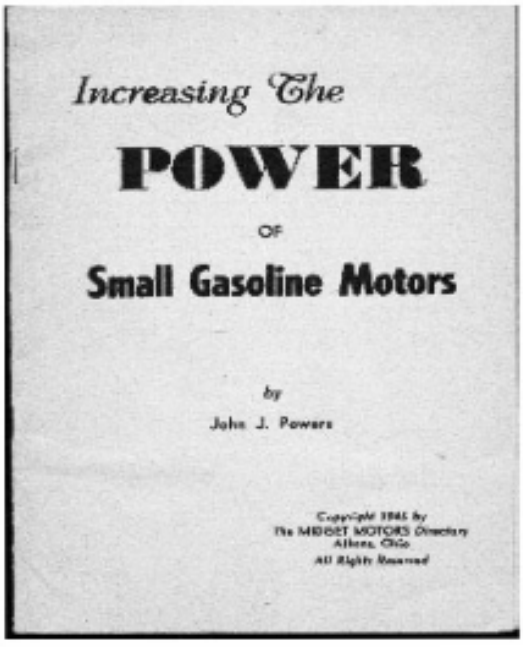
Section J Tuning

King Midgets utilize a variety of engines and each has its quirks. We've assembled four related engine sections for this manual. First, *Tuning* deals primarily with general challenges relating to original engines and cars. Next a section on *Wisconsin* engines, followed by one on the *Kohler*. Then, a section on the popular trend of *Modification;* installing modern engines and the like.

J-1 Power! *by Hal Douse*

My tech tip for this issue is better described as a kind of tech history lesson that comes from a small booklet entitled *Increasing the Power of Small Gasoline Engines*. The 1945 eleven page volume was written by John J. Powers and sold in various issues of the *Midget Motors Directory* for $1.00 ppd.



As the ad says, the booklet was written for the "older model Briggs Y FH LJ. engines of ½ to 1 ½ hp." My grandmother had one on her washing machine. Grandfather wanted to build a camp, and decided the little motor would be just the thing to power the cement

mixer and a table saw (remember this was back in the early 50's). Grandmother got a new washing machine and the little engine went on to help build several structures.

Back to our trip into tech history. I have selected a few choice paragraphs from the booklet which offers some sound and common sense advice.

"Performance doesn't always depend altogether on power," writes Mr. Powers. "There are many things that affect the performance of small engines. These things should be checked before rebuild-ing the motor. Small engines are designed to develop their full horsepower from 1500 to 3600 rpm. One mistake home builders make is gearing the vehicle so low that the motor cannot turn enough rpm's to develop maximum horsepower."

The author goes on to say that most home built scooters (and cars) are geared at a 4 to 1 ratio. This is not enough, the author states. Builders should shoot for at least a 6 to 1 gear ratio. He also offers the following formula for calculating speed:

M = Motor speed in RPM
D = Diameter of drive wheel in inches.
R = Ratio, being something like 6 to 1.

The formula is then M x D x .002975 divided by R = Speed.

The book goes on explain things we King Midget owners should be aware of to get peak performance from our cars.

"Chains, V-belts, and gears all need to line up. A V-belt out of line ¼ inch may cause up to a 75% loss in power. Worn sprockets or chains can cause up to 50% loss in power and efficiency. The life of sprockets, chains, and belts will be reduced if not properly aligned. An easy way to align pulleys is to remove the set screws so the pulleys turn freely on the shafts. Run the engine at a low speed. This will center the pulleys. Make sure belts match the grooves. Do not over-tighten chains or belts."

The author also recommends checking the timing, spark from the magneto, replace the plug, and check for good compression. Once all the above is completed you are ready to soup up the engine. Keep in mind this book was written for the Briggs & Stratton Y model, which produced from 1 to 3 hp and these hop up methods might not produce any significant results to your engine. Would I try these on my 50-year-old Wisconsin? I don't think so!

Mr. Powers suggests using a thinner head gasket to improve power and also machining the block 1/16 inch. The book also describes some modifications such as machining a larger hole in the block and fitting a larger carburetor. Then it says the resulting increase in hp after making these modifications might not be significant. The real key in the book is getting all the components of a vehicle working efficiently—then you will have a performer! □

The Doctor Will See You Now TECHNICAL INFORMATION

J-2 Tuning Basics *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 Washington, D.C. It begins: "I want to get more speed out of my King Midget but the darned thing just gets up to about 45 and won't go any faster. How do I adjust the governor?"

You Washington boys are too interested in politics. Oh, wait, you mean the *engine* governor! Well, that's easy to do because there ain't no speed control. Wisconsin and Kohler engines used by Midget Motors were ordered without governors but it didn't seem to cause engines to race apart because I met this here city-boy engineer in Athens, name of Gary Lumber, and he says that wind friction increases at the square of the speed. I guess it means that the faster you go, the more wind drag holds you back and, after a spell, all of the engine's power gets used up.

Pull off the head, clean out the carbon, do a valve job, set the timing, clean and set the carb new points and condenser, new air filter, real gas, and a new spark plug will get the speed up.

Feller across the river cleaned up his aluminum bumpers real good. He took 'em off, and used wet body sanding paper, 100 grit, then 220, 400, and 600. Sanded under a running hose and finished off with rubbing compound and wax. Pretty shiny for a backyard job!

Did you boys know that Midget Motors used roofing cement for undercoating? If it's too thick, thin it down with mineral spirits and smear it on with a cheap old paint brush. Cheap? Old? Nothin' intended!

Keep havin' those problems and let the OLD DOC help you out!

NOTE: The Editor asked Old Doc for permission to add the following paragraph:

The main factor governing the top speed of a King Midget is the number of teeth on the output shaft of the transmission. For Series 40 chain, low number of teeth (13-14) means good hill-climbing ability, but low top speed of about 35 mph; 20-21 teeth means a top speed of 50-55 mph, but slows down greatly on hills. □

Note: Wisconsin and Kohler had good reason for equipping their engines with governors. If allowed to rev unrestrained, they can fly apart. Avoid the temptation to let it all hang out on a downhill stretch! Bob V.

Mechanical Tidbits

J-3 Engine Tuning *by Alan Conley*

I have had several King Midget owners ask me about a similar problem. It seems as though their King Midget does not run as smooth and performance is not what it should be. All have tuned up their King Midget with new spark plug and ignition points and condenser. Many have even changed their coils. This seemed to have not cured the problem completely so some have gone as far as rebuilding the carburetor and readjusting it. The problem has still been that the King Midget does not run properly.

I have suggested that they try higher octane or better quality fuel. 1 have from my own experience, found that this has solved the problem in a lot of the cases. The fuel with the proper mixture of air and spark is what makes complete combustion that makes the engine perform properly and propels the car. This is one point that may be often overlooked and could be the easy remedy for **many** King Midgets. □

Mechanical Tidbits

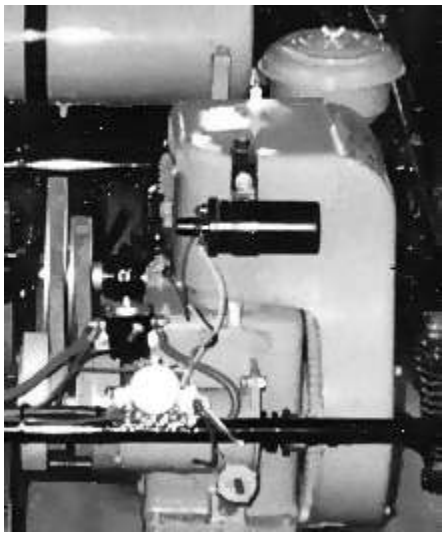
J-4 More on Tuning *by Alan Conley*

Several people are concerned about their King Midget don't have any power or seems to run real sluggish. The first thing most people do is tune up their King Midget and remove the engine cylinder head and clean the carbon from around the valves. Then they notice there car still runs okay but still no zip. Some have even checked their muffler for a restriction in the exhaust system. Now the problem is still not solved and they don't know where to look next.

I suggest a thorough brake system inspection. First push the car by hand and see if it rolls freely with no drag. Most find there is a little drag. Now you need to pull the wheels and see if cylinders are leaking. Make sure all springs are good and in place. If this all checks out good, check your brake hoses. If this leads nowhere, then check the master cylinder.

There are several things to look at on the master cylinder. First see if it is leaking or the brake pedal is sticking. (**Do not try to pull up on your brake pedal** while driving down **the road because the brake rod will come out of the plunger** and will not go back in and therefore you will **have no brakes at all.)** Then check the cap to see if the vent is open. There are several little ports in the master cylinder that should be open so it can work properly. The last two things are the most overlooked cause of a sluggish King Midget. □

J-5 Tuning Your Engine *by Paul Gerhardt*



When tuning, first check to see if the compression is OK. Remove the spark plug and install a compression gauge. Remove the small (12 gauge) yellow wire from the coil to eliminate spark. Crank the engine with the starter and with the throttle pushed to the floor, wide open. You should have a reading of 70 or more pounds. If not, write down the number you got and put about a tablespoon of oil in the cylinder through the sparkplug opening. With the spark plug out, crank the engine over to distribute the oil around the piston. Reinstall the compression gauge, hold the throttle open again and crank the engine with the starter. If the compression increases by more than 10 pounds, your rings are weak. If the oil makes no change in compression, your valves are leaking.

To install points in a Wisconsin AENLD, it is easiest to remove the distributor. Remove the other small wire from the coil going to the distributor and connect it to one side of a continuity light. Connect the other side to a ground. Turn the engine over by hand until the continuity light just starts to glow (or OHM meter needle moves if you use that approach). Mark the distributor case and mounting area so you can re-install at the same location. Then disconnect the wires from the distributor, remove the bolt holding the distributor in place and remove it from the engine. **Important:** *Do not turn the engine over while the distributor is out.*

Hold the distributor in a vise (lightly!). Remove the points and condenser. Watch for the felt washers around the screw that goes through the case. These insulate the screw from the ground. Hold the gear at the bottom of the distributor and then lightly try to turn the points cam. It is spring loaded and should move about 10 degrees and then spring back when you let go. This is the distributor's mechanical advance. If it doesn't move, then try spraying WD 40 into the distributor and try again (*do not force)*. If it still won't move, the distributor needs to be disassembled and cleaned.

When the advance works properly, spray a small amount of light oil into the distributor for lubrication. Wipe away any oil from the points plate and install new points. Make sure the washers are in place and the screw is not touching any metal. **Important:** *Points must be insulated from the distributor housing.*

Next, turn the shaft until the points are held open. Set the points with a feeler gauge to .020. Then turn the shaft until the points are closed. Then hold the points open and insert a dollar bill or business card and release the points so there is pressure on the card. Pull the card out to clean any oil off of the points' contact.

Before installing the condenser, hook up your continuity light to the screw coming through the housing from the points' other end to the distributor's case. Rotate the shaft to check that points are making and breaking contact. If the light doesn't flash, re-clean the points' contacts. If the light is on all the time, check for points, spring or a screw

touching the housing. If everything is OK, install condenser.

Turn the distributor so the points are just starting to break. Then install it in the engine with your marks lined up. *Do not turn over the engine.* Hook up your continuity light as before. Next, turn the distributor 'til the light starts to glow and then tighten the distributor clamp. Install wires and sparkplug and start the engine.

Let the engine warm up and then set the idle speed by adjusting the throttle screw to your liking. Next, the small adjusting screw (the low speed needle) on the side of the carburetor. Turn it *in* 'til the engine stumbles then turn it *out* 'til the engine smoothes out. Then, with the back of the seat removed, drive the car at full throttle down the road and turn the high speed needle in until car starts to stumble, and then turn out 'til the engine smoothes out, plus an extra 1/8 turn so engine is not running too lean.

Kohler points are controlled by the camshaft in the engine. Remove the points cover on the rear of the engine. Remove the points and install new ones. Turn the engine over until the points are open all the way and then set them with a feeler gauge to .020. Insert a card or dollar bill and rotate the engine to close the points and remove it to clean the points. Check "making and breaking" with a continuity light before installing the condenser and wire to the coil.

Start the engine to warm it up and then set the engine's idle speed with the throttle screw as noted above for the Wisconsin. Next set the idle mixture with small screw on the side of the carburetor. Drive the car to see how it runs at high speed. If you're not satisfied, you can stop and try ¼ turns each way (adjusting the screw on top) 'til it runs to your satisfaction. An alternative is to remove the deck lid and have someone set the carb while you're driving (and one of these methods might be better for your health than the one suggested above for the Wisconsin!).

If you're replacing the coil, make sure the one you buy is for the engine in your car. Not all coils will work. □

J-6 Question about Octane *by Don Balmer*

At the Jamboree in Mansfield, several of us were looking at a car with a note on the gas tank reminding the owner that he was to use only high octane gasoline. He said that he had been told that it was easier on the engine. Of the group there, no one could explain why this might be.

I recently had an opportunity to ask a retired engine designer about this. He said that he thinks the theory behind this is that high octane gasoline bums a little slower than the lower octane version. This would, in theory, mean that the pressure build-up from the burning fuel would be more gradual than with regular grade gasoline, thus less shock to the system. However, he also said that he doubted that the difference would be enough to have any practical effect.

Does anyone have the facts to back this up one way or another?

My Wisconsin AENL engine manual says, "Use only reputable, well-known brands of REGULAR gasoline. Fuels with the lowest possible lead contact, but not below octane rating 74 (Research Method), are best." □

Note: These days, regular gasoline contains ethanol, which can be hard on certain parts of these older engines. And "high octane" may be lower than "regular" used to be. Bob V.

J-7 LETTERS: Oil

Bob: Regarding Jim's question about oil for King Midgets, oil producers had to take the zinc out of the oil because of the pollutants it put into the air when burned in engines. Zinc would leave a film on parts so there was no wear at startup. This is the reason auto manufacturers started using roller lifters. Older engines need this additive to help protect flat tappets and camshafts.

Between detergent and non-detergent oils, I use detergent in everything I have. If you start out using non-detergent then you need to stay with it. Otherwise a detergent oil will start cleaning out the engine and plug up oil pumps, filters and oil passages. I like using straight 30 weight in air cooled engines. They started recommending 10w30 in lawn mowers because of less friction of oil to get better economy. Hope this can help. **Paul Gerhardt**

Thanks Paul, and so Jim, yes, that special oil with zinc is a good thing. □

J-8 Oil Controversy

Paul Gerhardt spent a lot of years handling Mobil products and knows them well. He's written the following to clear up some questions that bug us all.

There's been controversy over what weight oil to use in King Midget transmissions and struts. The [King Midget] manuals are not clear on the subject. It's actually not a big deal. Viscosity—the thickness of oil—is the question and it is measured in different ways. It happens that 30-weight *motor* oil and 90-weight *gear* oil are the same viscosity, so you can use either one in your transmission and struts. *But not in your engine!*

Motor oils differ from gear lube in having more additives. That's because engine oil must tolerate extreme pressures, pollutants from the fuel, and condensation. Also, they must release any air that gets into oil and adheres well to metal parts without washing away. Gear sets don't need all these additives.

Multi viscosity oil such as 10w30 start with a base 10-weight oil. Viscosity improvers are added to make the engine think it has a 30w in it. The base oil is a better lubricant than the additives and does not break down as fast. The break-down of additives is the main culprit causing sludge buildup. They don't carry the pollutants to the filter nor carry away the water to the oil pan for evaporation. And ultimately, the additives themselves turn to sludge. In earlier days, some manufacturers recommended non-detergent oils because they didn't have so many additives to break down.

High operating temperatures are also a factor. Because air-cooled engines run hotter, non-detergent oil was often recommended. If your engine has been running on non-detergent oil, you shouldn't change to detergent. It would start cleaning up the engine and gum up everything. The additives are so much better now you can hardly find non-detergent oil.

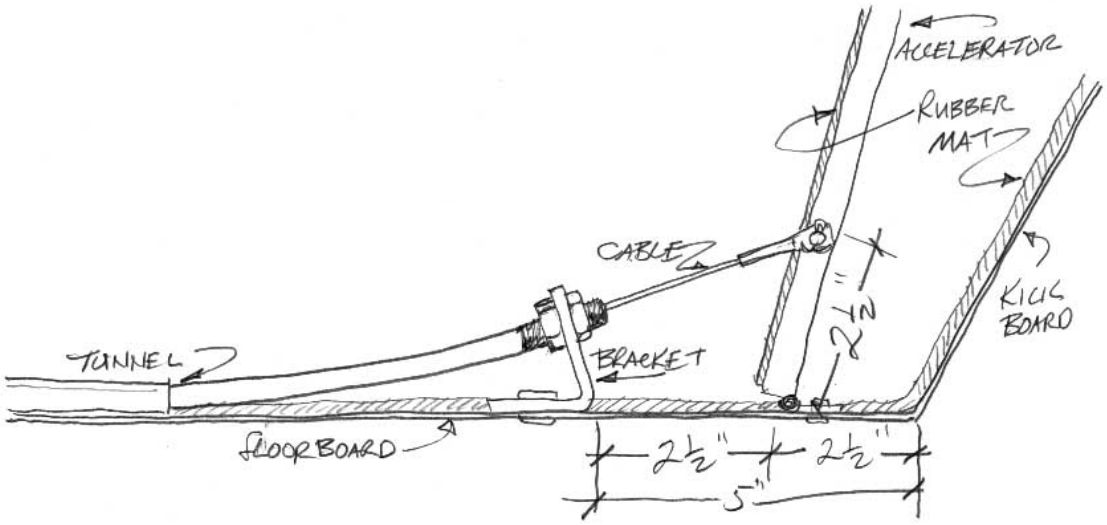
Paul sent along a Mobil book that goes into more detail on such matters, but he's covered the basic points. In preparing this article for print, a question arose. What if you just bought your King Midget and don't know what kind of oil is in it? What if you can't find non-detergent oil?

The book Paul sent has an 800 number for tech support, so we called and spoke to Bruce. He said it's reasonably safe to go ahead and use modern high detergent oil in your King, but it will indeed clean a lot of gunk out of your engine, if it has previously used non-detergent. Prodded further, he agreed it would be a good idea to first run the engine until it's good and warm before the first oil change, to loosen up as much of the gunk as possible. And it would also be good to change the oil frequently for a while to flush the gunk out as it breaks loose. □

J-9 Accelerator *by Bob V.*

My KM has the wrong cable so it flops. It works, but the pedal has no tension, how do you fix?

My accelerator cable was the same way. I fixed mine by releasing both ends of the cable, squirting WD40 into both ends and yanking the cable back and forth, while applying more solvent until it was well lubricated. It's worked fine since. Check to make sure there are no kinks in the cable first. I believe the spring on the engine is intended to retract the accelerator, and you might need to replace that spring or put on a stronger one.



Above is a diagram showing the proper accelerator front setup for a Model 3. □

J-10 The King Midget and the State Emissions Test *By Jon Dean*

Up until a few years ago, the State of Virginia went back only 20 years testing cars for emissions, and then they only tested the emissions by sampling the exhaust. Now, they have switched to the treadmill test that measures the emission in grams per mile, and, for some reason, they have decided to test all cars going back to the year 1969. Well, guess who has a 1969 King Midget!

This story started with the problem that the emissions computer did not know what a King Midget was. After calling the emissions control testing center in Richmond, VA, the inspector soon found out that the system would allow him to enter the car into the system manually. It was further decided that, since the King Midget had only one drive wheel, and didn't have any way of driving both drums on the treadmill-testing machine, just a low- and high-engine speed sample of the exhaust would be tested. It took call #2 to Richmond to make that decision.

Call #3 to Richmond came when the computer asked how many cylinders the car had. When the inspector entered that it had only one cylinder, the computer said that it was exempt from having to take the test. But Richmond said that NO car was exempt. They didn't even know that that was in the program.

It seems that they got the testing program from some other state and that it was news to them about the one-cylinder exempt thing. The lowest number of cylinders the program would test was three. So, Richmond said to tell the computer that the engine has three cylinders. This was fine and dandy until we realized that by telling the computer that the engine was a 3-cylinder, it divided the spark impulses by 3. This made it impossible to reach the high RPM level that was needed for the high-engine speed test, without blowing up the engine. Call #4 to Richmond: Now, what do we do? Richmond said to tell the computer to just give it the low-engine speed test.

I passed with a small adjustment to the idle adjusting screw on the carburetor. The test that normally takes about 20 minutes took the King Midget an hour and a half, but everyone in the Richmond testing headquarters now knows what a King Midget is!

This year, when it was time to renew my plates on the car, I was so disappointed when my registration stated that my King Midget was exempt from having to take the emissions test. I think I'll call Richmond about it. □

J-11 Preparing for Efficiency *By Bob V.*

The phone rang today while I was out in the barn, and it was the California Highway Patrol. Uh-oh.

Turns out he just wanted to be sure that those of us making the economy run in Lompoc understood the rule for slow-moving vehicles. I'd told the Lompoc Police and the CHP that we'd be driving these funny little cars about 30 mph. The officer wanted to know why so slow?

I explained we wanted to maximize gas mileage in hopes of beating a Prius. He deemed that an unfair test, until I pointed out that the Prius had run the same course at the same speed, establishing the benchmark of about 75 mpg that we hoped to beat. I pointed out that our cars are smaller, but they're 50 years old.

"Oh well, then, that's a fair test! Just be sure that if five or more of you are running together at those speeds and someone comes up behind, to pull over to let them pass. Good luck with your run, and have fun!"

Most people want to be helpful.

Let's see if we can think of some ways to crank out the maximum mileage from King Midgets.

First of all, be sure your engine is purring like a kitten (see Paul Gerhardt's tuning article in the previous issue of this newsletter). Personally, I'm not going to mess with mine for two reasons. First, it runs like a clock and has ever since I got it, with nary the first wrench applied to the engine. I'd probably mess it up. Second, I have to get this newsletter out, and my barn-time is very limited.

But last week when I was hauling the grandkids around, I noticed a bit of disharmony up front. Having gone to some trouble to get everything properly aligned (see KMM #34, Fall 2006), I wondered what might be wrong.

The other day I jacked up the front end and found I'd done a poor job of balancing the right front wheel.

Here's how I balance KM wheels. If you've got a better way, let me know.

First, be sure the wheel is spinning free and easy (more on that later—the offending wheel was fine). When I balanced it two years ago, I stopped by my favorite tire shop and asked the proprietor for a handful of his discarded weights (they always use new ones when rebalancing). I got a variety of sizes and weights.

They can be pounded on just as with any other wheel, but the larger ones have to be hammered into a tighter radius to fit these small wheels.

I was surprised to find I ran out of weights before getting that right-front perfectly balanced. It has two large weights on one side, and it seems that's not quite enough. I thought, "close enough!" considering how much weight I'd clamped on there. Wrong.

For one thing, small wheels require more weights. For another thing, I have Wal-Mart trailer tires on my car, and some Chinese worker had a bad day. That tire is not only out of balance, it's badly out of round, as evidenced by sighting across the leading edge as it

spins.

I have no answer for the out-of-round except to buy better tires, or sand off some rubber. No time for either. And no more weights in my shop. So I found a chunk of lead weighing at least an ounce, chiseled off a piece roughly to shape, and spot glued it in place with hot-melt glue. Then spun the wheel. Perfect! Good guess! I applied more hot melt around the leading and trailing edge and hope that will hold OK for the upcoming economy run or until I can remember to stop by and pick up some more weights.

Next I turned my attention to the left front wheel and was surprised to find it does not turn freely, nor is there any setting of the two brake adjusters that will free it up.

I'd been through this before a few years ago, and decided to fix the problem once and for all. Assuming the brake drums had warped from heat, I had them turned. This was no small trick, as not all brake shops are equipped to handle these small, odd brake drums. Find a brake shop specializing in handling whatever comes along. The cost was modest, and the improvement was substantial.

I'd advise against getting yours done though. Two reasons. KM drums are made of mild steel that is both thin and lacking in precision. That's why you have to use old-style brake linings made for Model A Fords and the like. Modern hard linings will ruin your drums.

My car has its original linings and they're in good shape, but those dumb drums have warped again! Because they're so thin, KM brakes can only be turned once, and even that makes them more prone to warpage than when new.

So after running those turned-drums on my car for just a couple of hundred miles, they're little better than before I had them turned.

My "fix" was to take a very delicate touch to both brake adjustment nuts and carefully set them as loose as possible. When the shoes hit the drums, they cost you gas mileage and heat the drums, which is a vicious spiral leading to more warpage. If anybody has a cure for this, short of non-stock brakes (that's what Carl Callaway suggested last time I asked!), I'd like to hear it and share it.

Another thing to check is your chain. Of course you want to be sure it's nicely oiled, but any time you tinker with adjusting the chain (such as when changing sprocket size), be sure to spin your rear wheel through several turns. You'll probably notice your chain is looser at some points and tighter at others. That's because that big sprocket on the wheel is often a bit off center (which doesn't help with balancing of that wheel either!). You want to be sure the chain does not become too tight at any point in its parade around that sprocket.

Finally, if you're going to participate in either economy run, and have any spare drive sprockets, bring 'em along! Given a relatively flat course like Lompoc, mileage should be best using the largest sprocket you have on the transmission's output shaft. Phil says the course at Coshocton has one hill that might give your car a bit of a challenge. There, a bit smaller sprocket might let your engine run easier and more efficiently. I really don't know, and that's the sort of thing I hope we can find out with a bit of experimenting.

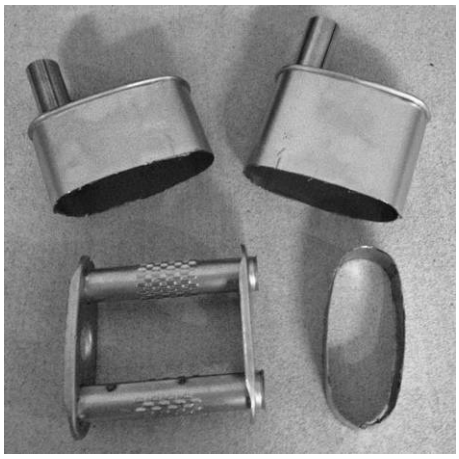
My guess is we'll get our best mileage by gently bringing our cars up to the shift point, and when she shifts into high, hold your speed just above the point at which it won't try

to "hunt" for low.

That slow speed will minimize wind resistance, which is the biggest force you'll encounter on a level course.

Drive like you had an egg under your foot! We want to show what these neat little ol' cars can do! ◻

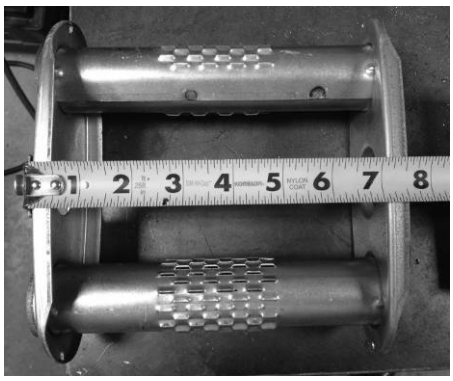
J-12 "Ernest's" New Exhaust" *By Bob Olbers*



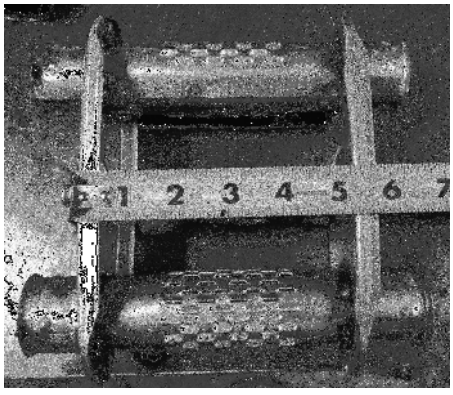
WHEN I INSTALLED THE KOHLER K-341 in my KM a few years ago, the exhaust system was a challenge. Because I didn't want to cut up the original muffler, I ended up with a somewhat oversized muffler, flex pipe, and adapters which did the job, but were a bit of an embarrassment when the engine was on display.

Over the years, I've acquired some welding skills and equipment. This past summer, I finally decided to make a proper custom exhaust for the car.

I wanted something close to the original Midget Motors "oval-style" muffler. I couldn't find an off-the-shelf muffler short enough (about 10" or less) to fit in the allocated space in the engine cradle, so I took the "hot rodder" approach and sectioned a universal-style muffler.



I first established cut lines using 2" wide masking tape and a Sharpie. I carefully cut through the skin of the muffler along these lines with a cutoff wheel. The muffler was largely pressed together with minimal welded joints, so once the body is opened up, it was relatively easy to pry it apart and separate all the pieces. I broke it down into the two ends and internal baffle structure.



The baffle structure had a pair of perforated pipes lightly crimped into two baffles. I used a large socket and a hammer to force the baffles down the pipes past the crimps. Then I removed an inch from each end of both pipes (four cuts total), keeping everything symmetrical. I tack-welded the baffles to the shortened pipes, making sure to carefully align everything to eliminate twist in the assembly. This was important because the welded structure had no "give" and any twist would have been locked in, affecting the fitment of the sectioned muffler.

I next cut a 1" wide strip from the scrap muffler body material to act as a doubler and alignment aid. After carefully tapping the baffle assembly down into its seated location in

one of the muffler ends, I began fitting the doubler to the muffler body. Inserting it about halfway widthwise into the body, I used just about every Vise-Grip in my arsenal to form the strip to the body contour and tack-welded it in place. I cut some ¼"-deep slots every inch or so into the open side of the strip and formed small "ramps" by slightly bending the material between the slots towards the interior of the muffler. I then seated the other half of the muffler body with a deadblow mallet; the ramps forced the two halves of the body into alignment as I did so.

I completed the assembly by MIG welding the seam together with numerous passes of "spot welds" to avoid distortion or burn-through.

Finally, I ground the seam down both for appearance's sake as well as to help find any small voids that needed

touch-up. I spent extra time grinding the seam flush on the top side of the muffler. I didn't grind the bottom side all the way flush since it normally isn't seen.

The result of these efforts was a 4" x 10" x 10" muffler which fits snugly but nicely into the left-hand side of the engine cradle.

For pipes I divided the system into two bolt-together sections to facilitate assembly on the car. The upper section consists of a downpipe connected to the engine. The lower section includes the muffler and tailpipe. I used an assortment of mandrel-bent 1-3/4" tube sections from Summit Racing for the pipes. To simplify fitment, all joints between pipes are 90 degree vertical or horizontal elbow joints; each pipe was rotated as needed to mate with the next.

My K-341 had provisions for a flange-mount exhaust. I measured the dimensions and found that the flange required 5/16 bolt holes spaced 2-1/4" on center. This is not a standard flange, but I eventually found a VW supplier advertising flanges with the desired dimensions. The bolt holes turned out actually to be 58mm on center (a little more than 1/32" too far apart), but some quick filing on the inside shoulders got them to fit just fine. I used another pair of the VW flanges to connect the upper and lower exhaust sections together. No filing was required on these flanges. I welded 5/16-18 nuts to the lower flange to ease assembly. The flanges didn't leave a lot of room for bolt heads, so I used cross-drilled socket head bolts (5/16-18 x 3/4) for the engine and 5/16-18 x 1 for the muffler flange) with safety wires to eliminate the need

for lockwashers. I cut my own exhaust gaskets from sheet material with a homemade wooden fixture, 1-3/4" bi-metal hole saw, 5/16 drill, and snips.

I cut and welded short sections from a scrap exhaust adapter that perfectly fit inside the 1-3/4" tubing and flanges. This allowed me to join the flanges to the pipes with a lap-type joint for additional reliability.

Even with the shortened muffler, the inlet side is close to the rail of the engine cradle. I used the tightest radius mandrel bend here and heavily trimmed and relieved the muffler inlet to fit the pipe as closely to the muffler as possible.

The muffler mounts to the engine cradle using the original mounting points. An exhaust clamp secures the inlet-side pipe to the same engine-cradle flange that the original setup used. I welded a short "dummy" pipe section to the outlet end of the muffler to allow me to clamp to the original flange there. I cut the end of the tailpipe at an angle, making sure that it clears the Panhard bar of the rear suspension.

Finishing Touches:

After finish-welding and grinding all the joints, I had the entire system ceramic coated by Jet-Hot in North Carolina. The end result is quite presentable and works well. It was well worth the effort.

Here's the result and a list of materials for the exhaust:

Part	MFG	P/N
Muffler	Walker	18136
Mandrel bend	Hedman Hedders	12075
Mandrel bend	Hedman Hedders	12012
Mandrel bend	Hooker Headers	12551HKR

Gasket material	Mr. Gasket	5960
Flange	Pacific Customs	ac750735-175

Note that Hedman Hedders is in fact spelled that way :) □

J-13 Dead Speedometer? *By Bob V.*

Well, it could be worse. Most M2s and all M1s had no speedometer at all!

You can get a nice little digital speedometer that counts the turns of a wheel and tells you exactly how fast you're going, but where's the fun in that? With a functioning M3 speedometer, you can take your friends for a ride and show them what 50 or 55 miles per hour feels like in a tiny car. You'll blow their socks off!

You don't have to tell them you're actually going more like 45 mph. They'll find the speedometer quite easy to believe! The smaller the car, the quicker it feels at any given speed. Doesn't Murphy or someone have a law about that?

Back in the days of Midget Motors, speedometer error of ten percent was the norm. Midget Motors merely translated that as 10 miles per hour, and after your first ride, it's hard to believe that speedometer isn't bang-on accurate.

So … best fix your M3 speedometer. When I restored mine 20 years ago, the fix was quite easy. I just got some speedometer lubricant and squirted it into the speedometer cable and was back in business! A couple of years ago after installing new front tires, the ride was smooth but the speedometer had quit. Duh. I'd put the speedometer's drive spring in backward! If you remove the grease cap on the left front wheel, you'll see it's quite different from the others. The retainer nut is held in place by a set screw instead of being a castle nut and cotter pin like the others. That stub axle is hollow and the speedometer cable runs through the middle of it. There's a hole in the end of that cable, and the straight end of a funny looking "G" shaped spring goes through the hole in the cable.

When you put the dust cap back on, you tuck the circular part of the spring inside. When the car goes forward, the spring tries to expand, can't, and drives the speedometer. In reverse, the spring easily contracts so it's not trying to run your speedometer backwards. Simple, and neat. But don't install the spring backward! If you're a bit dyslexic like me, it's an easy mistake to make.

Maybe that's how I broke my speedometer spring.

Midget Motors Supply has new ones, and they're just five bucks. The new ones are stiff and hard to convince they want be inside that dust cap, but you can do it. I found the best way is to coil the spring inside the dust cap and then use needle-nose pliers to pull the straight part out and through the speedometer cable, and then bang the dust cap into place using a deadblow or rubber hammer. □

J. Tuning