From the Garage

by Paul Hunter

Model A Generators

The Model A generator was a 5 brush unit, the shape resembling that of the generators used in large hydro-electric plant powerhouses, thus it is commonly referred to as a powerhouse generator. About October 1928 the powerhouse changed to a 3 brush unit, and about this same time the Autolite style generator was introduced, but not commonly installed until near the middle of 1929.

The Autolite had a rear ball bearing and the output stud was near the front of the case until March 1930. About March 1930 the rear bearing was changed to a bushing and the generator output stud was moved to the rear of the case

An ohmmeter can be used to check the generator field windings. The 5 brush powerhouse should read about 3 ohms, the 3 brush powerhouse about 2 ohms and the Autolite style about 1 to 1 ½ ohms. I like to test field coils by using a 6-amp battery charger with an amp meter. A 5 brush powerhouse should show about 2 amps draw across the field windings when 6 volts is applied, the 3 brush powerhouse about 3 amps, and the Autolite about 4 to 5 amps. A growler is needed to test the armature. A good visual inspection can tell much about the generator. Look for frayed insulation and wires, as well as look for thrown solder where the wires connect to the commutator bars. Look for burn spots or uneven wear on the commutator bars, and smell the field and armature to see if you can detect a burned smell. You can usually spot the burned insulating varnish on the copper wires.

A voltmeter is handy to test for a poor connection. Set the meter to the lowest DC VOLTS setting and connect the + lead to the most positive side of the connection being tested, and the - lead to the more negative side. For instance, if you are testing the ground brush on the powerhouse you would connect the + lead to the small copper wire coming from the ground brush and connect the - lead to ground. If all connections are good you should show no voltage on the meter. On a couple powerhouse brush holders, I have found the post holding the ground brush spring had a poor connection to the steel-mounting strap. This is easily fixed by soldering the base of the post to the steel strap of the brush holder. I have also found where the 2 field coils are connected on the Autolite generators; the wires were simply twisted together and not soldered, thus resulting in a poor connection.

The Model A generator is an unregulated generator, meaning the third brush is adjusted for a set output, and a set amperage is going to the battery, whether the battery needs it or not. When an extra load is put on the charging system, by turning on the lights, then the amps are taken from the battery, unless the third brush is adjusted for more output.

Since the generator is unregulated and the output voltage is only held in check by the battery, every part of the charging circuit must be in good working order to prevent runaway high voltage. Starting with the generator, it must have a good ground. The generator output strap to the cutout must be clean and tight. The cutout contacts must be clean for good current flow. The wire leading from the cutout to the terminal box must be good, and the connections inside the terminal box must be clean and tight. The two short wires leading to and from the amp meter must be clean and tight, as well as the special nuts on the ammeter terminals. The wire leading to the starter switch terminal must be clean and tight. And finally the battery cable leading from the starter switch back to the battery must be clean and tight, as well as the battery posts and ground connection. Don't overlook the possibility of the heavy cable inside the battery terminal having a poor connection. I've seen a couple cables pull right out of the heavy lead terminal. Any fault in the charging circuit just described will result in the battery not being able to control the generator out-put voltage. Since the power for the lights is picked up at the cutout, any fault in the charging circuit will let the generator put out up to 40 volts, which will immediately burn out light bulbs.

The generator armature produces ALTERNATING current, which is changed to DIRRECT current by the commutator bars and brushes. The generator output is controlled by the strength of the magnetic field and the speed at which the armature rotates through that magnetic field. The field windings get their voltage to create the magnetic field from the adjustable brush, which picks it from the

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armature. When the adjustable brush is moved towards the ground brush, the field voltage is lowered, and when it is moved towards the output brush the field voltage is increased, thus a stronger magnetic field and more voltage out the armature to the output stud. So, even if the adjustable brush is set to the lowest setting, where it might only be using a tenth of the out-put voltage, this still increases the magnetic field, which increases the output, which in turn again increases the magnetic field, etc. until you can reach up to 40 volts unless the battery is connected to hold the voltage in check.

This type of unregulated charging isn't the best system, as the battery is almost always being undercharged or overcharged. Lead acid batteries work best and have the longest life when kept at a full charge, without being overcharged. Overcharging will result in more rapid water loss, and extreme overcharge can buckle the lead plates and ruin the battery.

A typical lead acid car battery will have about 6.7 volts in a fully charged condition. A voltage regulator can detect a drop in voltage and will apply more voltage to the field windings to increase the generator output to maintain the 6.7 volts for a fully charged battery. When the battery has its full charge the electronic voltage regulator will cut back the voltage to the field windings, to the point that the amp meter will show about 0 amps or just a bit above 0. When the generator is putting out very little, then the pull on the engine and belt is very slight, which also helps to save gas and belts. The belt doesn't need to be very tight for proper operation. Midway from the fan to the generator, I can easily push and pull the V belt at least an inch by hand. For those using an alternator with the small pulley, you have less gripping surface, so the belt must be much tighter.

The Autolite style generator has no fan and no cooling holes, so it's safe output is kept to about 12 amps continuous, and the powerhouse can safely maintain about 15 amps output. Both styles of generators are more than enough for the Model A needs. A good generator will start producing enough voltage to run the car at about 800 to 900 generator RPM, which is about 550 to 600 engine RPM.

The cut-out is simply an OFF-ON switch, which disconnects the battery from the generator when the generator output falls below about 6 volts. The original cut-out has a long fine winding of about 50 ohms, which pulls the contacts together when the generator output reaches about 6 volts. The generator output then flows through the contacts and a short heavy winding, which helps to keep the contacts pulled together. When the generator output drops below battery voltage, then the current starts to flow from the battery to the generator. Since the heavy cut-out winding in wound in the opposite direction of the fine pull-in winding, this counteracts the magnetic pull of the pull-in winding and the cut-out contacts open by the force of the spring. Most original cut-outs have the cover secured by two small spot-welds near the bottom edge. These welds can be separated by using a sharp thin chisel, if the cut-out needs to be worked on. The cover is a snug fit and the two terminal screws and insulator blocks will keep it in place, so there is no need to weld or solder the cover. I often have to work on cut-outs to solder a broken pull-in winding wire, or to clean the contacts, or adjust the spring for a contact closing voltage of 6 volts. I think most cut-out problems are a result of overvoltage due to a poor connection in the charging circuit, when using an unregulated generator. My original cut-out when used with my powerhouse and electronic voltage regulator has been flawless for several years.

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