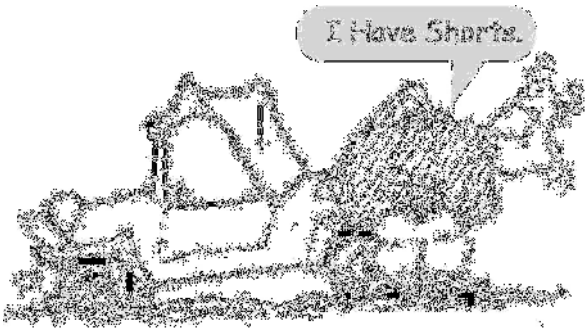


When I restored my 64 M3 I had my fingers crossed, hoping the wiring would be OK. It's another subject on which I am ignorant. It proved fine, for the past 20 years! Others rewire everything from scratch. Either way, this section should prove helpful. Bob V.

Section H Electrical

H-1 Wiring Mysteries *By Ralph Nodwell*

Let's start talking about electricity—oh what mystery—but not really. Remember the whole electrical system in your King Midget starts with the battery. Remember a poor battery reflects directly into a poor electrical system.

In this issue I want to write in generalities.

Your electrical system is divided into several systems:

- Battery
- Headlamps
- Parking Lamps
- Taillights
- Stoplights
- Signal Lights (if applicable)
- Starting System

First let's talk about the battery. It can be a six-volt or twelve-volt system.

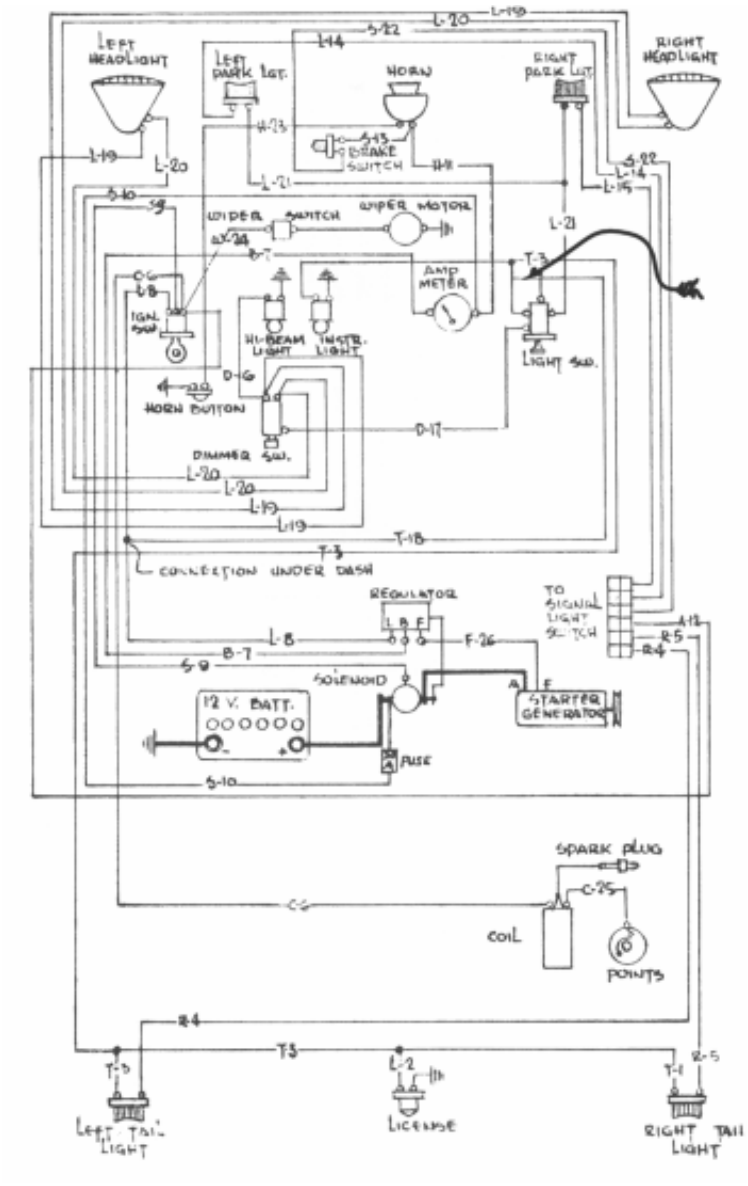
It can be a negative or positive ground system. This is called polarity. The Webster's definition of polarity is "the particular state of either positive or negative with reference to the two poles or to electrification."

If you examine your battery, you can easily find out the polarity—in most cases negative to ground. One terminal, usually this is the smaller terminal on a top-terminal battery, will be connected to a ground or perhaps a black wire. It is usually connected to the frame of the car or directly to the engine.

Our time is up. See you in a future issue where we'll talk about care and testing of your battery.

If you have a particular question regarding an electrical problem, send the editor a letter or email outlining the problem. We will try to help. □

H-2 Finding Technical Help *by Bob and Hal*



Ralph's right, we will try to help. When readers call or write, tech questions are most often on their minds. In our recent survey, tech help was the number one topic of interest among readers.

But we're hardly experts, so we're looking for help. Ralph Nodwell probably knows more about wiring these cars than anyone (he's the guy who prepared that giant plywood wiring diagram and pointed out the error in the original Midget Motors diagram (left) taken from the 1968 manual. If you have a copy of that manual and this diagram, white out the line the arrow points to. □

Note: See detailed wiring charts, Section H-12 and H-13. Bob V.

Note: Ralph donated his plywood wiring chart to the Club. Bob V.

H-3 LETTERS: Wiring Hints

I am currently rewiring my ’58 King Midget using new wire and the original harness as a pattern. It had the wire ends wrapped together and covered with electrical tape. Should I simply follow the same example, or should crimp-and-solder style connectors be used? What method and type of connectors have you used? Thanks, **Ian Grout**

I used the crimped ends as I was not concerned about absolute authenticity but a drivable car. I think Claud and Dale would rather have me drive a dependable King Midget. **Alan Day**

Ian, what I did was run the headlight wires all the way to the dimmer and put two terminals on the screw instead of one, and it works well. I don’t like the way that they did the connections from the factory, though they worked. I’m a perfectionist.

Also used a terminal connector made for a battery post to add accessories which takes tab connectors. I put them under the post for the headlight that’s under the fender. That is where I grounded the signal and the headlights. In the back, I self-tapped a screw to the frame near the taillight to attach a tab-connector to ground taillight. The reason was to insure a good ground and to save running so many wires.

While you’re making a new wiring harness, I’d put a few extra wires in it from the dash to the engine compartment in case you later want to run something else. I’ve now used all the extras I ran and I’m glad I had them. **Lee Seats**

Sounds like you are trying to do it right by replacing all of those old 1958 wires. I would recommend crimping then using light coating of solder to help minimize any future corrosion. Especially if the particular connection is going to be where it’s difficult to inspect and repair. Seem too many problems with just using a crimping tool on anything that has the least chance of drawing moisture.

A bad connection could also limit your voltage/amperage and there is never enough of that to go around on older vehicles. This has been especially helpful for me on some of the older tractors that I have rewired.

I often wonder if the “so-called” copper wire we get today is truly 100% copper or if it’s interacting with today’s crimp-on connectors. They seem to corrode very quickly. In some cases,

I’ve soldered the multi-strand wire before crimping and than soldered after crimping. This might be overkill, but when you have spent days finding one corroded connection, it might prove worth it.

I like extra electrical tape in some locations, but I learned my lesson, spending more money to buy the better tape. I used some cheap Chinese electrical tape one time and it didn’t last the summer. The wiring connectors seem all be about the same. Just be sure to match the wire gauge with the correct size connector to get the best crimp. **Royce Davis**

Like Alan, I generally just use the crimp-on ends for connections. Seems to work fine. You might slide a piece of heat shrinkable tubing over the crimp on ends to help weatherproof them a bit, but doubt you’ll be out in the weather all that much. **John White II** □

H-4 CHARGE! But Not Too Much *By Don Balmer*

While restoring my 1956 Model 2, I learned a bit about the charging/generator system which might be helpful to anyone with a car having a Wisconsin engine.

These engines used a 6 volt Autolite GAS-4190 generator. The Wisconsin AENL manual says that all 6 volt systems had a positive ground. The later engines had a 12 volt positive ground that was changed to a negative at engine No. 3991018. The same 6 volt generator was also used in some Crosley's and I found a reference to an airplane that used it. The Crosley also used a positive ground.

The generator is a three brush unit rated at 12 amps maximum output. These units did not use a voltage regulator. They had a cut-out, which is a small box with one relay in it. The purpose of the cut-out is to disconnect the generator from the system when the engine is running slow enough that the generator output is below the battery voltage. This prevents the system from trying to run the generator as a motor which could damage it and run the battery down.

The position of the third brush is used to regulate the amperage output of the generator. Too high of a charging rate can shorten your battery life and too low can make the lights dim and not allow enough current to start the engine.

On many three brush generators, Model A Ford for example, you loosen a screw and move a lever to adjust the output. On the GAS-4190, the third brush is held in place by friction provided by a couple of springs pushing on the third brush mounting plate. Push the brush counter clockwise, looking from the brush end of the generator, to increase the output and clockwise to reduce it. The Crosley specification is two commutator bars (minimum), two bars and a mica strip (maximum) between the third brush and the nearest, insulated main brush. I haven't found a specification for the King Midget. In the days of the Model A, Ford called for adjusting the rate seasonally—higher for winter and lower for summer—with other compensations for how much night driving you did. The goal was to not overcharge the battery, but to keep it charged enough to meet your needs.

This brings us to the question of how to get the most life out of the battery in a King Midget.

Option 1: Let it charge and buy a new battery when the old one gets cooked.

Option 2: Watch the ammeter and try to control the charge with the head lights. When you first start up, the battery needs a charge to replace the current that the starter used, so a high rate for a few minutes is fine. But then you would like it cut down, so turn on the lights and use some of the excess current to run the lights.

Option 3: Add a voltage regulator. A traditional voltage regulator requires some connections to the generator which the GAS-4190 does not provide. There is a solid state regulator made for the Model A which will work with the three brush generator. I talked to the gentleman who makes them and he said that in theory, it should work, but he hadn't tested it, so he wouldn't guarantee it. They are solid state and easily ruined, as well as expensive.

Option 4: A 6-volt positive ground, one-wire alternator. These units are available on-

line from several sources or as a kit to convert an old 10SI Delco alternator, used on many GM and other cars from 1969 to the late 80's.This is the option I picked. Using some threaded rod and a bunch of nuts and lock washers, plus a couple of short pieces of band iron, I was able to mount the alternator from the same lugs that held the generator. No modifications to the car.

This gives me good regulation. It charges at a high rate for a few minutes after starting and then drops back for running. The other advantage is plenty of current for the headlights so they are plenty bright for night driving. The disadvantages include when you first start up there is no charging until you rev up the engine the first time, but then it will charge, even at fairly low speeds. The second disadvantage is that the self-exciting alternator puts a small drain on the battery even when the engine is off. If left on for several days it will run the battery down. I added a cut out switch on the battery terminal. When I am not going to use the car for a few days, I turn the battery off. This also provides a bit of fire safety in case something is shorted. Another option would be a switch in the wire from the alternator to the ammeter.

There may be some King Midgets out there which are set up for negative ground. The easy way to find out what you have is to turn on the lights with the engine off. If the ammeter shows a charge with the engine off, your battery is connected backwards for the wiring in the car. Both of my cars, a ’56 and a ’58, came wired for a positive ground. If for some reason you want to change the system you will need to switch the wires on the ammeter to the opposite terminals and probably change the two small wires going to the coil to the opposite terminals (check for + and – marks on the terminals) and re-polarize the generator.

Another thing that I learned the hard way, fortunately on a dead generator, is that if you want to disassemble a GAS-4190 generator, start at the pulley end. Remove the pulley first. I tried to do it the other way and broke the springs that hold the third brush in place.

If you want to know more about three brush generator systems and battery life do an online search for **Rocky Mountain Model A Club Batteries**. The article *“Batteries, out of Sight out of Mind”* is a good discussion of the whole topic as it applies to the Model A and mostly to the King Midget. □

H–5 LETTERS: 6 V Generator

BOB: I WAS READING THE ARTICLE in the newsletter on the generator used in the 6-volt models. One of the big troubles with this generator is it was made to be used at more of a constant speed. If you set it full on, it will actually burn out the ignition coil. Full on it will put out as much as 9 volts. I'd recommend setting it the same as the Crosley. No matter where you set it, it doesn't have enough output to keep up if you run headlights etc. all the time.

You really want an output around 7.2 volts. According to which cutout you use, it can be used for positive or negative ground, depending on which way you polarize it to start with. On Dick Russ’ car, he said running it off the small pulley it seemed to only put out when running the engine at high rpm. I told him to enlarge the size of the pulley on the crank and that seemed to make it work better. A five-inch pulley in place of the original small pulley on the crankshaft. **John White II** □

H–6 Some Notes on Wiring

In the Spring 2009 issue, we published a six-volt wiring chart, put together by Dick Russ, John White and Ted Richardson. When Dick finished wiring his car, he updated as follows:

Yesterday I finished the fabrication of the new wiring harness, temporarily installed all the electrical components (lights, etc.), brought up the power and checked everything for operation. Everything worked great; even the Sparton turn signal switch that I had to take apart and rewire. John, that was a good suggestion to take it apart.

The only change I needed to make to the wiring schematic was the wire #20 from the ammeter to the brake switch connection leading from the ammeter to the brake switch needed to be moved the other side of the ammeter.

Also a small note that might help others regarding the turn signal flasher hookup. Wire #34 goes to "X" terminal on the flasher, wire #3 goes to "L" terminal on the flasher. And wire #7 goes to "P" terminal on the flasher.

Nick Barbour asked the Yahoo Group about converting his M2 to 12 volt. "…it is a 6 volt system. I also see that I had a 12V battery … do I need a 6V battery for the 6V systems? My coil is 6V. When I tried to turn the car over, it would just click and the positive wire from the battery was hot and looked like smoke was coming from celluloid."

"Bottom Cop" answered this way: "I'm guessing that the car has been running as a 6V system at some time before you started changing the wiring. I would recommend you stay 100% 6V or you will also have to change out every light on the vehicle. I believe there is a wiring diagram available on this site or someone should be able to provide one for your KM's year if you do not already have one. Pay attention to wire routing *and* the gauge of the wire. If you still have the old cloth wiring, you might also have a short someplace. The covering on the wiring is rotten on every vehicle I look at from your time period. Wrong gauge wire (either too large or too small) could also cause problems. I thought all of the wiring was 12 gauge. The coil *must* be the same voltage as the battery. Some points are only designed for 6 volts; they will work with 12V but burn quicker than normal. Depending on your motor, there might be an electronic conversion kit available that would do away with the points. Check with your local repair shops or parts warehouses.

"If you must use a 12V battery, a resistor is recommended to reduce the voltage to the points from 12 back to 6. Chrysler did this for years on their early 12V cars and trucks. Also, many International tractors (and others) used 6V points and condensers with an external ceramic resistor. Both types should still be available. Starter solenoid and starter should be able to handle 12 volts for the brief periods it would normally be in use, but using 6 volts would still be better. The vehicle's original 6 V charger and regulator will not properly charge a 12V battery.

"If you are looking for more cranking/operating power, I would recommend one of the new 6V Optima batteries. They are expensive but have a much higher amperage rating than anything else you will find. They are also lighter and safer than any lead-acid battery. My Sam's Club has the 12V Optimas so they might be able to order the 6V versions. Also, Interstate batteries (at least in my area) is distributing the Optimas." □

H-7 The 6 Volt Generators & 12 V Starter-Generator *John White II*

Midget Motors used many different generators over their years of production. The Model 1 was more the do-it-yourself car and came with no factory generator.

Options listed in the assembly manual told how one might use a generator mounted in place of the pulley used to tighten the belt.

Scooter generator

It also listed a 35-watt generator available from Midget Motors. This 35-watt generator was driven by a hard rubber wheel that ran against the flywheel of the engine. I believe this was the same generator used on the scooters to power the headlight and tail light. It had no regulator, and much like the early Model T, headlight intensity varied with engine rpm. The generator was engaged by flipping a lever to engage or disengage it from the flywheel.

With the introduction of the Model 2 cars, on the earlier models, a flywheel-powered generator was listed as an option, engaged and disengaged by a lever behind the seat.

By 1952 or ’53 an Auto Lite GAS-4166 DC generator had been fitted to the cars. It ran off a belt and pulley from the engine and charged a 6-volt automotive battery. This generator was mounted behind the engine on the engine cradle itself and had a counter-clockwise rotation as viewed from the pulley end. By 1955 the Model 2 was fitted with an Auto Lite GAS-4190 6-volt generator. This generator was mounted to the rear cross member of the car behind the battery box and was of clockwise rotation. Midget Motors made their own 3/8” belt pulley for this generator. It screwed onto the threads that were for the nut that had held the original style pulley on these generators. Both of these generators are positive ground types using an adjustable third brush for current control and a simple cutout type regulator between them and the battery.

Generator GAS 4190

The GAS 4190 is rated for 72 watts maximum output. By moving the third brush in the direction of rotation, output was increased and moving it against the rotation of the armature decreased output. Midget Motors recommended a mid point setting that was good for about 5 amps output. These generators are not really the best for variable speeds as used in a car, but better suited for stationary engines running at a more constant speed. The regulator is a simple cutout type, which opens any time the battery voltage exceeds the generator output. This is to keep from burning up the generator at low engine speeds when the generator would be at minimal output.

Some of the problems on these generators, as with all generators, may be brushes, or they may need new bearings. If the commutator the brushes run on is worn, out of round, dirty, gummed or has high mica, it should be turned down in a lathe and the mica undercut.

When installing new brushes, they should be seated to the commutator by using a strip of No. 00 sandpaper wrapped around the commutator with the grit side out. Drop the brushes down and pull the sandpaper in the direction of rotation. Repeat this step till the brushes are seated well. Blow out any dust from doing this. Do not use emery paper for this process. It may leave bits of emery embedded in the commutator and cause increased brush wear. New brushes, along with bearings, should be available through your local auto parts store. The cutout should be available too. A solid-state cutout is now available for this type of generator. I bought mine from a local rebuild shop for generators/starters for about 25 dollars.

I've heard a few complaints that the generator will not keep their battery charged. Since they have only a 72 watt maximum output available, if you run your headlights etc. while driving, you are actually exceeding the generator's ability to put back into the battery what you are using. A typical sealed beam headlight is usually 35 watts each on low beams and 45 watts on high beams. So with two headlights burning on low beams, you are already very near your generator's limit of output. Plus, you have to add in tail lights to this current draw and also the engine ignition coil itself, which can pull four to six amps.

I knew generators need to be polarized to charge properly. Usually this is done by flashing the field terminal momentarily with a wire from the above ground terminal of the battery. But on this type generator with no external field connection, I wasn't sure how it was done. I contacted a few different people and got various answers, ranging from "it doesn't need to be flashed" to "I don't know." Finally the answer was found. I contacted a gentleman by the name of Jerry Herbison. I'll quote the following from his e-mail.

"All generators need to be polarized, including the third brush types. A quick check to see if polarizing is necessary is to run the engine with no wires connected to the generator. There should be at least ½ volt present at the armature terminal due to 'residual magnetism.' If it's not there, flash the battery voltage to the armature terminal of the generator for a second or two, with the engine not running. This flows a short heavy current through the armature and temporarily magnetizes the field coils."

He goes on to say that the voltage output should be adjusted while charging against a fully charged battery. You want the generator putting out ½ to ¾ of a volt above the

battery voltage. If you have the mechanical type cutout it should be adjusted to close when the generator voltage is ½ to ¾ volt higher than the battery voltage. Probably somewhere around 7.2 volts on a 6-volt battery system.

I will add one tip of my own on the 4190 generator, and maybe this applies to the 4166 too. On the original generators, the pulley or gear had a shoulder on it that fit back in a seal on the pulley end. I notice that the Midget Motors pulley has no shoulder, hence it does not seal out dirt from getting into the front bearing. To solve this I made a sleeve to fit the shaft and the inside of the seal that I put on the shaft before screwing the pulley on.

Around 1963, Midget Motors decided to change to a 12-volt electrical system on their cars. They used a combination starter and generator. This was a Delco 1101970. I don't have a lot of information on these units. I can tell you that the unit used by Midget Motors was rated at seven amp output. It uses a four wire type regulator, Delco part number 1118988.

Bob Olbers was able to purchase a new regulator for his car from NAPA. Their part number is ECHVR896. The main thing with these—and any generator—is make sure all connections are clean and tight for optimum performance. Make sure the generator housing and also the regulator are well grounded. The 4th wire on these regulators is underneath the regulator itself. These combination units work as both a starter and a generator. They have one field wound with heavy wire in series with the armature and one field wound with many turns of smaller wire that is in shunt, or parallel with the armature. When voltage from the battery is applied to the armature through the starting solenoid, voltage passes through the heavy wound field that is in series with the armature. When the engine starts and the voltage is removed from the armature terminal via the starting solenoid, the unit then acts as a generator. The starting field, being of such heavy wire, adds little resistance to the armature circuit when the unit is generating voltage. The field that is made up of many turns of finer wire comes into play when the unit is generating voltage.

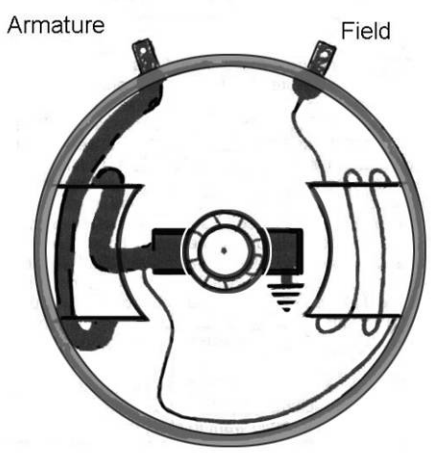


Diagram of starter/generator

The brushes used in the starter/generator have some copper added to their mix, so regular carbon brushes for a generator will not work in these units. Also even though certain regulators from automobiles and farm tractor etc. look like the same thing, they should

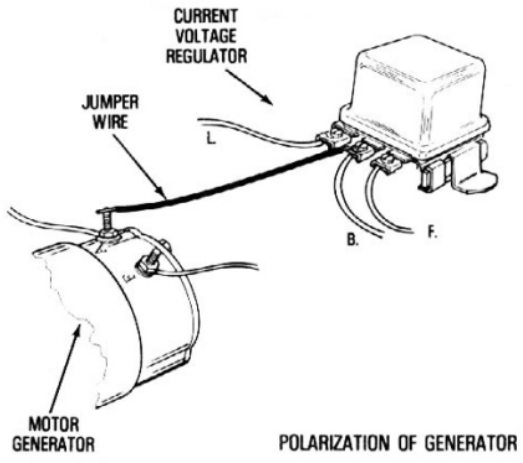
not be substituted for the regulator used with these units.

The settings in automotive and farm tractor regulators are set too high for these units; most being set for 20 amps and up. The use of one of these regulators will eventually result in a burned out field coil.

You can check to see if your problem is the starter /generator or the regulator with a few simple checks. First, with the engine running at half throttle or so, there should be 13 to 14.5 volts present at the armature terminal. If the voltage is less than 12.5 volts, try grounding the field terminal on the starter/generator. If the voltage rises to the above voltage range, then the problem is the regulator. If there is no change, then the problem is probably in the starter/generator itself.

As I stated above, one of the main things is make sure all connections are clean and tight. Make sure paint isn't keeping your regulator or starter/generator from being properly grounded.

To polarize this type of generator, connect a jumper wire for a few seconds from the battery terminal to the armature of the starter/generator.



Polarizing the starter/generator

There is much more detailed information on starter/generators at the following website www.edensltd.com/starter-generator.htm □

H–8 LETTERS: Electric Fuel Pump / Carburetor

Bob: I worked on the 67 KM with Kohler 12 hp today to find out what the gas starvation problem is all about. It is definitely the fuel pump—after it would not start I used the hand lever and pumped up the fuel and it ran for awhile and then no fuel again. I then installed the VW electric fuel pump and that was even worse—it turns out the pump was defective and only pumped one stroke after connecting it each time. I removed the bad one and will return it to the Buggy Haus.

I then purchased an American made electric fuel pump and installed it. It worked the first time I turned the key on and the engine fired immediately. I took it out for a drive and it ran just fine. Got some gas and drove it some more and saw the speedo at 50 mph

(real speed about 40 mph. Then went home and did something else like fixing the toilet. Got that done and then was going to drive the KM again. It started but would not keep going—closed garage and left it.

When I returned to work on the KM, I took the carb apart and found a piece of dirt in the main jet. Cleaned, reassembled and car ran fine. Drove it down to parts place and got another fuel filter and put it just before the carb.

So far it is (finally) running well and I love the power it has. Man, if I had only known earlier I would have replaced that old pump sooner! **Gert Gehlhaar**

Good news/bad news, Gert, I put the fall issue to bed listing the Buggy Haus fuel pump suggested as a source! Hopefully, you just got a lousy example.

Most likely, but I did not want to run all the way over to Grover Beach again and get another pump. This Carquest #E8016S came with a filter and is a 2.5–4.5 lbs pump – working fine. **Gert** □

H–9 LETTERS: Electric Horn

I have my non-working horn from my 58 KM Type 3 on the bench, cleaning it and trying to get it going. So far I've hooked it up to my DC Power Supply (for electronics) and set it to six volts with the assumption that it's a six volt system in the car. The leads are just hooked up to the two terminals on the back of the horn. It's not working so far, is there anything more to it? Thanks, **Ian Grout**

I did the same thing and got the same results. Unless you have a POWERFUL power supply it won't put out enough current to honk the horn. Also if you had the horn apart it will only work if you have the two halves aligned properly. I made that mistake too. Good luck. **Don Balmer**

You may not be getting enough amperage with your power supply to make the horn work. You could try using 12 volts from a car battery momentarily to see if it will work. You can test the horn for continuity by using a multi-meter set on ohms reading and hooked to the two horn terminals. I hope this helps you. **Gale**

About 6.6 volts would be what a 6-volt system puts out. Even at 6-volt though it should beep. Sounds like you might have a bad horn. It can be disassembled. You might try checking the leads from the terminals to the horn coil to make sure one isn't broke off. How much current does your bench top supply make? Be sure there's not a bunch of dirt and rust between the horn plate and the housing that might be restricting movement. If the coil itself is bad, you're kind of out of luck, unless you want to try and rewind the coil. **John White II** □

H–10 Turn Signals; Don't Throw Away that Old Sparton Signal Switch! *By Lee Seats*

In most cases you can restore it to as good as new. These switches are very durable. Most times all that happens is the wire covering rots away with age and the wires short together or the connection fails. Sometimes the switch inside the housing sticks or maybe there's a

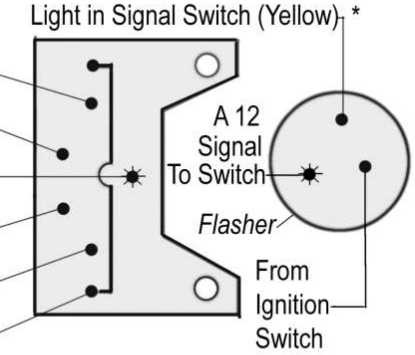
mechanical failure, but in most cases the damage can be corrected.

First remove the switch from the steering column, clipping the wires where they connect under the dash. Leave a little of the wire on the signal switch side or under the dash to help keep track of them for easy replacement. Remove the clip that the hose clamp uses to hold it to the steering column. Then remove the two slotted screws from the back of the housing, allowing the front cover to be removed. Next remove the Philips screw that holds the switching arm in place. Be aware that the spring is under tension so hold on to it (or watch where it lands when it flies across your garage!). With the arm out of the way you can remove the canceling wheel. Remember where the washers and spacers go for reassembly.

Next remove the two Philips screws in the bottom of the housing that secure the switch. Work the wires out of the housing with the switch and put the switch in a vise or somewhere to hold and unsolder the wires. Remove the old wires with a soldering gun or iron *carefully;* don't overheat the fiber material because it can deteriorate. Rewire with 16 gauge wire and use small solder for ease of melting.

WIRE COLORS & CODE

	Sparton	*KM Diagram*
Passenger Rear Signal	Orange	Brown R5
Passenger Front Signal	Green	Yellow L15
Power From Flasher	Black	White A12
Driver Front Signal	Gray	Brown L14
Driver Rear Signal	White	Black R4
Brake Light Switch	Red	White S22



* If using indicator lights on dash, omit and connect each light to front signal lights. Also can use two prong flasher.

You can number the wires to match the King Midget wiring diagram or match the colors the switch had before, which ever works best for you. In the diagram above, I've shown the wire colors used by Sparton and both the colors and codes from the King Midget wiring diagram.

Now you're ready for reassembly. At this point I usually paint the housing black and the canceling arm and hose clamp bracket silver. As you reassemble, spread some light grease on the canceling ramps. This should make your signal switch work like new (which was never all that good!).

The diagram above is the inside of the switch housing and shows where all the wires connect. □

Technical Tidbits

H-11 Last Pushbutton Start and First Inline Fuse *by Gary Wood*

The later 1960's Supplemental Instructions give some interesting information. The copy I have has no specific date but the wiring diagram in it is dated "March 1967" This states:

"All King Midgets manufactured since 1966 beginning with Serial No. K660390 are equipped with an inline fuse to protect the electrical system from possible permanent damage. This fuse has a 20 amp rating and is connected in series with the 5-10 lead, on the diagram, at the solenoid.

All vehicles manufactured before June 1966 are equipped with a button type ignition. Vehicles equipped with a button start differ from the diagram in that the S-9 wire connected to the starter switch goes to the starter button. The solenoid is a different part number but is connected to the circuit the same way. When ordering parts make sure to specify the type of ignition switch and serial number of your King Midget." □

Note: Dick Russ created a 6V wiring diagram when restoring his KM and its update (See H-12). It is followed by a 12V wiring diagram (H-13).

H-12 6V Wiring Diagram

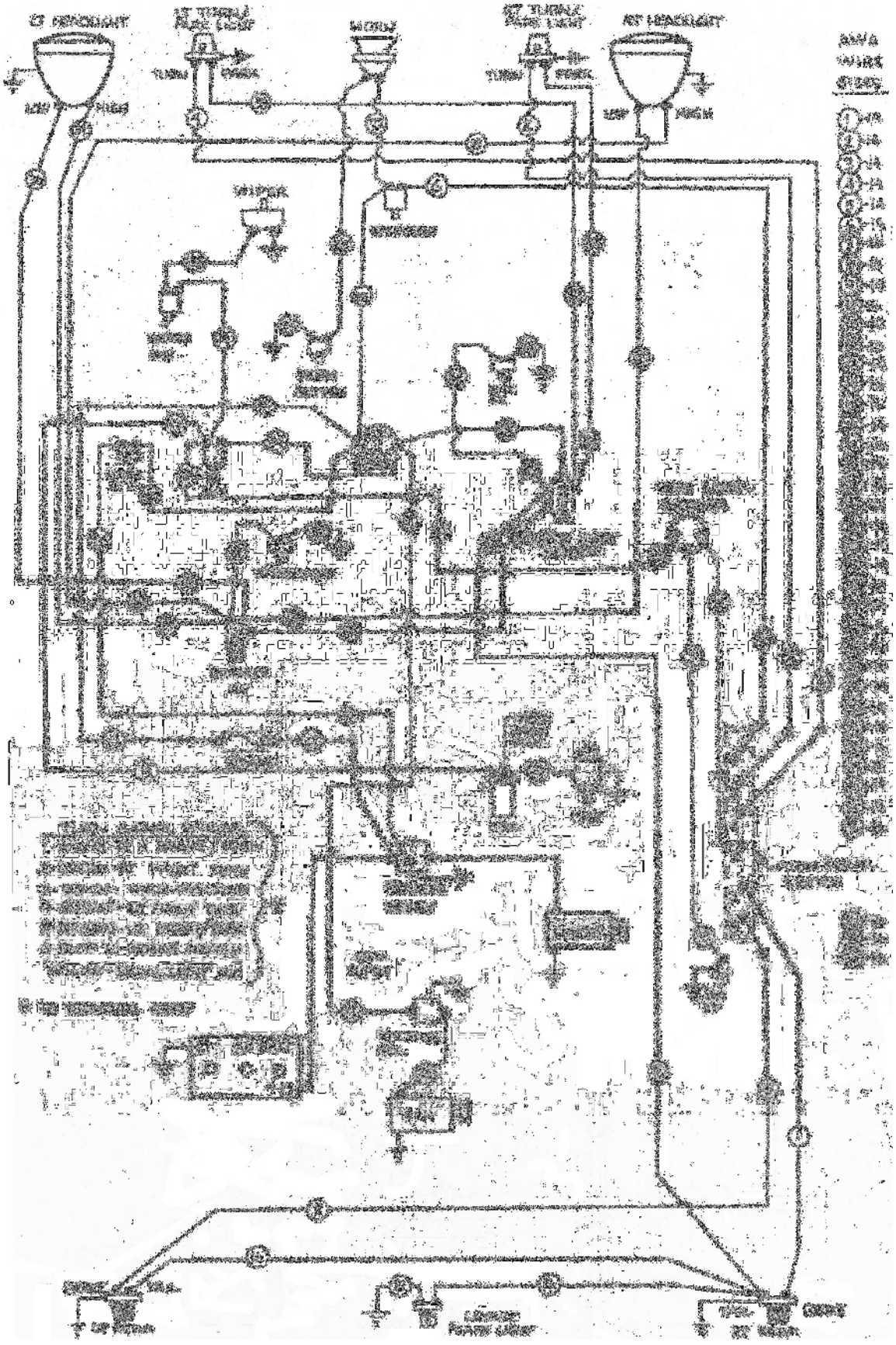
Dear Readers: *A "correction" of sorts. I printed that 6-V wiring diagram in the fall newsletter for the second time, in smaller scale with a little more information added. After sending it off to be printed, I remembered somebody had suggested a correction. I looked in my files and found two scribble "corrections." One said wire #16 from ignition to amp should be #14, and that got changed before going to print. The other shows wire #20 from the brake switch to the amp going to the right side of the amp instead of the left. I asked John White if he could straighten me out, thinking he'd been the one who mentioned it before.*

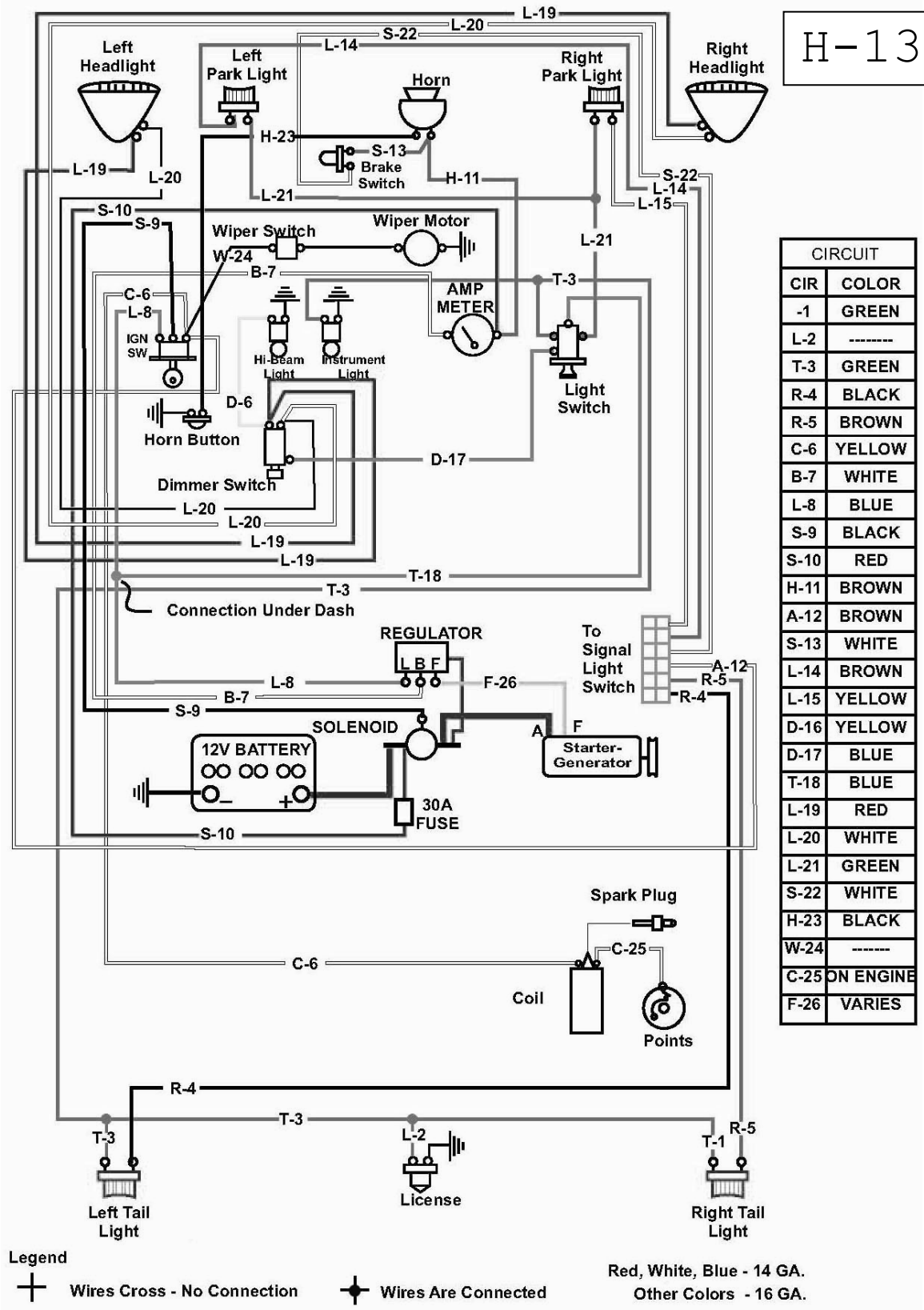
Bob: I'd have to look at it again. But mainly it would be according to whether you were wiring it as 6 volt positive ground or 6 volt negative ground. Originally they were 6 volt ground, which would need the wires on amp meter. It would be the same as the 12 volt if you were wiring it as a negative ground. Or the connections would be opposite if positive ground. **John White**

Thanks for clearing that up, John. Dick did switch the ground, and explained about the

ammeter in the text! I'm a slow catcher-onner.

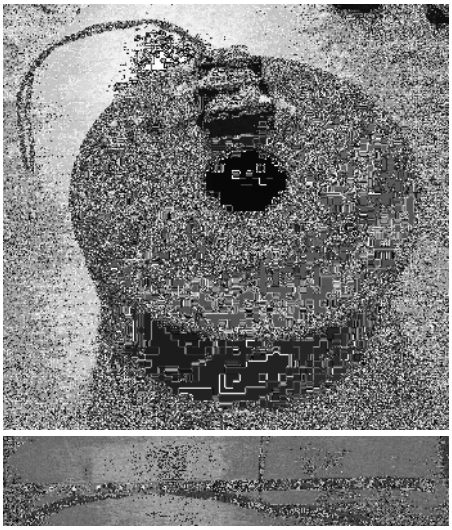
H. Electrical

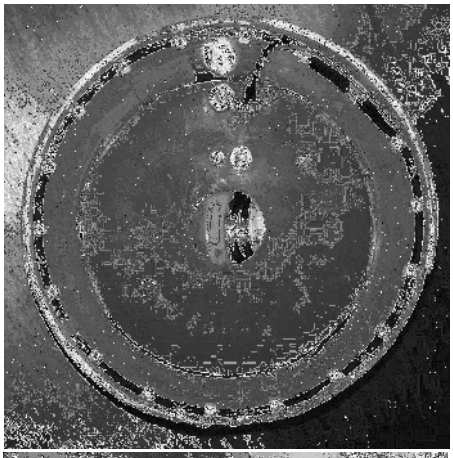




CIRCUIT	
CIR	COLOR
-1	GREEN
L-2	--------
T-3	GREEN
R-4	BLACK
R-5	BROWN
C-6	YELLOW
B-7	WHITE
L-8	BLUE
S-9	BLACK
S-10	RED
H-11	BROWN
A-12	BROWN
S-13	WHITE
L-14	BROWN
L-15	YELLOW
D-16	YELLOW
D-17	BLUE
T-18	BLUE
L-19	RED
L-20	WHITE
L-21	GREEN
S-22	WHITE
H-23	BLACK
W-24	-------
C-25	ON ENGINE
F-26	VARIES

H-14 Gauge Lights for a King Midget *By Bob Olbers.*





I ENJOY DRIVING MY KM AT NIGHTTIME, but I have never been happy with the feeble illumination from the single-bulb dash lamp. One evening a while back, I was holding a flashlight behind the dashboard and noticed that light was shining through onto the speedometer face. Further investigation revealed that the speedometer has four windows which are apparently intended to allow this sort of illumination from behind.

I constructed a metal "can" by TIG welding a section of 4" exhaust tubing to a circle I cut out of some 1/16" sheet steel with a saber saw. I used the speedometer clamp as a guide for cutting the tubing to length and marking the necessary hole locations in the base of the can. I drilled the large center hole with a step drill.

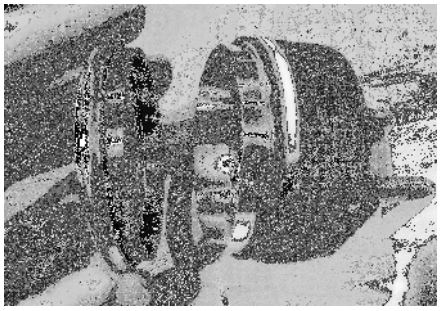
The can replaces the stock speedometer clamp and provides a location for the instrument lighting. I had to make a notch in the can to clear one of the dashboard mounting brackets. When the metalwork was complete, I painted the outside a nice shade of "Midget Motors Red Oxide" primer. The inside was already aluminized, so I left it that way.

For lights, I used a strip of "warm white" LEDs of the type commonly used for under-cabinet lighting:(Superbrightleds.com p/n NFLS-WW30-DI 50cm[19.7in] Warm White)

These strips can be cut down to fit a variety of applications. I used some heat-shrink tubing to carefully strain-relieve the wires before adhering the LEDs inside the can. I attached a cut-down terminal strip to the back of the can to simplify wiring. The wires were routed through a hole in the strip and then fixed in place with a bit of clear silicone caulk.

The lighted speedometer looked great, but now the ammeter looked out of place.

I initially purchased a lighted "2 inch" Stewart-Warner ammeter to replace the stock Rochester unit, only to discover that it is really 2-1/16 inches in diameter and wouldn't fit in the dash. A sane person might have simply enlarged the hole a bit, but I am very obsessive about keeping any modifications I make to the car bolt-in and easily reversible, so this approach wouldn't work for me. I tried to find a lighted gauge with the appropriate look and diameter, but to



no avail.

I found an inexpensive ($12), made-in-the-USA ammeter (Steiner Tractor Supply p/n ABC016) and bought a pair of them to play with. These gauges have plastic bodies, so they are fairly easy to modify. I needed to make a window for light to come from behind the dash and illuminate the gauge face. Because the ammeter is fairly thin, I also needed to backspace the gauge face about a quarter-inch to make room between the back surface of the dash and the gauge face for the window.

I carefully disassembled the gauges by working the rim of the bezel free with an assortment of screwdrivers. I used a fixture to hold one of the (empty) gauge bodies in place while I used my table saw to cut a 1/8-inch slot just above where the gauge face sits. The slot is at the top of the gauge and extends to the limits of the needle travel. I used a laser cutter at my job to make a thin ring from white translucent plastic the same diameter and thickness as the gauge body and epoxied a section of this into the slot. There are many other ways one could accomplish the same thing without using a laser cutter. Finally, I used a belt sander to remove the rim where the bezel had been crimped.

I cut away the back half of the second gauge body on a bandsaw just above the surface where the gauge face rests. I cut and formed some thin aluminum sheet to make an extra-deep replacement trim ring for the new gauge. This ring also provided a large gluing surface. I cut a slot in the aluminum to clear the window.

After dry fitting everything together, I assembled the needle and gauge face into the back half of the new gauge. I epoxied the trim ring carefully into place, then added the front half. My original attempt at this used common “5-minute” epoxy. Unfortunately the joint between the trim ring and the gauge front failed when I attempted to fit the gauge into the dash. I bought some Loctite brand epoxy made for plastics from Home Depot for another attempt. I cleaned off the epoxy residue, roughed up the aluminum and plastic surfaces and drilled some holes around the periphery of the gauge front to provide additional gluing surface. The reassembled unit worked out fine. Once the epoxy had fully cured, I sanded the outside of the gauge until it fit snugly into the dash.

I used some of the leftover LEDs from the speedometer to light the ammeter. I cut down a Nibco 4804 PVC drain adapter to make a ring for the LEDs. I epoxied a section of the ammeter clamp into some slots I made in the ring and added a terminal block for the wiring.

H. Electrical

I added an inline fuse to the dash lamp wiring and then soldered a wire to the original lamp socket's hot terminal. I connected this wire to the terminal strips of the two gauges.

This gauge-lighting project was a lot of fun and I especially enjoyed figuring out solutions to the problems as they arose. The lighted gauges look great and really give the dash some personality at nighttime. □