape, and finding the tire center involves a bit of guesswork.

Here's a better way. Get a couple of wooden boxes, tool boxes or the like that are five to seven inches tall and as long as the diameter of the wheel. Set one tight up against each front wheel. Then measure the distance between the boxes, ahead and behind the wheel. (See diagram) Mine was  $49 \frac{7}{8}$  at the rear and  $49 \frac{1}{4}$  at the front. *Way* too much toe-in.

Next, loosen the lock nuts on each end of the tie rod (one turns one direction, the other the opposite—darned if I can keep track of which



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is which). Use a small pipe wrench to hold the rod from turning rather than applying all that pressure (often in the wrong direction in my case) against the tie rod end. (On M2's both turn the same direction.)

Once both lock nuts are loose, back them off several turns, and commence your adjustment. Turn the tie rod in one direction (again, I can't say which) and you increase toe-in. The opposite direction—well, you get the idea. Just try turning it two or three turns, bump the boxes back up against the tires and check your toe-in measurement. Fiddle with it until the front is an eighth less than the back. Mine worked out to be  $49 \frac{5}{8}$  rear and  $49 \frac{1}{2}$  front. Then tighten the lock nuts.

### Lubrication

While she's up on the jack, you might as well give 'er a good grease job, and what the heck, why not change the oil?

Claud used to say you could grease a King Midget while in your Sunday Best. Don't try it—especially on a Model 3. The general location of the grease zerks is shown on the diagram, but they vary a bit, so look yours over carefully and be sure you got 'em all. The



big manual says, "The fitting behind the steering box is often overlooked." Well, I guess! I overlooked mine until I crawled under there with a trouble light and really looked carefully. It only takes a bit of grease, but it needs that bit! (Older cars have no zerk there but a shot of oil is suggested.) In truth, a King Midget is much easier to grease than most cars of its era. We tend to forget that in those days, greasing was part of the normal maintenance of all cars.

Lubrication of the front struts is covered above. The rear struts on Model 3s need oil too but they bleed less and need less attention. That's good, because they're harder to oil. Some manuals say you can just lift the rear bumper, which will extend the shocks enough to expose the fill-hole. In the big yellow manual, the lube chart says to lift the bumper, while on page 16 it says it will be necessary to disconnect the "sway bar" (which is actually a Panhard strut—it's that diagonal bar that keeps the rear suspension properly located) in order to extend the struts enough to expose the holes. Give 'em the same shot as the fronts and be sure they stay shiny and black in use.

Check that the transmission is full to the add mark and if not, top it up with 30 weight engine oil.

Oil the chain while the rear is up, turning the wheel so every part of the chain is well lubricated. Oil it frequently.

Changing the oil is easy enough. Do it when the engine is still warm from driving and

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10-W-30 oil is fine for most purposes. If your car has always had non-detergent oil, high detergent stuff will shake loose a lot of gunk and you should change oil frequently until it clears up. The manuals are confusing about the amount of oil needed. Put in a quart and then check the dipstick, adding more until she's topped off to the Full mark. Don't overfill.

Doing all this is not as complex as it sounds, and the result will improve the handling and running of your King Midget. Not to modern standards, but back to the way they built 'em in Athens. ■

Note: Skip Weaver and others have suggested as much as double or triple the factory recommended toe-in, perhaps to compensate for wear. Also, the number and location of grease zerks on the steering box has been found to vary considerably. The grease doesn't actually go much of anywhere except into the box anyway, so the important thing is to get lots of it in there so plenty can find its way onto those gears. Bob V.

### I - 5 LETTERS: Steering Tune-up *Skip Weaver*

Thanks for the kind words, Dave. Two things most people overlook. The first was play at the steering arm where it attaches to the steering box. Snugging up that castle nut takes a lot of that play out. I've found a lot of transferred play in these, especially if the steering arm (on the box ) is loose. The arm needs to be 6 and 12 o'clock with wheels straight ahead. Have someone sit in car and rock the steering wheel within loose or free-play range, while you watch for where the play is. Tubes may also need adjustment, but are not always at fault. Second, toe in needs to be about 3/8's of an inch. If it is without toe in, or toes out – *at all* – this will create problems. The car did have loose tubes, which I snugged up too. Good little car, and Dave and his wife will be wonderful additions to the Club. Skip

*First I've heard of 3/8 inch toe-in, thought it was 1/8 inch. Same for Model 2 and Model 3? M. Leiner*

1/8 inch isn't enough. These front ends flex, and tend to have some looseness no matter what. It has to be 1/4 inch, minimum. Every one I've driven/owned over the last 18 years, I've set at 1/4 to 3/8". I've never had ONE with a modified front end. ALL stock. If yours shakes or wanders, bring it on down to Clermont, we can fix it. Glad to help. Skip ■

## I. Steering

## **I – 6 More on King Midget Front Ends** *Bob V.*

*Last issue I spouted off a bit on the techniques of tuning up your KM's front end. Well, I've gotta tell you, I'm not an expert in the field and my own car could use a little tweak here and there. I believe my cheap tires are out of round, but ... who knows? I wonder how many KM front ends have been replaced because people didn't know how to adjust them? Or how many steering dampers have been added? Nothing wrong with that, but it's nice to stick with the original design and it's also nice to save a buck here and there. Following is a tip from Skip Weaver:*

King Midget front ends should never be adjusted when hanging, only on the ground with a person in the car. The front end needs the steering arm on the steering box adjusted first—at 6 o'clock. Once that's snug, someone sitting in the car should move the steering wheel left to right—gently to see what other play is involved. If tie rod ends are loose, they need to be attended to. As for the struts, they need to be adjusted in their range of motion area. This requires reaching up inside the fender and snugging the nut a little at a time. The front end should not bounce like a baby buggy. Set toe-in at 1/4" and away you go! I have fixed dozens of King Midgets this way.

*Searching in my files for something else, I ran across some material that Bill Borton sent me in 1996. In about 1964, he bought a '56 from its original owner's estate. It had about 7,000 miles on its odometer and the front end was weak, so Bill wrote to the factory for help. He got a letter from Joe Stehlin and instructions for tidying up his front end. The instructions seem to have been written by Claud. That's how he always spelled "height."*

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### ADJUSTMENT FOR KING MIDGET STEERING AND FRONT END

First check tie rod end and steering drag link bolts to make sure they are snug enough to prevent play in these connections but not tight enough to cause bind. Inspect bolts and tie rod ends for wear and replace them if there is much visible wear. Be sure and lock these bolts tight by tightening the nuts on the bottom to keep them from loosening.

With front wheels exactly straight and the end nuts adjusted as above, measure across the center of the front tires at axle height in the front of tire and at back. The toe-in should be  $1/8"$ , that is the center of the tires should measure one-eighth inch closer at the front of the tires, than at the rear.

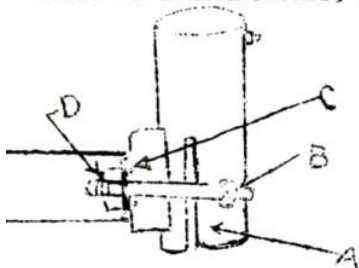
The drag link has a small bend in it. This bend should be at the top of the drag link. It is important that this bend be turned up, as this is to prevent binding when turned to extreme.

The drag link can be adjusted so that both wheels turn to the same amount of extreme turning. This will usually just about let the tires just touch the pan on either side.

Cars made in 1956 and after have adjustable shocks. These should never be pulled up tight enough to bind, but only enough so they do not have excessive play.

One older cars that may have excessive wear in the shocks from lack of oil, the new adjustments may be added. To do this we furnish a small kit at \$1.97, postpaid, consisting of the necessary shaped bolts, nuts and brackets. To install this, it is only necessary to hoist the car up so that there is room to work. Remove the top bolts in the shocks and drop the lower shocks and wheels out. A heavy, extra wide hack saw cut is made up the back of the top shock tube, 4" (four inches) from the bottom. The special bolt is welded on one side of shock tube, as shown, and the special bracket is welded on the main shock bracket. Reassemble and adjust these as above.

DO NOT LET SHOCKS RUN DRY OF OIL. IF THEY DO NOT SHOW A FILM OF DAMP OIL ON THE LOWER SHOCK TUBE, THEY ARE DRY. DO NOT TIGHTEN THE ADJUSTING NUT ON SHOCK TUBES SO THAT IT BINDS. DO NOT USE MORE PRESSURE IN FRONT TIRES THAN IS NECESSARY. WE NOW RECOMMEN EIGHT TO TWELVE POUNDS, INSTEAD OF 12 TO 14.



Rough sketch (not drawn to scale) shows how adjustments may be added to older shocks. A is wide saw cut, 4" up from bottom. B Weld special bolt to shock. C weld special bracket onto side of main shock bracket. Adjustment is made by tightening nut D to compensate for wear.

*Note that he shows toe-in at  $1/8"$ , as do other KM manuals. So is Skip wrong? Probably not. A little wear could make a big difference. Too much is probably better than too little. Let's work together on this. Tell me your front end story and suggestions for fixing. Let's figure out all the tricks that can be used to make the original front end work as well as possible. □*

## I. Steering



## **I – 7 Taming that Wandering Front End**

*Everyone who's had problems with the front end of his or her King Midget please raise your hand. Wow, I see a lot of hands out there. In the last issue, I asked for some good tech articles and you responded. Following is a whole lot more about taking care of—or restoring—your KM's front end. Long time readers will recall there have been several other articles on this subject, and there likely will be more.*

### **Steering Adjustment** *By Scott Olene*

If you're reading this then you probably have a problem with your steering. First, let's say one thing about the steering on both the Model 2 and the 3. They are both very simple. So simple that some people forget to perform simple maintenance.

Two things must be done regularly on the steering. Lubrication, and tightening the bolts. The lubrication goes for the tie rod ends, as well as the shocks.

If the tie rod ends and the shocks are dry, then you're going to work the front end harder than you should and make it wear faster. Though these systems are very simple, they are easy to damage. As for tightening the bolts, that's simple too. Preventive maintenance is the key. But what if you still have problems, or have inherited problems with a car you bought?

Let's assume that everything is lubricated fine and the bolts are tight. Start by raising the front end and putting it on jack stands, leaving the wheels dangling. Pull off the front wheels. Grab hold of the bottom of the shock struts and try to wiggle them. If you can move them more than 1/16" you need to adjust the shocks by using the adjuster on the back of the upper section. It's best to make the adjustment when the car is back on the floor.

After tightening the adjustment strap, be sure the wheels can be turned freely through their whole range. If you've already made this adjustment and still have problems, it may be your shocks are worn egg-shaped, in which case, you may need new shocks. Early M2's don't have the adjustment and are more prone to wear problems. Talk to Skip Weaver about fixing shocks that are worn beyond adjustment.

Let's move on to the tie rod ends. The Model 2 and Model 3 use different tie rod ends, but the principle is the same. If you find that the stud from the tie rod end is loose in the steering arm, then you have a problem. That stud must be tight in the steering arm because the tie rod end itself is where much of the work is done in the steering. You either have to replace the tie rod ends or fix the steering arms, or both.

The last place to check if all else fails is the steering box itself. The most common place for wear is the stud where the castle nut screws on; the pivot point for the steering. This area also lacks in the lubrication department, perhaps because there is no grease zerk, or it may be hidden behind the steering box where it's hard to find, and has not gotten proper lubrication. The simple way to repair it is to replace the cover assembly, as I did. Jim Daniel has a way of repairing it using a bushing. If you have a broken or badly worn steering gear, then I would send it to Skip Weaver to be rebuilt.

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Can you do these repairs at home? Sure. If you have a welder or know somebody that does, simply cut the steel tubing off the steering arm and the gear and find a tube that fits with no slop. Reassemble it as it came apart, making certain that you install a grease zerk so that you can keep it well lubricated.

You might need to replace the steering gear if it's worn too badly. You might check with McMaster Carr about proper replacement gears. In any case, if you replace one gear, you must replace the other.

With all this done, your steering should be much tighter—just keep it greased!  $\square$

### I – 8 LETTERS: Toe-In

**Bob:** As I look over my new acquisition carefully, it is obvious that I have a bent tie-rod, and this has thrown off the toe-in of the front wheels. I will be removing and straightening the tie-rod, but my KM Manual from 1967 doesn't show what adjustment to make to achieve proper toe-in. Do you have any front end specifications; perhaps caster/camber, and toe-in, toe-out I should be adjusting to? Thanks for your help. **Tom Clarke**

*The KM manual calls for 1/8" toe-in but some say more may be better, up to 1/4" and that may vary with wear on the system. Caster is fixed and cannot be adjusted. Camber is vitally important—though it is also “fixed.” With your car on a level floor, put a square up against each front tire. It should show a bit of positive camber—that is, “in” at the bottom. If it does not, you've got a problem. It may be easily fixed. Maybe not.*

- 1. First confirm that the inner struts are slick with oil. If not, they're low on oil and that is critical. Squirt half an oilcan full into the fill hole on the side of each strut (after which, park on a sheet of cardboard for a while, because the struts will drip on your floor if you put enough in. Do your rear struts while you're at it).*
- 2. Block the front end up with both wheels dangling. See if they're loose when you yank sideways on the bottom of the tire. If they're sloppy loose, tighten the binding strap on the upper tube until each is snug. Then loosen enough so you can turn the wheels freely through their entire range of motion.*
- 3. You should be able to do this by grabbing either wheel. If they're free and loose at the middle but snug at either end of the turn, your struts are worn egg-shaped from running too long without proper lubrication. It's a common problem and can, if you think about it, clearly cause the “fixed” camber to become “unfixed” and indeed negative, if worn too much.*
- 4. With the shocks tightened as much as possible to allow free turning (and with them well lubricated) drop the car back to the floor. Bounce the front end a bit. Now check the camber again. If it's got some, even just a little bit, you're probably OK. If those front wheels are still splayed out much though ... trouble. Contact me again and let's talk about that.*

*With the toe-in set and the camber as good as you can get it, ten pounds of air in the front tires, 20 in the rear, take a test drive. If she drives fine, heave a sigh of relief! You're*

### I. Steering

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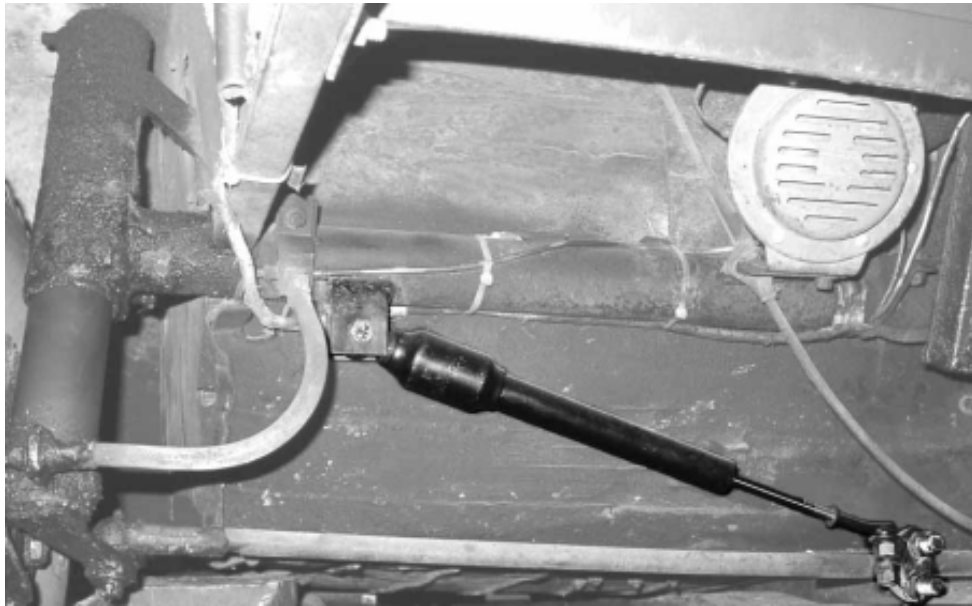
*probably OK. If not, your wheels may need balancing, your tires may be out of round or your steering box may be worn. Check all those items before getting too upset about the remaining problem. If none of that helps, or your camber remains bad, or you have problems fixing any of those things, get back to me and I'll see if I can help or put you in touch with someone more knowledgeable. It's all fixable, but it's important to put your effort on fixing the right things! KM front ends can be problematic because of lack of adjustment and inherently poor design (having the kingpin/shocks so far inboard). But they're forgiving because the front carries so little load. Still, an abused front end can be a challenge to fix. This newsletter has had several articles on the subject. Keep me posted.*

*I should have mentioned that the fill holes on the rear struts are in the inner tube and are not visible until the shock is fully stretched. Block on the frame and let the rear wheels dangle. You may even have to bounce the rear wheels a bit to get them to drop enough to expose the fill holes. □*

### I - 9 Stopping the Bounce *by Bob V.*

The steering on my '64 is just as nice as it could be, but many King Midgets are not. I've never aligned a front end before. I simply set the car on the level, set the steering wheel for straight ahead and held long boards against the wheels. I then adjusted the steering links until the two boards pointed straight ahead, then over-corrected a bit for a little dose of toe-in. And my old tires have no balance weights anywhere. We'll see what happens with the new ones.

Many owners complain about their front ends. If you've done your best at alignment and have the proper ten pounds of pressure in the front tires, it may be time for a stabilizer.



The one shown above is on Robin Cole's car, and is from a Volkswagen. They have the same problem of light front ends.

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Robin welded a bracket to the cross-tube. He reports the setup works fine. If you don't have a Volkswagen handy to strip, you can get a new VW stabilizer from J.C. Whitney for less than \$20.

**Note:** That was then. I did buy new tires, but made a serious error, buying cheapos made in China, where tires of this size are still made by hand and subject to overlapping bits of fabric and so forth that throw them out of balance and out of round. Buy Carlisle high speed tires, made in U.S.A. Bob V.

### I-10 Model 3 Front Shock Rebuild *By Scott Olene*

Over the past year I decided to do some dressing up of my Model 3. Nothing major ... or so I thought, but you know me.

I started with pinstriping, new white mud flaps, chrome wheel spinners, chrome headlight visors and a pair of the King Midget badges Lee Seats makes. I figured that was enough.



When I took it for a spin though, I was perplexed by noises coming from the rear. I consulted experts and felt stupid when a young kid home from the Navy pointed out the oil pump was shot.

New ones are not available from Wisconsin and I don't like to install used parts so ... you guessed it. Time for a new engine. I found a used lawn tractor that had a good Kohler 20 hp V-twin and got the whole tractor cheap. I was amazed at how much lighter that engine was than the Wisconsin, yet twice the hp.

The installation was easy and I could hardly wait to drive it. *Holy Cow!* I'm having to learn to drive again! So I'm done, right? Wrong.

With the quiet engine I noticed squeaks in the back, which proved to be the shocks. I decided to replace them with coil-overs. The ones I got didn't fit and a 45-minute job took three hours. And when I was done, and I took out the jacks, the car went down like

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the Titanic. The shocks were too weak. Since I'd modified them, they couldn't be returned. A \$100 learning curve.

I considered reusing the old shocks but found them bent, rusted and full of crud.

At a buddy's junk yard I found a pair of front shocks off a Yamaha, for just ten bucks. Learning curve again. With a bit of adjustment to the mounts, they work fine.

After all that I had a close look at the front shocks, which had never been right since I bought the car. I'd patched it seven years ago when I bought the car, but decided it was time to fix it right. I considered a new front end of the Pryor/ Gerhardt type but I don't like the way they raise the height of the car.

I decided to build a new set from scratch. Not a terribly easy job—but if you can weld you can do this.

Here is a list of what you need. MIG welder, DOM tubing, NOS springs from Midget Motors Supply, 1" x 1/4" flat stock, 4" angle grinder, 3" cut off wheel, cardboard and sharpie, degreaser, catch pan, bench grinder, bench vise, gloves, safety glasses, drill and drill bits, drill press, -square, digital camera, and anything else that I forgot. If you don't have the equipment, maybe you can find a friend who does. Take photographs of the whole existing setup before you begin. You'll want those for reference in putting it all back together.

Notice that I listed springs? Old ones may be compressed and weak and you can get new ones. Matt at Midget Motors Supply has a full barrel of springs from the old plant. I should also explain that DOM tubing is better than seamed tubing. Means "drawn over mandrel" and the stuff I used is thicker and harder than the material Midget Motors used originally. The crucial thing is that the inner and outer tubes of the strut fit snugly together and the inner tube slides freely inside the outer tube, without any wobble or slop.

Start by cleaning the shocks in degreaser. When they're all clean set one of the shocks vertically on the cardboard and use a Sharpie to trace the outline of the shock, its mounting and the steering arm. You want references for later installing the steering arm on the bottom of the shock. All angles on your front end are critical and you want to be sure they're exactly as built at the factory. I made new arms, but if you're careful, after separating the bottom cap from the tubing, you can reuse the original arms.

Now you start cutting apart the shock. If you bought new springs, you will not need to be to kind to the old ones. You only need the spindles. But if you're going to use the old springs, you need to be careful not to damage them.

Clamp the shock in a vise and start cutting, making sure that you put a drain pan under to catch the oil and sludge. Take a cut-off and cut off the bottom of the shock, and at the same time cut off the brake clip.

Set all pieces to one side as you continue. You might also need to use a Sawzall to remove the steering arm. Once that is done take a drill with a small bit in it and drill out the welds that hold the brake backer mounting plate in place. Don't worry about it looking good; just get it off the spindle for now, cleaning will come later. Now you're down to the spindle, tube, and spring. Use the cut-off wheel to cut off the tube. If you're not going to use the old spring, then throw it away. All you need is the spindle. But if

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you're planning to use the old spring, be careful in cutting. I cut mine right off!

Once the tube is removed, extract the spindle from the spring. Now is the time to clean everything. Your primary concern is to make sure that the spindle is clean and ground smooth, best done with the bench grinder. Remove the weld stuff from the brake backer mounting plate, making sure to grind off only the weld, leaving the original parent metal.



At this point, using the old arms for patterns, make your new ones. Be certain to pre-drill the needed holes in them before welding them in place. Many a drill bit has been destroyed drilling through heat treated metal. On 1958 and newer cars, you'll need to be able to re-cut the taper for the original tie rod ends. Seats says a plumbing pipe reamer gives the correct taper. 1957 there'd be just a 1/2" NF thread. John White says you can also do this for the tapered-end cars and substitute heim ball joint ends for the original tie rods. John suggests a good quality heim ball joint, preferably the Teflon lined ones. They require no oiling, so they don't attract dirt.

Reassemble doing the reverse of taking it apart! Start by putting the 2" DOM tubing in a vise in the drill press. Use a 3/4" drill bit to drill a hole about 3/4" up from the bottom so that you have 1/4" of steel at the bottom. Install the spindle and check for fit; it shouldn't be sloppy. If it slides through easy, that's good. You don't want to force it. Use the pattern to make sure it is plumb. If all is ok, then cap the bottom of the shock with a 2" cutout piece and weld it solid. Then insert the spring and spindle and again check the squareness and weld the spindle solid.

Now take your cardboard diagram and lay the steering arm on it and put the shock on top of that. With all the pieces lined up, tack-weld it in place. Then hard-weld the whole thing together and grind your welds smooth.

Take the brake backer mounting plate and slide it over the spindle. The spacer that is used behind the brakes also centers the mounting plate on the spindle, but do not weld the

### I. Steering

## SHOP NOTES King Midget Maintenance and Restoration

spacer in place. Once the plate is tacked in place, use a square to plumb it with the spindle. The pictures from before you took it apart will help. Once you are satisfied that it's in place, remove the spacer and weld it solid.

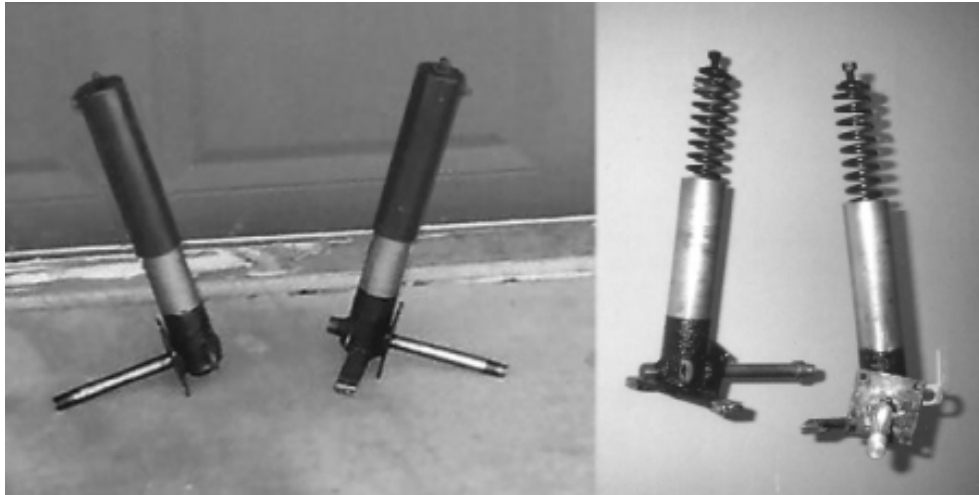
To ensure that it doesn't leak, I recommend using Herculiner truck roll-on bed liner to seal up any leaks that may remain. If you have good welds they won't need sealing. You can tell if they're leak-proof by pouring out the oil, wash it up good and then put in a little kerosene. If there's a leak it will show up as a wet spot. Clean it off and re-weld that area.

I made the inner struts and then found the outer strut (the part welded to the frame), was also worn and needed replacing. I asked John White to make those for me, which he was reluctant to do because he wasn't sure of the diameter of my DOM tubing, but I pleaded. He cut them to length, capped them and put in the hole for the oil plug. Then he took a cylinder hone to smooth the inside and make it fit snug, but not tight and sent them to me for final fit. They were perfect.

You may be able to take the shock to a local shop to insure a good fit between the two sizes of tubing. Then cap the end and put in the oil plug and the adjusting strap.

The welding part is next. Measure the old upper strut and mark the new one where it is to be welded. Use the 3" cut off wheel to cut out the old one—not a torch. Too messy and you want a good fit.

The last step is key. When welding that upper tube in place, you must weld hot enough to "burn it in" but not too hot to shrink it. If you don't weld it in hot enough, you'll be going down the road on two wheels. If you err, make it on the side of welding too hot. You can always use the hone to fine tune the fit. Remember you have very little room between the two pieces. When welding, be sure the lower tube still fits neatly into the upper, and hone until it does.



See that wasn't too bad! It's quite possible to replace the upper tubes with the body on the car but best done with the body off if you are doing a total restoration. And I do

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recommend that you install the NOS springs from MMS. One reason is, if you do hit the spring with the grinder I will guarantee that it will break, and I know that you'll not want to do this again! □

### **I. Steering**



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### *The Doctor Will See You Now* **TECHNICAL INFORMATION**

#### I - 1 1 **Lubrication** *by Old Doc Buckeye*

*(Editor's note: Old Doc Buckeye has owned King Midgets for years and, although his whereabouts is a secret, he can be reached with questions through the editor.)*

Our first letter comes from a feller in Burned Bearing, Ohio. It begins, "Dear Doc Buckeye: Does that Lubrication Chart cover all the important bearings on the King Midget?"

Well, sonny, NOPE!

Seems those Midget boys got so excited about making the car that they plumb forgot a couple of little things. First off, there're TWO bearings inside the 10" low speed pulley that have no grease fitting and are shielded on the outside but not the inside. Pack them with grease when you take the pulley off the transmission input shaft. If not, the end of the shaft gets ripped up when the bearings bind. It's a real good idea to change these bearings before they run sloppy.

Does your steering work too hard even though you lube the gear and tie rod ends? There is a bearing in the steering column that none of you smart whipper-snappers have ever seen. Seems those Midget boys used a piece of sash cord, you know, that clothesline stuff. It's all wound around the steering shaft and held in place by the crimp at the top and bottom of the tube. Shoot a little light on down that tube once in a while.

See you boys in Plain City, and remember—"If it ain't broke, check it anyway!" ▣

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### I - 12 LETTERS: Shocks and Mufflers

Bob; My membership application is in the mail so I consider myself a member pro-tem, or is that pre-tem ???

A list of Florida members would be very much appreciated. I have so many questions. I commented on the guest book register but I hope that as a member I'll have access to a chat group format. My shock absorbers are froze solid and my muffler is an amplifier!!

**David Craig**

*Lee and I tried to help. I sent a list of Florida members, suggested he join the Yahoo Group, and here's what Lee said:*

Dave,

There are a few things you can do to help. 1) Balance the tires. You can get that done at a motorcycle shop. 2) Tighten the front end as I explained yesterday. That will help greatly. If you're still having steering wander, try a VW steering damper. 3) Check the torque rods on the sides of the rear wheel cradle close to the back of the seat under the car. If these are worn they will cause the car to be a little squirrely. 4) And lastly check grease and oil all that is required in the service manual. Especially check the steering shaft behind the steering box, which most people forget to grease. **Lee**

*David got three of the shocks freed up and a mechanic was working on the fourth, and later, Skip Weaver helped him get everything ship-shape. On the muffler question, I sent David some apologetic suggestions on controlling the decibels, but that's a subject I know little about (yeah, yeah, one of many). What's the word from you experts on both "proper," as in close to stock, and "good," as in quiet and efficient mufflers? I've heard the question a lot more times than I've heard answers! □*

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### I - 13 LETTERS: Spring Spacers

**Bob**, I found out something very interesting about the KM front suspension – they are not all the same.

This is a picture of the front suspension of the parts car I got from San Diego. Notice the 1.25” spacer on top of the spring – my ’58 Electric King Midget does not have these.

The ’65 King Midget I purchased from Don Nichols also has them and rides just fine. Now what I did was install these spacers on the Electric ’58 King Midget and now the front end rides level, the springs work just fine and it steers easily and makes for a much smoother ride. The problem of the weight from the extra three batteries is now gone and I have plenty of suspension travel.



I had the machinist make me two 3” spacers that I will try some day when I have the energy to take it apart again. Sure glad it turned out to be such an easy fix. It wasn’t really bottoming out. What it did mostly was raise the upper shock tube so that it does not hit the front axle brackets

Now the front end actually sits on the front spring and can go up and down. It surprised me that it would make that much difference.

**Gert Gehlhaar**

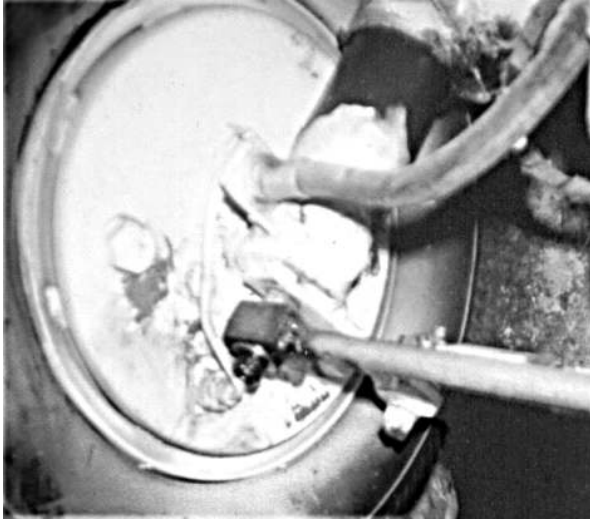
***Bob and Gert**, I had only ever run across the spacers on a 1957 car I have. Dad's '64 did not have them. My thoughts were that MM was using up left over M2 springs on*

*the 1957s. They lengthened the upper and lower tubing a bit more on the M3 cars over the M2 cars and so made up the difference with the spacer. Not sure how long they did this. The '57 car, like the M2, has the spring bolted at the top and bottom tubes. So it is removable. Later MM bent a hook on the bottom the springs and inserted the front axle through the hook to hold the spring in. I guess this did away with the tendency to leak at the bottom bolt.*

*Your spacers are different from what I've seen. The ones in the '57 are made with a washer and a piece of tubing welded to it. The washer end goes down against the spring top and MM brazed in a longer bolt in the top of the spring to pass through the spacer. Maybe the springs in that car were getting weak and someone made the spacers. Also, front springs seem to vary somewhat. I've seen some NOS leftover springs from MM where there was spacing between the coils in the upper part of the springs and no spacing between the lower coils ... not much spring action. **John White II** □*

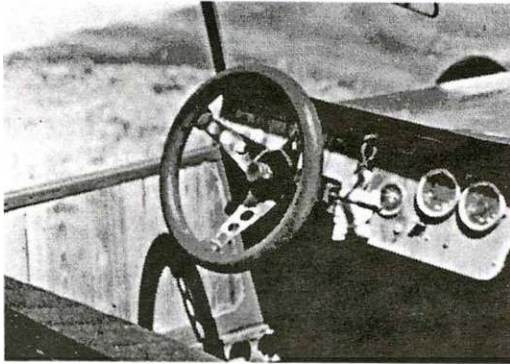
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### I - 14 Tie Bar Stabilizer *by Jim Berg*

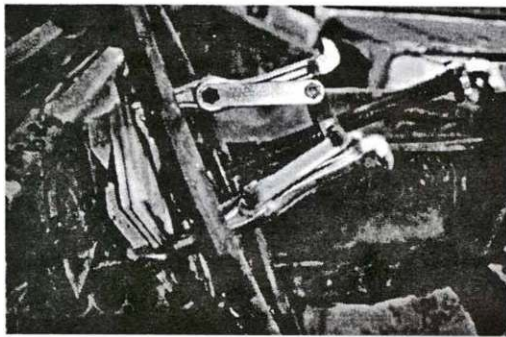


My second Type III is a 1965. I put a stabilizer bar on the front end of both cars. It helps to minimize the “shimmies” that seem to plague the stock front end. It is an adjustable length half-inch round bar that connects to the centerline of the lower suspension tubes. I drilled and tapped a 3/8”-16 hole in the center bottom of each tube. The bar keeps the tubes from spreading due to wear. ◻

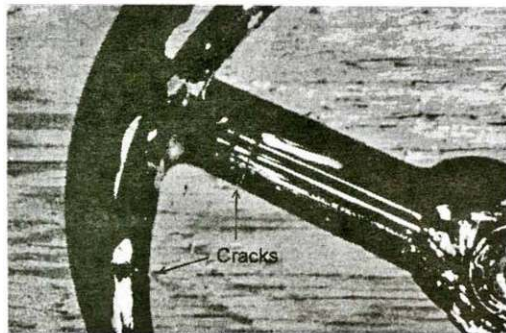
## I-15 Amateurs at the Wheel *By Harold Douse and Bob Vahsholtz*



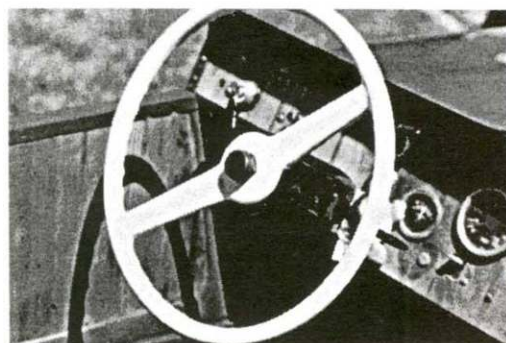
Hal's Old Steering Wheel



Attempting to Pull Bob's Wheel



Cracks in the Rubber



The Refinished Wheel Installed

As you can see from the photo at the left, the steering wheel on Harold Douse's car, a sort of J.C. Whitney racing type, is not appropriate for a nice King Midget like Harold's. Harold advertised in *King Midget News* and *King Midgets West* for a replacement. Bob Vahsholtz said if no better alternative came up, he'd sell the wheel from one of his parts cars. Neither of us was thrilled with that option, Harold because Bob's wheel was in poor condition; Bob because he'd have to extract it from the parts car.

The ads bore no fruit, so a price was agreed upon and Bob set out to remove the wheel. He suspected it would be a challenge, having tried unsuccessfully to pull the wheel on the car he restored. Newly equipped with a puller, Bob screwed together some scraps of wood intended to spare the rubber of the wheel from the puller's claws. He also surrounded the brass horn contact with washers to save it from the puller's plunger.

No luck. Liberal quantities of Liquid Wrench, WD 40 and the like, applied and soaked thoroughly, didn't get the job done either. Of course, yanking on the rim of the wheel is not advisable, as evidenced by the number of cracked King Midget steering wheels around. Tapping on the wheel and steering column with a rubber mallet to speed the flow of lubricant made no apparent impression. Finally tightening the puller broke the wooden blocks, resulting in new ones made of oak. Lying prone on the floor, legs skyward, and pounding upwards on a block of wood set against the base of the wheel didn't seem to work either. After a couple of weeks' frustration (and soaking), another attempt was finally successful and the wheel popped off and was shipped to Hal.

Via e-mail, Hal and Bob discussed various options for restoring the shabby old steering wheel. Hal found a steering wheel repair kit

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available from the Eastwood Company, Box 3014, Malvern PA 19355-0714 (800-345-1178) for \$22. Deeming that price a bit steep, he opted for a do-it-yourself approach.

First Hal washed the wheel thoroughly with hot soapy water, then used a triangular file to bevel the cracks. They were then filled with epoxy cement, mixed in very small batches. When the epoxy had set, it was trimmed with a razor blade and sanded smooth. The remaining white paint was also sanded off, along with years of accumulated nicks and scratches, using 260 grit sandpaper. The result was a smooth black steering wheel.

Lacking painting equipment, Hal was limited to finishes available in spray bombs. After considering rubberized paint, epoxy and various primers, Hal opted for keeping it simple and just fogged on white enamel paint that cost \$1.99 per can. Four of them were required to fully cover the black rubber.

As attested by the photo at the left [above], the restored wheel is a big improvement over the old one.

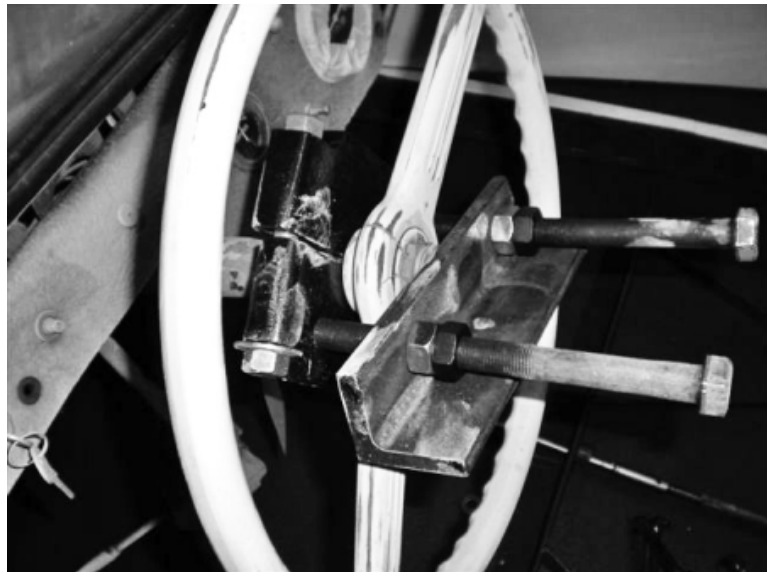
This long-distance project shows that two heads are better than one, and ingenuity can win over dollars. We share our experience hoping others will send *King Midget News* their solutions to this and other restoration problems. Let's all use these pages to learn from each other. □

## I - 16 Stuck Steering Wheels *By Bob V.*

When Ed Benson was doing his restoration, he asked how to remove his steering wheel. Your non-techy editor had attempted that challenge to no avail, so I asked Lee Seats if he had figured out a good way to pull a KM steering wheel. Here's his response:

“The way I did the few I’ve done is to first soak with solvent a while (I have found Kroil to be the best at breaking stuff loose). Put a ball joint remover “tuning fork” under the steering wheel—you will need to move the signal light switch out of the way—then hit the fork to remove the wheel.”

Ed had no problem. He said “I used a six-inch bearing separator, and a piece of angle iron. I sprayed PB Blaster on it overnight then just wrenched it off. No marks at all. Here’s a picture.” □

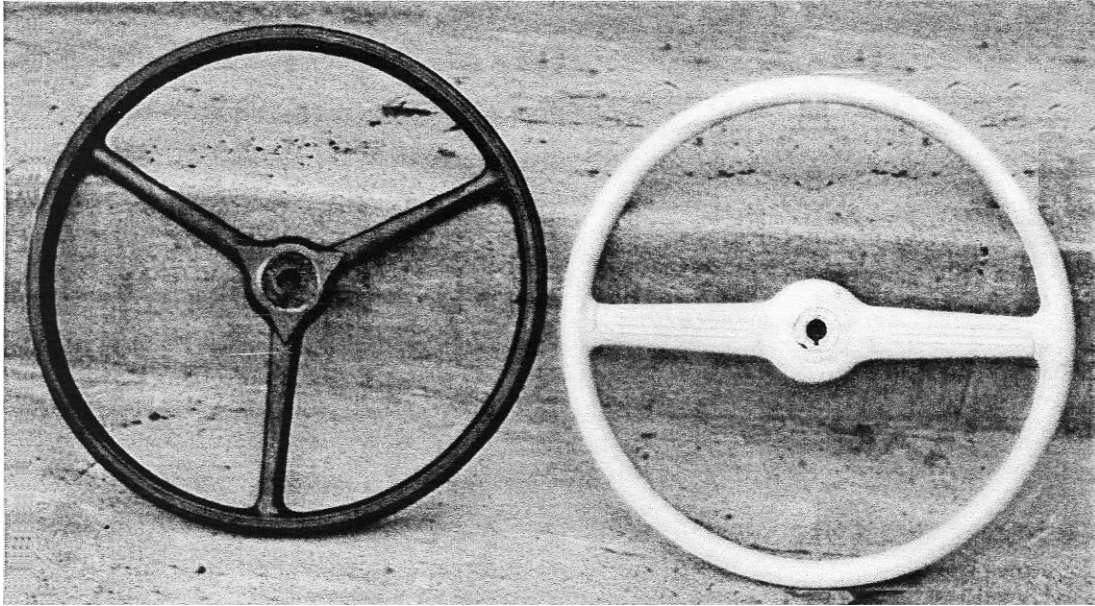


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**TECHNICAL NOTE #10** by John Weitlauf

### I - 17 Versions 2 and 3 – Steering Wheels



Three-spoke black wheel used 1951-1954; Two-spoke white (or cream) wheel used 1955-1970 ■



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### I-18 The Steering Box Challenge *More Suggestions Summarized by Bob V.*

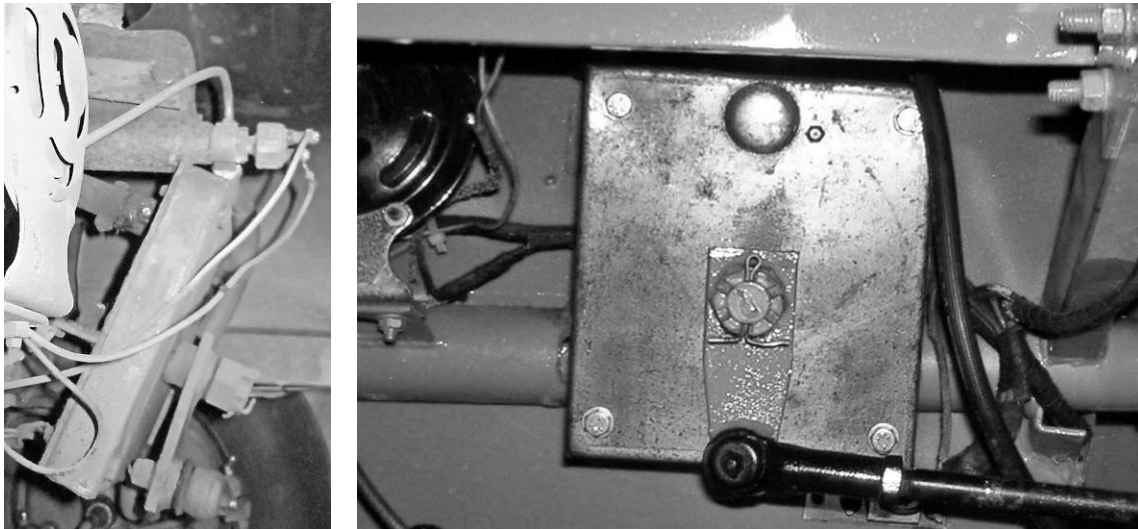
I asked both Scott and Dick about the condition of their steering boxes. Both indicated the box and gears inside seemed to be fine. Nevertheless, Scott replaced the outer part of the box.

Dick noted there had been some sort of fiber spacer (3/4" ID x 2" OD x 1/8" thick) that was completely worn out. He replaced that with a comparable piece of leather, which works great, reducing excess gear wear. John White says it was originally a piece of graphite asbestos. He has replaced them with fiberboard soaked in grease.

Both Dick and Scott agree that the front zerk is hardly adequate for proper lubrication and suggest, first, greasing everything thoroughly when you have it apart and second, pump it full of grease through the zerk until the stuff has to find its way to the wear points. That's particularly important if you've not taken it apart, as the old grease has probably long dried out.

John suggests checking carefully for extra zerks. Your M3 may have as many as three, with one or two of them buried behind the box and very hard to find. It's where the steering wheel column fits on the steering box (greases the input shaft) and another on the end of the main shaft to grease the output shaft.

The photo below right is of Scott's steering box and if you look closely, you'll see the grease zerk at the upper right, just beside that lump.



But if you check out Dick's steering box [B-9] you'll see his car has the zerk at the lower left.

Why the difference? Maybe Dick's was built about the time Claud noted you could "grease your King in your Sunday best"?

My car's steering box, pictured left, has the zerk in the same place as Scott's, but look carefully. See that second zerk nearly accessible behind the steering box? It's not mentioned in some manuals and is easily overlooked.

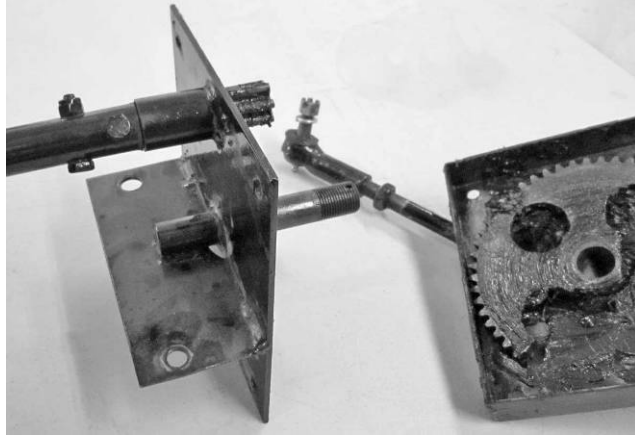
## I. Steering



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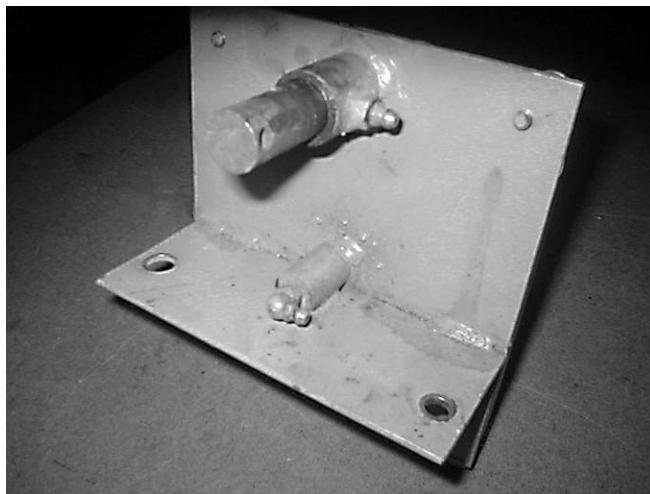
Your car's zerks may be different, but find them and grease them! John recommends turning the front wheels completely to one side and putting in a pump of grease, turn it a bit back, put in another pump etc. until you're back to the opposite stop. Then work it back and forth a few times to spread the grease over the sector gear. That's likely to get at least some grease to the critical parts.

On the M2 John says there is one zerk that greases the two gears. It is located on the backside; accessible from inside the car. There is also a small hole drilled in the collar where the input shaft comes out of the box where you're supposed to add a drop or two of oil to lubricate the input shaft.



Last spring at our Western Tech meeting, Gert Gehlhaar took apart an M3 steering box. Here's what it looks like.

The steering column attaches to the box's input shaft with those two bolts at left. The "hidden" zerk is to grease that plain bearing that the tiny steering drive gear runs in. The photo below is from John and shows the backing plate with twin zerks. If your car has both, you're lucky!



John has drilled the front end of the steering shaft up to the depth of the bearing, threading it for a zerk and drilling a side hole to enable proper greasing of that front

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bearing. But as long as the rear weld holds, the lubrication of the bottom bearing is probably not as important as the one at the top. Any slop in that bearing will cause that drive gear to ride up and greatly increase its wear, as well as that of the driven gear shown at the left and below.

Jim Daniel has had success in making new bearings to support the steering shaft and hold the gears tightly meshed.



The half gear above rides on the lower shaft, and most cars have no grease fitting for that. It also rides on plain steel where the shaft emerges from the steering box. If your steering box is loaded with grease like this one, it should stay lubricated.

Paul Gerhardt says he believes Midget Motors made those steering gears, and did not temper them. Thus they can wear badly, especially at the big half-gear's center point where most of the action happens. That will be magnified if the bearings have gotten worn, allowing a sloppy mesh of the gears.

Dick thinks it's likely that MM bought a stock "driven" gear and cut it in half, using one gear to supply two KMs. He suggests if your steering gear is badly worn, you can probably build it up with a welding bead (filed down to shape) or replace it with a common gear of that size with the same tooth spacing.

In the close-up shot of Gert's steering box, note the abundance of grease! That's good, because wherever it's located, that front zerk just puts grease inside the box. It has to find its way to the wear points.

That's why John suggests that steering exercise each time you grease. If you look closely, you'll see the half gear runs in the top of the box, getting down to the lump of grease only on tight turns.

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John White notes that a little play in a steering box is to be expected. There are just too many points where a small amount of wear can add up. Even the GM recirculating ball steering box has play, though a good rack and pinion steering setup has less. King Midgets, he points out, are not cars meant to be driven at 55-60 mph. They were built for 40.

Some have replaced their original steering box with a setup Lee Seats worked out, using a rack and pinion steering box from an MG.

Though early King Midgets had steering box problems, most have held up well if kept lubricated. Be sure that's the case with yours!

*So there are three more looks at front end problems and cures. Try 'em out. Let us know if these work for you or especially if something else works better! □*