"Drive line" refers to the King Midget's reverse transmission and the chain drive to the rear wheel.

Section G Drive Line

G-1 Tech Stuff from Paul Gerhardt

Paul knows King Midgets. Like the other real tech experts we have around, he's a busy man, so it's great to tap his expertise at Jams.

While lots of folks were off shopping for Longaberger baskets and the like, Paul gathered the die-hard KM fans in the parking lot and talked about the challenges of KM maintenance.

When recruiting members, we tend to tell aspiring fans how easy it is to restore and maintain King Midgets, what with nearly all parts being available and all that. Truth is, some little details can be very tricky. Here are some tips from Paul:

1. Midget Motors tended to use the same bearing for multiple uses, for example, using the same ones in the transmission as used in the wheels.
2. When replacing bearings in the reverse transmission, there are three cap screws that hold the left bearing in place. All should be equally tight against the race.
3. That bearing race should be a comfortable fit. Better too sloppy than too tight.
4. When installing the chain inside the case, be sure it doesn't rub against the case—shim if necessary.
5. There's a grease zerk on the transmission shaft. Don't worry; you can't over-grease it as some have suggested.
6. You tell the high-speed clutch from the low-speed because the high-speed is the one that has the pulley on it.
7. In taking your clutches apart, take great care with the rubber inserts. Replacements are not available.
8. If your drive chain rubs on your drive tire, it's probably because early KMs had 550:8 tires, which are no longer available. 570:8's may be a bit too wide.
9. The instructions for wheel alignment call for 1/8 inch toe-in. That adjustment should be made with the driver at the wheel, because weight changes the toe-in.
10. Lubricate the clicker-clutch once per year to preserve its life.
11. Be sure the high-speed belt is tight, as it's the one that does the main driving.
12. When lining clutches or brakes, use old-style "soft" linings and bake the adhesive at 400 degrees for an hour. □

Note: Just how to lube that clicker clutch without taking it apart has

never been made clear. Bob V.

Alan Conley points to the grease zerk on the transmission shaft. It should be moved to the left end. Works better and keeps grease out of the transmission.

G-2 Jamboree Workshops

There have been workshops at Jamborees before, but none as useful as this years. I'll take that back. Ralph Nodwell announced the availability of a complete wiring harness for a Model 3 from Saint Wire and Cable (888/994-9913) that could be very useful for anyone whose KM wiring is ruined.

Alan Conley is a little shy, so he teamed up with Dave Stults and the two of them did a super job of presenting tips on Midget maintenance and repair. Some highlights:

- Don't use 10w30 oil. Multiple viscosity oils have 20% additives and break down under the heat of air-cooled engines.
- Do use Stabil (or equal) in your gas if you store your car for long periods.
- When re-assembling your clutches, the low speed clutch goes in *opposite* the high speed. Counter-intuitive, but important for smooth operation.
- A bad bearing may cause roughness in low.
- Hard shifting may be due to a weak spring on the ball clicker.
- Don't use a puller to remove the driven high speed pulley. Use penetrating oil through the set screw hole and tap. If all else fails, apply some heat, carefully.
- If your car jumps out of gear, it may be full of sludge from the grease zerk. Try 30 weight oil instead of 90 as the manual says. □

G-3 Transmission Leak *Alan Conley*

Your transmission is leaking oil onto the garage floor. Kitty litter keeps the oil soaked up pretty well, but, the mess is sure annoying. *King Midget News,* Vol. 2, Issue I talked about leakage around the bearing retaining nut. But, another reason may be that over the years the gaskets have shrunk. The 1/4" bolts holding the aluminum transmission housing tight may have loosened, as a result. Tighten these bolts and some leakage may be stopped, or at the least, avoided in the future. □

Mechanic's Note *Alan Conley*

G-4 Transmission Output Shaft Leaks Oil

You may observe an oily spot on the floor of your garage beneath the transmission. The oil you've put in is leaking out very slowly. What now, is the output shaft seal bad? Likely not, but maybe.

The leak is probably around the threads of the bearing retaining nut that you can see locked in place with a cotter pin. No sealant was used around these threads, so oil finds a way out.

Fortunately, a fairly simple solution is available for this problem, too. After draining all the oil out of the transmission and removing both chain and the sprocket from the output shaft, remove the cotter pin. Don't bother the output shaft seal, but let it come out as you screw the bearing retaining nut out of the transmission. A small punch may be helpful in rotating the retaining nut.

Put some silicone, like type seven silicone, on the threads of the retaining nut and reinstall it to its previous position against the bearing race and replace the cotter pin. Reinstall the output sprocket and the chain and fill the transmission again with 30W detergent oil.

You'll be back on the road again and will have avoided the need for a complete transmission teardown. □

G-5 Transmission Jumps Out of Gear

The transmission keeps jumping out of gear, or you have to hold the shift lever down while moving, to keep the transmission in gear. Very Annoying! Let's try a simple solution before taking the transmission all apart. First, check the transmission oil fill plug to see whether the oil level is at or above the bottom of the plug hole. If there is no oil, get a small pan to put under the transmission and remove the drain plug. Maybe a small amount of oil will come out.

Get out your handy oil squirt can with a spout small enough to fit into the fill plug hole and fill the squirt can with a quality 30W detergent oil. With the drain plug reinstalled, fill the transmission from your squirt can until the oil begins running out the fill hole, making it obvious that the oil level is just above the bottom of the fill hole. Replace the fill plug and go drive your car.

You still have to hold the shift lever down to keep the transmission in gear. Your first response is that your efforts were wasted, but don't go home yet. Drive it a couple more miles and observe that the transmission begins to stay in gear all by itself.

What have you accomplished? Initially, the detent ball and spring that were supposed to hold the shift assembly in forward, neutral, or reverse became gummed up and stuck so that they couldn't work because of the low transmission oil level. The new oil washed away the gum and freed the ball and spring so they could function properly and hold the transmission in the forward, or other position when you put it there. □

The following articles were first published in King Midget Motoring*, Fall 2005 and Winter 2006. They're reprinted and updated for the majority of you who may not have a copy. As always, your comments and tips for dealing with this tricky procedure are welcome.*

G-6 Rebuilding Your '56 to '69 Transmission *By John White II; updated by Bob, John and Randy Chesnutt*

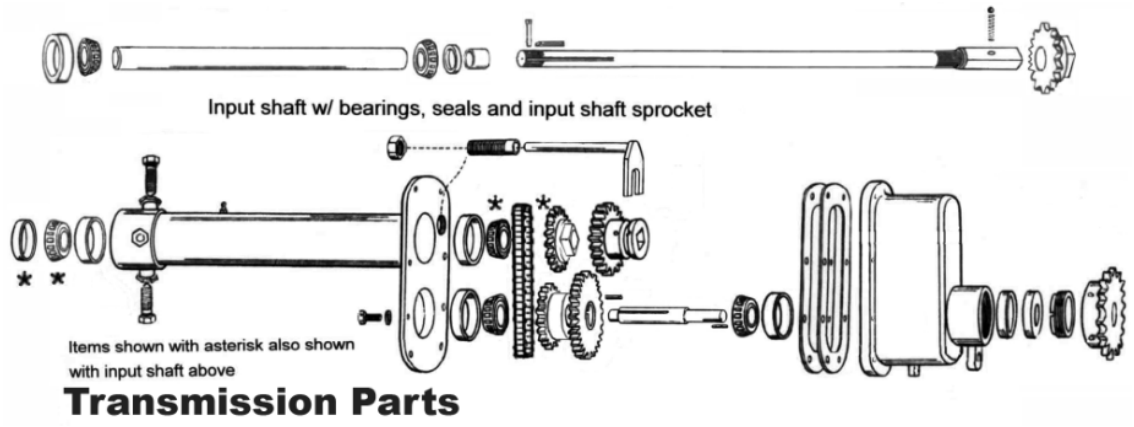
The King Midget reverse transmission is a sturdy design but can be damaged by abuse, or even by careful use by those who don't know the details or don't have their KM tuned correctly.

New owners generally do not understand that these cars can and should be left parked in forward or reverse, but not in neutral. If your idle is set properly, the car will not "creep" even at a fairly fast idle, and the gears are approximately synchronized between forward and reverse, as long as you avoid spinning the transmission in neutral. Accelerating the engine in neutral throws the gears out of mesh and results in a difficult "grind me a pound" shift. If you find yourself in neutral with the gears wanting to clash, don't let them! Turn off the ignition and hold tension on the shift lever. If it doesn't pop into gear, blip the accelerator while holding that tension and it will go right in.

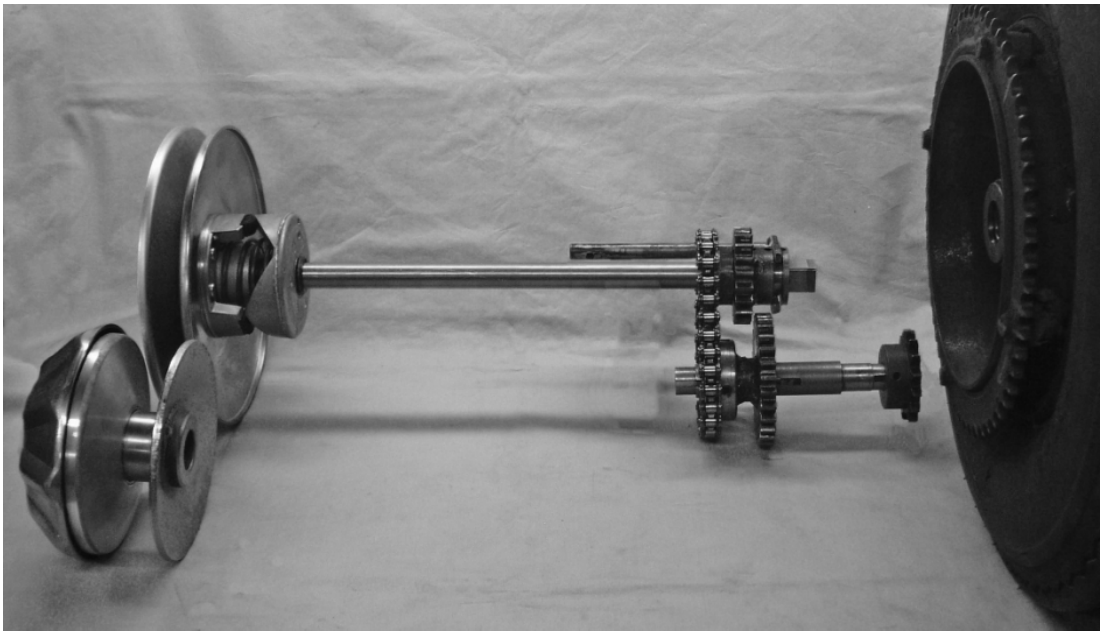
Further, when the main transmission shaft spins in neutral, it runs on a bronze bearing. If that bronze bearing is worn, you have a problem.

If your car is jumping out of gear, two crucial parts inside are probably worn or damaged. We'll try to tell you what's involved in fixing it, but unless you're handy with tools, you might prefer to leave the job to someone who has done them before.

This section focuses on the newer versions. Page 13 adds a note on older M 2s.



The drawing above shows tranny parts and the photo below shows parts, from a car with a Comet



Tools Needed:

Wrench to fit input shaft nut
A set of basic combination wrenches
Hex key set (Allen wrenches)
Ball peen hammer
Bench vise
Needle nose pliers
Metal punch
PB Blaster, WD40 or other rust buster
Permatex #2 or other gasket sealer
Block of hardwood
Soft faced or rawhide hammer
Small two or three jaw puller
A helper can be handy for some steps

First remove the drain plug (if your transmission is so equipped—not all have one) and catch the oil. Next loosen the belt tensioner and remove the drive belts. Loosen the jam nuts on the chain tightener, and remove the chain from the output sprocket. While there, also remove one end of the chain tightener from either the transmission ear or the wheel cradle ear—the one from the wheel cradle is usually easier. Next unhook the gearshift link to the transmission shift arm. Remove both U bolts that hold the transmission to the wheel cradle mounting. Lift transmission out. If your transmission has no drain plug, you can now remove the fill plug, turn it on its side to drain out the old lubricant.

It's best to mount the transmission in a vise while doing most of my work on it. Start by removing the cotter pin and nut retaining the pulleys to the input shaft. After the nut is off, remove the 10" pulley from the shaft. If your transmission is equipped with the "clicker clutch," be careful not to lose the tapered spring and ball out of the 6" pulley.

Next tackle the 6" pulley. It is mounted to the shaft with a taper lock, key and a set screw. Remove the set screw, spray some rust-buster in the hole and allow to soak in. Don't hammer on the outer part of the pulley as it is easily bent. Make sure the shaft ahead of the pulley is clean and free of corrosion. Try bumping the pulley with the hammer; if it doesn't want to move, some heat to the center of the pulley might help. If you have, or can borrow, a hydraulic press, press it off. Support the 6" pulley behind and screw a ¾" fine-thread nut onto the shaft to keep from damaging the threaded end. Press the transmission and shaft down through the pulley. With the pulley off, remove the key from the keyway. Remove the spacer through the seal and pry out the input shaft seal.

On the output end, first remove the output shaft sprocket. The sprocket is held on the shaft by four set screws—two in each hole. They'll probably be tight, held in place by Loctite. Remove the upper set screws and loosen the lower two to remove the sprocket. I have had to cut the sprockets off before because the set screws would not budge. I use an air cut-off tool making a cut through the sprocket being careful not to cut the shaft. Then make another cut the other way across to the first cut. You might try heat, but be careful next to the aluminum housing.

With the sprocket off, remove the cast housing by taking out the bolts that retain the aluminum housing to the steel housing. The housing should slip off pretty easily. Some newspaper or cardboard under the transmission will catch the grease that oozes out.

With the aluminum housing out of the way, the transmission internals are exposed. Remove the reverse slider gear and shift fork from the square on the input shaft. Be careful when removing the gear not to lose the detent ball and spring underneath it. Best to wrap an old rag around the gear and shaft to help catch it. Then remove the chain from the sprockets. It might be endless or have a master link. On transmissions with the master link, remove the clip from that link and take out the link and the chain. On those with an endless chain and tapered roller bearings, the output shaft can usually be tilted enough to remove the chain. Remove the output shaft.

The three socket-head set screws and jam nuts should be removed before driving the input shaft back through the transmission. This prevents putting the pressing force against the tapered points of the screws. To drive the input shaft out without damaging its threads, place a ¾" fine thread nut on the threaded end of the shaft and use a block of wood and a ball-peen hammer or a soft faced hammer to pound on the end of the shaft. Once the outer bearing has been forced down the shaft to the threaded part, it can usually be slipped on and off the shaft fairly easily.

With the input bearing off the input shaft it can now be removed from the back of the housing. Remove the piece of steel tubing from the shaft. Now you can drive the other bearing, thrust washer and sprocket off the input shaft. The bearings usually fit very tight to the shaft. If you know someone with a lathe, this job can be made easier by having them turn off a few thousandths between where the bearings run on the input shaft. This slight undercut saves you having to drive the inner bearing clear up the input shaft. If not, try a puller or cut it off, ruining the bearing. By holding the square end of the sprocket in the vise lightly, you can drive the input shaft down through the inner bearing, thrust washer, and sprocket. Be sure a nut is on the threaded end of the shaft. You might also use a hydraulic press for this.

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Next look at the output shaft. Wash it in a pan of grease remover with a parts washing brush. Examine the rollers for discoloration, pitting, or scoring. Also try spinning them by hand to see if they feel gritty. If they do, use a puller and remove them from the shaft—and replace both halves of the bearing if either is bad. To remove the bearing race from the steel housing, one can usually use a small pry bar or an old screw driver with the blade bent on the end. Work your way around it prying at different points. If it is really tight, a couple of holes can be drilled through from the outside of the housing so the bearing race can be driven out with a punch. Then plug the holes by threading and installing 1/8" pipe plugs or welding them shut. On the aluminum housing, remove its threaded collar by taking out a small cotter pin and unscrewing the collar with a small punch. Then drive the bearing race out. Tapered roller bearings used for both the input and output shafts are 05075 cone and 05185 for the race. The output shaft seal number is CR 7572. These should be available at your local autoparts stores.

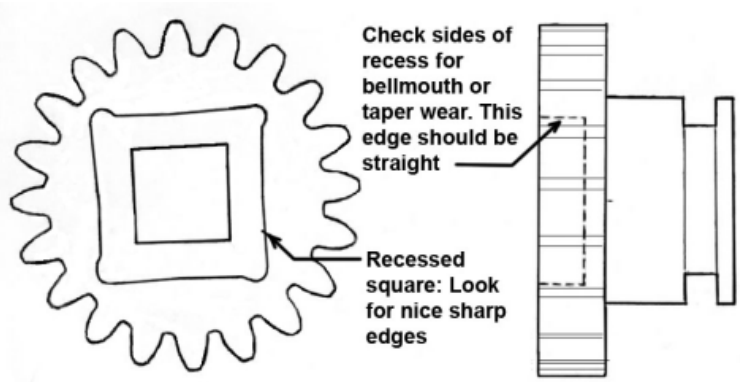
Some of the other things to check. Look at the sprocket you removed from the input shaft. The square should be nice and straight with crisp edges and minimal wear marks. Engaging forward when driving requires aligning the square on the output sprocket with the square on the input, and you may have noticed this can be difficult, particularly if your engine idles too fast. If either part is rotating when engaged, you'll hear the clash and it's a common sound around King Midgets. Too much of it rounds off the edges, and that's a major cause of your transmission jumping out of forward gear.

The one on the left is OK, the right, worn.

If the edges are burred off, you can replace it with a part from Midget Motors Supply or weld the surface back up and machine or file it square. It's a tricky process and the part should be heat treated to harden, but if you exercise care in shifting it will probably serve all right.

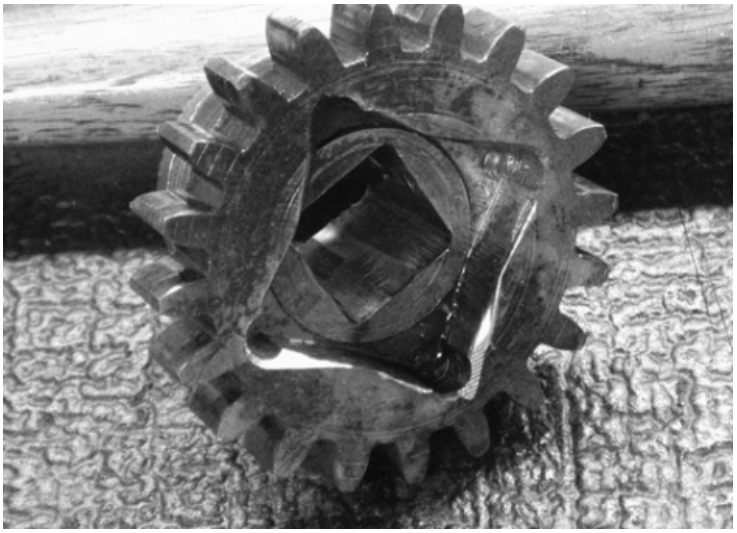
Next, check the square recess in the reverse sliding gear from the input shaft. It should not be "bell mouthed," but should have nice straight sides. If it is worn, it should be replaced. This and the above parts can be ordered from Midget Motors Supply. This one will be trickier to fix by welding, but you may be able to do it. If you get a new reverse slider gear, make sure it is welded to the hub. It just needs three or four tack welds around it.

Another thing to look at is the detent system that holds the sliding gear in place.



Reverse Sliding Gear, Face and Side Profile

The one below is worn but proved serviceable



G. Driveline

Sometimes the spring gets clogged with grease and grit so that it can't do its job.

You may want to replace the spring or stretch the old one to improve its grip on the sliding gear.

Also check the input shaft sprocket bronze bushing to be sure it does not turn on the input shaft. When in neutral, the sprocket is supposed to turn on the bushing, but if it was installed too tight on the sprocket, it can turn on the knurled part of the shaft, and if it does, it will wear quickly. If worn, it will allow the sprocket to tip and slip out of gear. If the bushing is loose on the shaft, replace it. It's available from Midget Motors Supply or you can modify one you might find elsewhere.

Nearly half this bushing has worn away

Wash up and examine the tapered bearing cones you removed from the input shaft, looking for discoloration, pitting or scoring of the bearing rollers. Also spin them to see if they feel gritty or rough. If so, replace both them and their bearing races in the input shaft tube. Use a long rod or metal punch to drive out the bearing races by hitting them around their circumference. Don't hit in just one place. Keep moving back and forth across to drive them out straight.

Check the condition of your output shaft sprocket and reverse gear. These usually are not worn much because they run in oil. If they need to be removed there are two set screws behind the sprocket that hold the assembly to the output shaft.

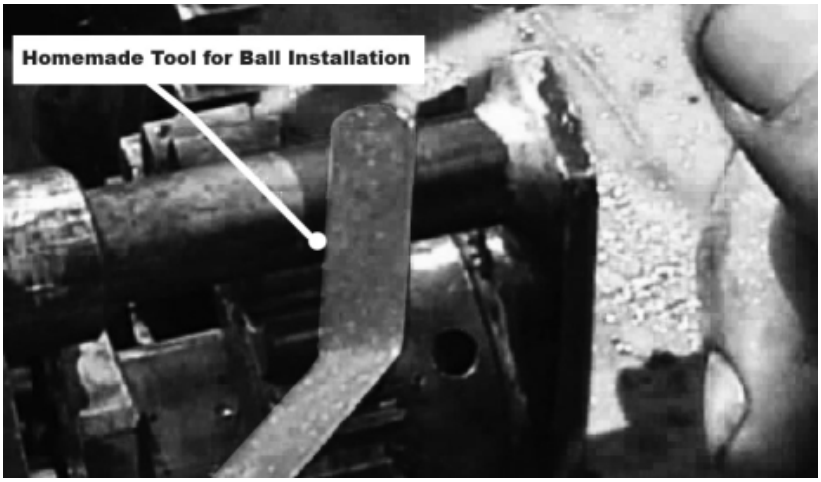
Once you have the replacement parts you need, start reassembly. Not all the following will apply to all cases, depending on what you needed to replace in your transmission.

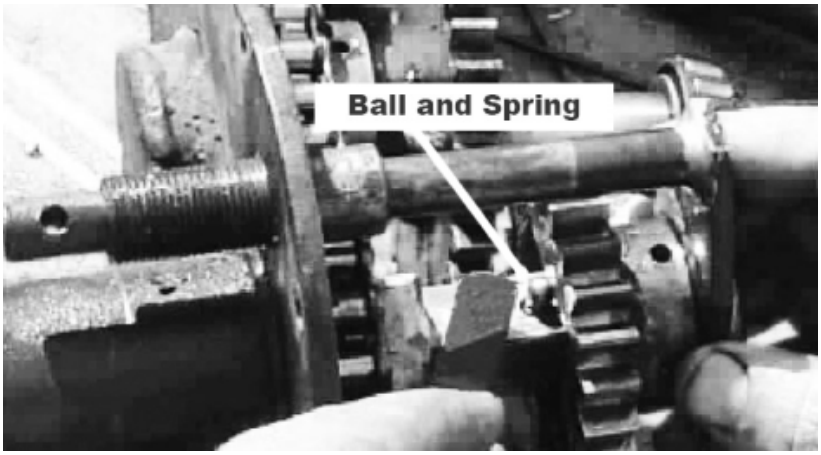
First, be sure your transmission housings and all parts are clean. Next let's address the fitting of a new sprocket bushing and checking for positive engagement of the forward gear detent. With the bushing in your sprocket and flush (even with the recessed part on the square side of the sprocket), look to see how much past the sprocket it extends in length. It should extend around .002 of an inch, or about the thickness of a tablet-back cardboard. If yours is longer, it should be shortened. The easiest way is with a lathe. Or you could use a file or maybe a piece of emery paper of medium grit on a flat surface, moving the bushing back and forth across it, being sure to keep it straight across on the end. Once you have this done, you can drive your new bushing onto the input shaft. Put

the old bushing ahead of it while driving it on, or you can use a piece of tubing. Make sure to remove the old bushing when done.

With the bushing in place, try your sprocket on it for fit. You will probably find it now fits tight. To remedy this, mount the input shaft in the vise and use a strip of emery cloth wrapped around the bushing, working it back and forth around it 'til the sprocket fits on and spins freely. This is important so that the sprocket turns on the bushing rather than the bushing turning on the shaft.

Then check for positive engagement of the forward gear detent. With the sprocket in place, slide the reverse slider gear and its ball and spring in place over the square shaft.





I use an 18 or 20 gauge strip of metal about 4" long and ¼" wide with a bend in the end to hold the ball and spring in the hole on the square shaft 'til the reverse slider starts over them. Patience will be needed here. You have to hold your tongue right and ask the proper blessings. Once it is slid on the square, hold the sprocket tight against the shoulder on the shaft and slide the reverse slider 'til the last hole engages the ball. Did it push the sprocket back? If so then it is bottoming out between the sprocket and the bottom of the square hole in the bottom of the reverse slider. You will need to remove some metal from the face of the square on the sprocket and possibly from the shoulder also, but not very much. A milling machine is the easiest way to do this, or you could also use a grinder and

G. Driveline

carefully take some off. You should not need to remove much and no more than necessary. You have to allow room for the chain to run on the sprocket without rubbing the reverse sliding gear.

Next, put the bearing races (05185) in the input tube of the housing. Drive them in by tapping around their outer edges carefully, switching side to side to keep them going in evenly. Drive them in till they bottom on the shoulders of the tube. You can also install the output shaft tapered bearing race into the steel housing. Next, stand the input shaft on its square end on a block of hardwood, wipe some grease or oil on the sprocket bushing, and then install the sprocket and bronze thrust washer. Pack the bearing cone (05075) with grease and start it on the input shaft. Using a piece of tubing that fits loosely over the input shaft but small enough to drive the center part of the bearing, drive the bearing onto the shaft. If you have a press, you could press the shaft from the square end through the bearing. Make sure the bearing seats up tight to the bronze thrust washer.

With the bearing installed on the input shaft, next put it through the input tube of the steel housing. First wipe a bit of grease around the bearing races. Don't forget the piece of spacer tubing that goes between the bearing cones. If you have the newer tapered roller bearing, you can wait to install the chain and output shaft later. With the input shaft slid into place, set the transmission with the input shaft on a hardwood block. Pack the other tapered roller bearing cone (05075) with grease and start it on the input shaft. Drive it down 'til it seats up against the piece of tubing. Now you have your input shaft back in place. Install the seal (CR 10074) on the pulley end. Insert the spacer in the seal.

Install the pulleys before the input bearing so play can be adjusted. With the spacer through the seal, install the key in the keyway and slide the taper lock against the spacer. Then slide the 6" pulley up over the taper lock, making sure to install the ball and spring in the clicker clutch. It is easier to keep the ball and spring in place with the transmission stood on its end. Put the 10" pulley on next. Give it a spin to make sure the ball stayed in place. If so, then put the castle nut on the end of the shaft. Put a wrench on the square end of the input shaft to hold the shaft from turning while you tighten the nut. Tighten it up snug, but don't go overboard! Insert a new cotter pin in the nut. Next put the set screw in the 6" pulley and tighten it down. Next make the bearing adjustment on the transmission. Put in the three socket head set screws in the transmission housing. Screw each in an equal number of turns. Tighten these down 'til the in-and-out play is removed, but the shaft does not drag. After this is done, hold each one from turning while you tighten down the jam nut on it to lock it.

If you have not yet done so, you will need to remove the reverse sliding gear back off the input shaft and reinstall it with its fork now. Alan Conley recommends using the newer detent spring in the older transmissions, because it is stiffer.

Next the output shaft. If you are installing new tapered bearings, now is the time to install the bearing cones. Since they run in oil there is no need to pack these bearings with grease. Drive them by their center portion onto each end of the output shaft. Also on the tapered roller bearing, drive the race in the aluminum housing. With the shaft in the front bearing of the steel housing, install your chain and master link. With the shaft in tight, check to see that the sprockets are running in line with each other. This can be adjusted by loosening the set screws in the output shaft sprocket and gear assembly and sliding it

ahead or back, as needed. Once you have this done, the aluminum cover can be reinstalled. If you were careful you can reuse the old gaskets. Put a little Permatex #2 on each side of the gasket and put it on the housing with the bolts started through to help hold it in place. The aluminum case can now be slid on and the bolts tightened up. After this is done, put a bit of sealer on the threads of the adjustment collar and screw it in against the lower bearing race. Screw it in 'til lower shaft end play is removed. Before installing the cotter pin, install your new seal in the adjustment collar. The old hole in the collar may not realign now so you will have to drill a new hole through the aluminum housing hole through the collar and install a new cotter pin.

Now all that is left to do is install your output sprocket and reinstall the transmission in the car. Leave your outer set screws out of the sprocket at this time 'til you have the transmission back in the car. First line up your pulleys for the drive belts and then snug, but do not tighten the U bolts. Next, slide your sprocket in or out on the output shaft 'til your output sprocket and wheel sprocket are in alignment. Misalignment of the chain can cause premature wear of sprockets and chain.

INPUT Shaft	**Bearing**	**Seal**	**Note**
1952-1970	5075	CR10074	Two tapered roller bearings, cone & cup, one seal
OUTPUT Shaft			
1951-55	BR6204	7572	Two Radial Open Face Ball Bearing, one seal
		7930	Current SKF seal number
1956-70	5075	7572	Two tapered roller bearings, cone & cup, one seal

Once lined up, tighten the inner set screws in the sprocket and screw in the outer set screws to lock them. Reattach your chain adjuster and adjust the chain, with the drive wheel turned to the point where the chain is tightest, leaving just a little slack. Then tighten your U-bolts.

You've done it! Time for a test drive. □

G-7 Rebuilding Your Older Transmission *John White II*

There are some of the differences between the ’51—’55 transmissions and those covered above.

The input shafts are basically the same, other than the absence of the three external input bearing adjustment screws and jam nuts, and the piece of tubing that is used between the input bearings of the l956-69 transmissions is not used. On these transmissions, the input bearing adjustment is made with an externally threaded collar that is held to the shaft by setscrews and has two thin spanner-type nuts that are used to adjust bearing play. There is also a thick washer between the collar and the seal spacer at the input end of the transmission.

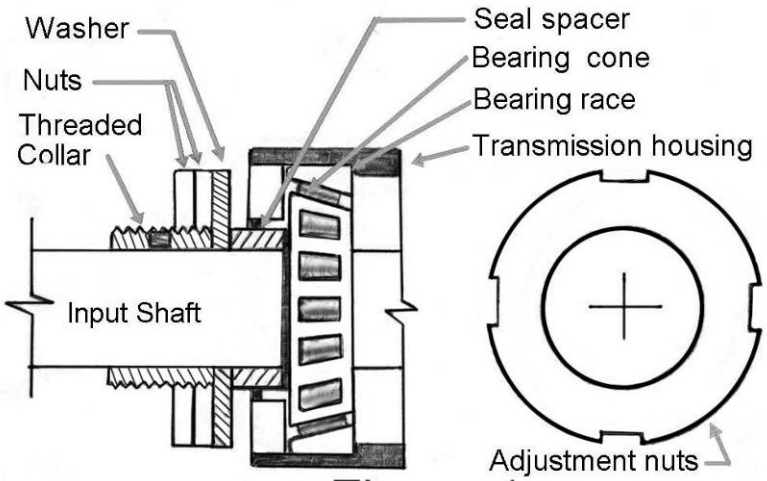


Figure 1

To adjust the input bearing play, make sure both bearing cones are seated in their respective races. Now slide the threaded collar up against the thick washer and tighten the set screws to hold the collar in place. Next tighten one spanner nut up against the washer. While doing this, turn the input shaft by hand to check for bearing tightness. You want to adjust this nut to remove play in the shaft, but not to tighten it so much as to cause binding.

Once this is done, tighten the other nut up against the first one to jam it and hold your adjustment. The nuts I’ve seen have four notches on their circumference. Midget Motors probably had spanner wrenches to fit these. An extra helper might be useful in this adjustment. Have someone hold the inner nut with an old flat-bladed screwdriver while you use a small punch and hammer to pound the outer one against it tight. Recheck to make sure adjustment hasn’t changed. Once this is done the six-inch pulley and taper lock can be reinstalled.

On some early versions of these transmissions, ball bearings were used in place of tapered roller bearings. I have not seen one of these so I can’t comment on their adjustment.

Another difference on these transmissions is the use of ball bearings on the output shaft. (Bearing number is BR6204.) Also, there is no seal retainer on the output shaft bearing. The seal is driven into the aluminum housing itself. You may also find the outer bearing a loose fit. It can be held in place with Loctite 680 Retaining Compound (Loctite part number 68035) which is recommended for maximum diametrical clearance of 0.015. You can get it from McMaster Carr.

If your transmission uses an endless chain between the input and output shafts you will need to install the input and output shaft together with the chain installed. The reason for this is the output shaft can not be tilted to install the chain later. If you are replacing your chain with a new one having a master link, this is not a problem and the chain can be installed after the output shaft is in place in the steel housing side of the transmission. End play is adjusted on these transmissions by the number of gaskets installed between the aluminum and steel housings. Usually I find that if you're careful the original gasket or gaskets can be reused, if they're not torn. Put a thin coating of Permatex #2 sealer on both sides of the gasket and reinstall.

One reader e-mailed me and said I forgot to tell the readership to refill the transmission with new oil. Thanks Glen Smith. Midget Motors recommends 30w oil. You would want to use a straight-weight oil and not the thin 5w or 10w stuff. Probably a non-detergent oil, though I'm not sure it would make much difference whether detergent or non-detergent is used. I've heard some have even used synthetic oils or moly additives. I don't know whether any benefit is realized with the use of these, but I doubt they'd hurt anything.

You can also use 90 wt transmission oil, which Paul Gerhardt says is approximately the same thing as 30 wt. non-detergent oil. □

Note: When replacing the link chain inside your transmission, it is best to avoid using a removable link, especially if your car has been repowered. Alan Day had a removable link come off, breaking his transmission case. Lee Seats makes up his own, or you can buy one made to order from McMaster Carr. John White

G-8 Torque Steer *By Bob Vahsholtz*

There are any number of King Midgets running around with 14 to 18 horse engines, and I know some people have had problems with them. Others seem to run like clockwork and work very well, as far as I've heard.

Up in Washington there's a King Midget owner I'm recruiting for the Club, and he has a problem. He's put a 14 horse Kohler (taken from a Wheel Horse tractor) in his Model 3. He's using a Comet clutch driving the original transmission, and a Chevy alternator in addition to the Kohler starter. So far, so good. The car accelerates like crazy and will lay down rubber. He's had it up to about 50 mph, and hasn't pressed it further because it gets very hard to handle at speed. His basic problem is excessive torque steer. We all know you get this with one wheel drive, but in his case, it's so extreme, he can negotiate mountain roads, using only the accelerator to steer. If he floors it while cruising, he says the car practically jumps in front of oncoming traffic. He doesn't feel safe driving it. He's planning on installing a differential from a garden tractor.

I suggested he try moving the brace that tensions the drive, but it's already directly under the belts. I suggested a steering damper might help at high speed, but I don't think it would do much about torque steer. Can anyone offer him any suggestions? □

Note: Some early 57 Model 3s lacked the trailing link between the main frame and the suspension cradle, which compounded the torque-steer problem. Bob V.

G-9 A Real "Tension Headache" *By Bob Olbers*

IT ALL BEGAN INNOCENTLY ENOUGH when I decided it would be a good idea to take up some of the slack in my drive chain. Back then I did not realize how off-center the drive ring can be with respect to the wheel and I did not know about jacking the wheel off the ground and spinning it around to make sure that the chain had adequate slack throughout the revolution of the wheel. Consequently, I ended up overtightening the chain such that it put enormous strain on the drive sprockets and subframe at certain times.

I drove the car like this for a while. The next signs of trouble were heavily worn teeth on the drive sprocket and occasional metallic popping sounds as I would start off from a stop. I realized pretty quickly that the worn sprocket was caused by the runout issue and corrected that with a new hardened sprocket from McMaster-Carr, and a more careful chain tension adjustment.

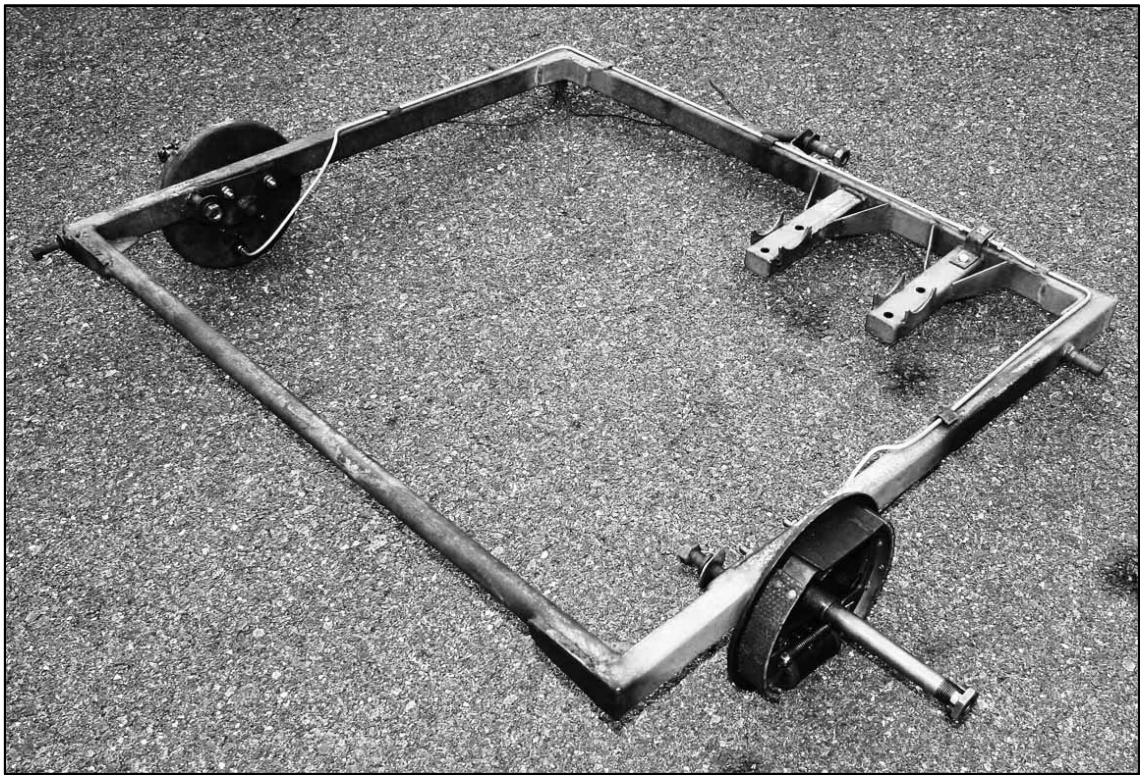
These fixes seemed to take care of things for a while, until one day on my way to a car show the engine started revving freely and the little guy stopped moving forward. I thought at first that my drive sprocket setscrew or key had come loose, which had been a fairly regular issue in the past. But a bit of inspection revealed a more serious problem. I had actually sheared the transmission output shaft at the case! Luckily for me, I have very good friendships with some machinists from my old job and was able to get a new shaft made in exchange for taking them out to lunch.

After getting this all sorted out, I figured that the metallic popping sounds had probably been due to cracks propagating in the output shaft and that this had most likely been started by my over-tensioning of the chain. At this point I thought I had addressed all the problems.

Regular readers of this publication may recall a story I submitted a few years ago about my visit to the 2010 Microcar World Meet near Chicago. In that story I mentioned that my participation was cut a bit short by a broken drive chain. Once I got home I replaced the chain. A week or so later I drove the car to work as a shakedown cruise to make sure it was ready for the inaugural Micros at the Beach in Cape May NJ (see story on page 13 in this issue regarding the 2013 event). On my way home I once again suffered a broken drive chain. This time I got a tow from AAA (this turned out to be a bit amusing, between explaining to the operator what kind of car they were coming for and the rather drastic size difference between the tow vehicle and its cargo…).

Determined to figure out why these chains kept breaking, I did a more thorough inspection under the car. I discovered that the front corners of the subframe that mounts the transmission and the wheels had cracked through and that this was allowing the frame to twist under load and break the chain. A particularly worrisome aspect of this was that the brake lines and the emergency brake cable both go right across these areas, so this could have caused a rather unpleasant complete failure of the brakes in an extreme situation. I realized that these cracks had probably been the actual source of the aforementioned noises.

The only solution was to cancel my upcoming beach trip, disassemble the car, and repair the frame. I was again fortunate that I had signed up for welding classes at a local community college and was able to repair the frame for free.



Look closely and you can see where the reinforcing angles are welded in, and how total failure at those points could have led to disaster. □

Chain Slack Adjustment

G-10 Headache Relief! *By Bob V.*

THE WOBBLE-SPROCKET PROBLEM Bob Olbers describes seems to be common to KMs.

If you look at the "Supplemental King Midget Instructions" on page 81 of *King Midget: A Historical Scrapbook*, you'll see what I believe to be the only factory instructions that mention this problem. I quote, "... roll the car forward enough to make one complete revolution of the rear wheel, at the same time checking the slack on the underside of the chain. At the tightest point the slack side of the chain should be loose enough that you can move it about 3/4" straight up and down."

Years ago, a subscriber from Oregon told me he planned to switch from #40 to #50 chain, because the smaller chain "stretches like salt water taffy." Probably he adjusted the chain tight but checked at a loose point. Perhaps because he didn't tighten it enough to bust things up.

Perhaps this problem traces back to factory tolerances tending to multiply, a well known phenomenon. Thus the wheel might be a bit out of round, and then MM welds on the brake drum, which they then true up inside using a lathe. But the drum itself may be a bit off, and thus the attachment points of the sprocket. The sprocket has a bit of tolerance, as does the drilling of the mounting holes. Each of those tolerances may be small, and may cancel each other out, but Murphy's Law suggests that they generally multiply and make the driven sprocket wobble.

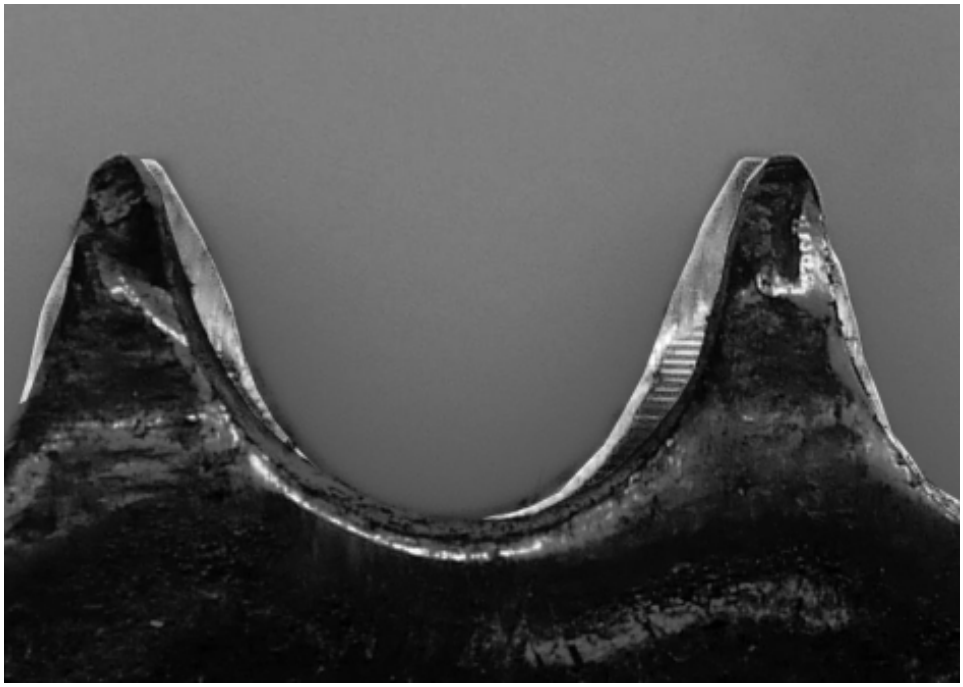
Since Bob's tore things up so bad, let's hope it was a worse than normal case.

Here's a similar story from Randy Chesnutt:

Last winter I tried to remedy a chain slacking problem that I experienced on my KM. Chain slacking is apparent when you continually rotate the tire. The chain will tighten and then go slack.

My concern is this pulsating will cause wear to the transmission output shaft bearing, bearing seat and loosening sprocket. The approach John White suggested is to remove the tire from the rim and mount the rim on a lathe and then true it up. I did this and it didn't help. Chain slacking was just as bad. Another email conservation with John White convinced me that my approach was right, so I decided to try again.

This time I decided to not only true-up the driven sprocket attachment points but to replace the original sprocket with a new one. I've finished my task and this time there isn't any chain slacking.



The dark original sprocket is aligned (best I could) on the shiny new sprocket. The pocket and reduced wear area is seen in a row of 10 or so teeth and then the rest of the teeth show even wear. It's very hard to photograph this so that you can see what I'm describing. Therefore, the photograph shows only a small section of the sprocket.

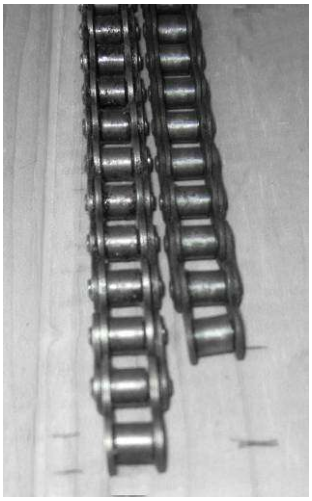
The picture shows that a wear pocket with an increased wear area on one side was created on the sprocket.

So I think John is right. The only real way to eliminate chain slacking is to replace and true up the driven sprocket … not an easy task.

It would be interesting for each of us having the standard drive setup to measure the variance between the tightest and slackest point on our chains by performing the test from the previous page. We could then list the results in an article for the newsletter.

A useful tech challenge at a KM Jamboree or other meet. □

G-11 Drive Chains *By Bob V.*



THE KM MANUAL SAYS you should replace a worn drive chain. Good idea. They get loose, rattly and can even bust, leaving you stranded, and surely that would be embarrassing (says he who had three breakdowns at our June KMW meet).

The manual tells you the chain is shot if, when you lay it out flat and stretch it, you can push it back ¾ inch or more. I tried that. Pushing on a chain is a bit like pushing on an oily noodle. Trying this on the concrete floor, it looked to me like the chain was compressing a half inch or so.

In the pursuit of precision (always dicey in my barn), I cleared space on the workbench and nailed one end to the bench with a small staple. Thus secured, I could pull the chain to full stretch, make a mark on the bench and then squish it back against the staple as tight as it would go without buckling. Wow—7/8 inch! Time to replace the chain.

I bought a new one and nailed it in place beside the worn one. The same test revealed just 1/8 inch differential, so the old chain had clearly worn ¾ inch.

When the King Midgets West Chapter met at our house in April, I showed the guys the result of this test.

Randy Chesnutt showed us an alternative test that's better and easier. Simply lay the chain on the floor and see how far you can bend it sideways without it tipping up. The result is a sort of "bow." Measure across where the "string" would go. On a new chain, that distance was 45 ½ inches. On my worn out chain; 36 inches. No nailing on the bench!

So I pulled the chain from my Model 3 and performed both tests on it. On the "stretch test" it measured ½ inch compression. On the bow test, it measured 44 inches. Heck, that's good enough for my old Kohler! I put 'er back on the car.

True confession time: When I bought the new chain for my M2, I measured and it was four feet long. Suspecting I might need a chain for the M3, I bought eight feet. That was dumb. Turns out an M3 chain is about five inches longer than an M2. Sigh. □

G-12 The Drive Key to Success *By Bob V.*

DID I EVER TELL YOU about the time my drive sprocket key fell out at a King Midgets West Chapter meet in Palmdale, California? We were leaving Randy's house, heading out on another cruise, and my Model 3 lost power on a corner, a block from the driveway. We searched for the key, but—needle in a haystack. We pushed the poor thing back to be repaired another day, since we had no spare key. Marge and I got in our van to follow the rest of the KMs on that cruise. As we drove around that corner we'd searched so diligently, I spotted the missing key through the windshield of the car, right where we'd looked so carefully!

Lesson learned. There are four set screws that hold your drive sprocket and its key in place, and they're under great pressure to resign their task. Wiser heads informed me of the importance of using Loctite to keep those set screws on the job. At home I applied liberal doses of Loctite Blue—the kind that gets a grip but leaves you the option of changing sprockets without taking a torch to the old sprocket to convince Loctite Red to let go.

I did change my sprocket, seeking the right size for our conditions and the "competition" on our local cruises. (It turned out to be 18 tooth, with my #40 chain and Kohler.) I was able to remove the old sprocket and install the new one with no problems. Nice.

… until last April, as we were finishing up a nice cruise, bopping along on a smooth and level street, and my M3 just rolled to a stop, with the engine running fine. Drive key gone! *Again!* Rats!

With a lot of help from Gert Gehlhaar and others (for example, Don Nichols leaning on the fender and skooshing Gert's head under the car), we managed to get a temporary key in place and I drove the M3 home. We couldn't get the right key in because there was some sort of obstruction.

Back in the barn, I set out to file away the "obstruction" and found that what we thought was grease or gunk in the set screw hole was, in fact, the inner setscrew, protruding slightly into the key chase, and I couldn't get it out. There was old gunk and (I suppose) Loctite mashing into the thing—I simply couldn't get an Allen wrench on it. I finally drilled out the gunk and the setscrew came out easily.

When buying spare keys at the hardware store, I mentioned my problem to the nice Ace Hardware man. He suggested two things. First, mix Loctite Red and Blue, half and half. That results in a stronger bond that can still be broken without resorting to the torch. Second, be sure the screws and the screw holes are clean. Oil and Loctite don't mix well!

Two parting words here. Even if following the above advice, carry spare set screws, keys and an Allen wrench of the right size. Second, the standard keys—at least the ones I bought—are a quarter inch too long. That doesn't hurt anything, unless you make the mistake of driving them in flush. That can damage the oil seal on your reverse transmission. It happened to the former owner of my M2. □ ■