

Introduction

The scope of this article is to discuss alternatives to the stock Lucas alternator on negative ground MGB's. The intention isn't to cover positive ground cars or to attempt to convince you to convert generators to alternators.

The role of the battery in your car, is mainly to power the starter and ignition for long enough to get the engine started. After that, the role of supplying amperage for the coil/spark plugs and accessories falls to the alternator. While the car is running, the alternator will charge your battery back up and keep the ignition, lights and accessories going. When the alternator stops doing that job, your battery will keep your ignition system running for a time... hopefully long enough to get home or somewhere safe.

MGB Alternators

The issue generally with alternators on any car is that they are mechanical devices that contain electronics. Given enough time and use they *will* fail, either because rotating parts wear out, or because diodes blow. Unlike other engine or drivetrain parts, a failure of the electronics will come without warning. The red lamp on the dash comes on, and/or your battery stops charging and the clock starts ticking to get the car home before the battery runs out of juice. For all the joking we do about Lucas electrics on our cars, there is nothing inherently wrong with the engineering of the Lucas alternators. The design principles are the same as all other modern automotive alternators and the originals don't really fail any more often than other contemporary units. The worst we can say is that they are a product of their age. The available engineering leads to a maximum amount of power for the size and the limited OEM use on British cars of the era means replacements aren't likely to be sitting on the shelf in the local Canadian Tire. The discussion of alternatives is driven by two main concerns: Output and availability. The original Lucas units have limited output for modern needs and overload can cause poor accessory performance and if continually overstressed, overload leads to premature alternator death. When that happens, sourcing a rebuild or replacement can put your car out of commission for couple of days.

Original Lucas Generations

The original Lucas alternators used in MGB's fell into four main generations.

- Lucas 16AC: From 1967-1968 with an output of 34 Amps
- Lucas 16ACR: From 1969 – 1972. The "R" denotes the internal regulator. It supplies up to 34 Amps. This was available with two different connectors in those years.
- Lucas 17ACR: From 1973 – 1975. Improved the output to 36 Amps.
- Lucas 18ACR: From 1975 and onward. Supplies up to 45 Amps.

Over the years as alternators have failed, owners of MGB's have fit the best available alternator and have adapted plugs etc. to suit. It is not reliable to select your existing alternator or connector based on the year of your car.



Load

The load we ask the alternator to carry can vary wildly. Even on a stock MGB the Amperage needed can begin to climb past the limit when many accessories are used simultaneously. (Or when a failure happens like a wiper motor stalling) On a cold, rainy night, with lights, heater and wipers on, you pull up to the stop light and flick your turn signal on. Your headlights dim...

You can see that the Amperage can add up quickly.

- ⦿ Ignition ... 2 Amps
- ⦿ Headlamps.....9 Amps
- ⦿ Wipers...9 Amps
- ⦿ Radio...2 Amps
- ⦿ Heater Fan...3 Amps
- ⦿ Turn Signals...4 Amps
- ⦿ Electric Rad Fan... 12 Amps
- ⦿ Horns... 10 Amps
- ⦿ Plus other possible modern additions such as in my roadster:
 - Heated Seats... 14 Amps
 - Amplifier... 20 Amps
 - Powered Subwoofer 15 Amps
 - Phone/GPS/GoPro...5 Amps

Output at Idle

Your first instinct is to look at the list with relief as you see that you're still drawing less than the 36 Amps your Lucas is rated for. However, it's important to remember that the output of the alternator varies with RPM. In the scenario where you're idling at a stoplight, the maximum output of the alternator is less relevant than what it can actually output at idle. You can't achieve that 36 Amps unless you run the alternator up to about 5000 RPM.

An MGB with a 6" crank pulley and a 2.5" alternator pulley has a ratio of 2.4:1. The alternator shaft revolves 2.4 times every time the engine turns once. So if you're idling at 800RPM, the alternator is turning at 1920RPM. If we look for example at the output curve for the 17ACR, at 2000RPM you only have about 22 Amps available not 36.

Alternative 1: Bosch

For many years, the best available replacement for MGB's was the Bosch alternator installed OEM on 1978-1980 Ford Fiestas. (Bosch 13107/13280). This is nearly a drop in solution as the unit fits without modification and the plug from Lucas 18ACR cars even plugs into the Bosch. This unit will supply up to 55 Amps and can be sourced for less than \$100. At idle, the Bosch should deliver around 30 Amps. However, it is becoming even rarer than the Lucas to find, so for the small increase in available Amperage, you are sacrificing availability.

Alternative 2: Delco / Saturn

The primary objective of this article is to discuss the use and installation of the Delco alternator. The Delco CS130 was installed on various midsize GM sedans through the mid 1990's. The easiest parts counter cross reference to use is for a 1995 Saturn SL, SOHC. (Which is why this solution is often called the "Saturn Alternator"). Depending on the rebuilder, this alternator will put out a maximum of between 96 and 110 or more Amps. It is available on the shelf at many auto parts shops, or can usually be brought in within a few hours. At some point, someone with tremendous visualization capabilities realized that this alternator would fit in an MGB if the case was "clocked". In other words, the mount points on the case will line up with the available MGB points if you remove three bolts on the alternator and rotate the housing 120 degrees. Using this alternator does require that you also use a GM connector "pigtail" to plug into it, which in turn means you need to cut the old Lucas connectors off your harness.

For the effort, the benefit you gain is output. At a 2000 RPM alternator idle, you have up to 71 Amps at your disposal. In addition to the output and availability advantages, the Delco is a couple of inches shorter than the Lucas, giving you a bit more space in the engine compartment for oil changes etc. It's worth noting that at a given RPM, the Amperage rating is a maximum possibly available. An alternator will only output the number of Amps that the electrical system is calling for at any point in time. Installing a 100 Amp alternator does not mean all 100 Amps are coursing through your wiring at all times.

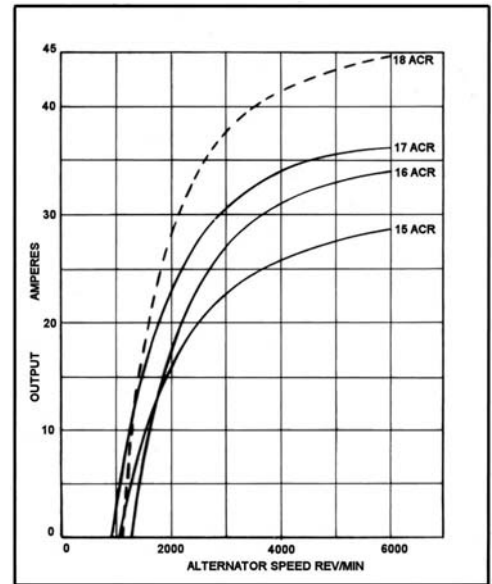
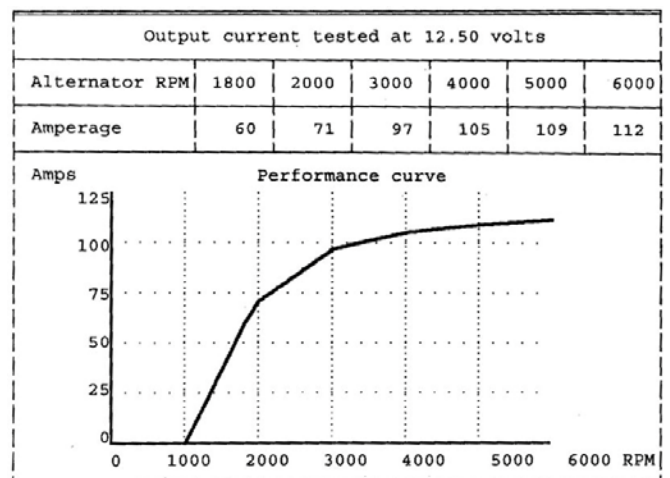


FIG 1. ALTERNATOR PERFORMANCE CHARACTERISTICS



These test results are collected with highly sophisticated computerized test equipment and can not be duplicated with regular bench type testers!

Process 1: Alternator Preparation

Items needed: CS130 Saturn Alternator, Single V alternator pulley, E-9 External Torx socket, GM 3-wire pigtail.

1. Loosen and remove the three torx head fasteners that connect the two halves of the alternator. Do not separate the halves.
2. Rotate the face (pulley end) clockwise 120 degrees until the next set of holes line up.
3. Reinstall the 3 Torx fasteners and tighten them back up.

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4. Remove the multi-rib pulley. The nut is usually 24mm and the shaft center is a 6mm or 1/4" Allan key. The easiest way to remove it however, is with an impact wrench and a gloved hand on the fan.
5. Install a single V pulley. Use a spacer if the pulley does not have a flange on the inside face to support the center.



Process 2: Conversion Preparation in Your Car

1. Disconnect the battery! The brown circuit we are working with is always live and is unfused.
2. Clean up the wires leading to the alternator enough to see the colours.
3. Pull the Lucas alternator plug or plugs from the alternator.
4. Disconnect the leads to the Temp Sender (green with blue), Distributor (white with black), Oil Pressure Sender if you have one (white with brown) to give you some slack on the harness.
5. Clean the GM pigtail and identify the S,F,L leads. Do not go by colour as some websites suggest. The colours vary.

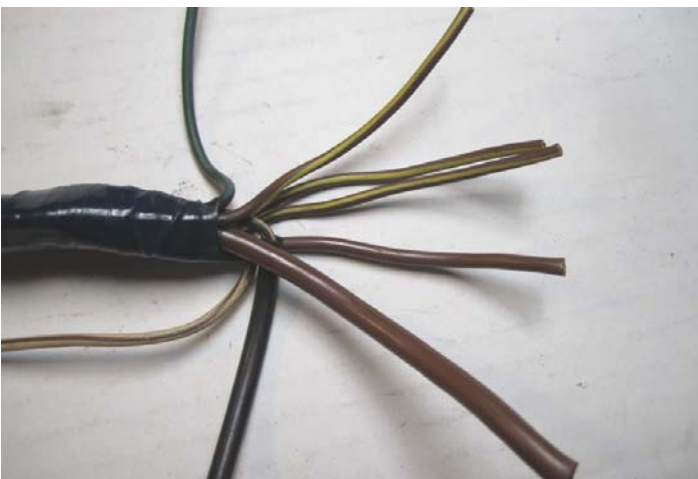


Process 3: Remove Lucas Connector

Cut the one or two Lucas connectors off. Leave two or three inches of wire on the connector so that a future owner can return the car to stock if desired.

You will have:

- One heavy gauge Brown wire
- One (or none) medium gauge Brown wire
- One to three small gauge Brown with yellow wires.



Process 4: Terminate and add GM Pigtail

On the MGB Harness:

1. On the heavy gauge Brown wire – attach a 1/4" Yellow ring terminal
2. On the medium gauge Brown wire – attach a 1/4" Blue ring terminal
3. On the Brown with Yellow wires – bundle them together and prepare them to connect to the GM pigtail "L"

On the GM Pigtail:

1. Heavy gauge wire "S" – attach a ¼" blue ring terminal
2. Snip and cover wire "F" – it's not needed
3. Connect wire "L" to the harness Brown with yellow wires. A tube style butt connector works. Solder and shrink tubing is even better.

Process 5: Alternator Install

1. Remove the Lucas alternator and install the lower slotted bracket snugly (but not tight) on the Delco
2. Test fit the Delco. Use a straightedge to check to see if the pulley lines up with the water pump and crank pulley.
3. The rear bracket is slotted where the fasteners attach to the engine block to allow some adjustment. Reverse the alternator's rear attach bushing if that helps with alignment. If necessary, shim the top attach points with washers. The front of the water pump ear sets the fore and aft position of the alternator. The rear attach point "floats"
4. Install the belt, tighten all fasteners and check to ensure the lower slotted bracket does not foul the alternator fan. If it contacts, grind down the bracket corner slightly for relief or purchase a slightly longer belt.

Process 6: Final Connection

1. Slip all ring terminals on the threaded "B" terminal on the back of the Delco and fasten down with the nut. The nut is likely to be 10mm
2. Plug the GM pigtail connector into the Delco
3. Reattach distributor, temp and oil pressure leads
4. Reattach battery terminal
5. Start the car and check for noises, fouling, looseness, and belt alignment.
6. Check voltage with a multi-meter or voltmeter while the car is running. You should see between 14.5 and 14.8 volts at slightly more than idle.

Final Thoughts

As with my other articles and upgrade suggestions, I would like to point out that there are thousands and thousands of MGB's out there with original Lucas alternators that are humming along just fine. I don't intend to imply that any one of them is about to get stranded at the side of the road without this. Each owner needs to weigh the effort, cost and willingness to install something non-original against the relative merits and benefits. I do try to approach changes in a way that is reversible so that future owners can undo my alterations if they wish to prepare the car for its concours judging.



Supplies and Sources

"Bosch" 13107 (Made in recent years by Remy)

Amazon \$60 <http://www.amazon.ca/BBB-Industries-13107-Alternator/dp/B000CAUYVS>

Parts Monkey <http://www.thewrenchmonkey.ca/products/auto-parts/remy/13107/>

"Delco" CS130 as specified for 1995 Saturn SL SOHC

Napa Auto Parts Canada 96 Amp 3 Year Warranty Power Reman Alternator PN 2134591 \$167

Canadian Tire / Partsource "Champion" 96 Amp Lifetime exchange warranty PN 0198100 \$168

Parts Monkey <http://www.partsmonkey.com/en-ca/part/index/1217618> \$140

Ebay <http://stores.ebay.ca/totalpartscanada?dmd=1&nkw=saturn+alternator> \$142

Mgccars.com Ed Madak supplies a complete ready to install kit - Delco alternator, clocked, correct pulley with pigtail. \$110USD + \$63USD Shipping. (\$230CDN) <http://www.mgccars.com/electrical-upgrades-for-you.html>

Pulley single groove 3 ¼" diameter with 17mm bore. (and spacer if necessary) - Any auto-electric alternator rebuilder - \$10 or less

Delco Alternator Pigtail GM 3 Wire

Dorman 85854

<http://www.thewrenchmonkey.ca/products/auto-parts/dorman/85854/> \$8

<http://www.autopartsway.ca/search.cfm?allveh/allb/allct/allst/search:85854> \$11

E-8 Torx socket

Princess Auto ¼" drive 6 piece set including E-8 SKU 8159121 \$14

<http://www.princessauto.com/en/detail/6-pc-deep-e-torx-socket-set/A-p8159121e>

