...and be sure to say "BLUE STREAK" when ordering BATTERY and IGNITION CABLE!

the WHYS and HOWS of voltage regulators

a few DOs

DO make up your mind that . . . a new regulator won't fix anything that's screwy in the rest of the system. You can put in one or five new regulators and still be in trouble if you have a bad battery—a loose connection—a grounded generator field.

DO polarize the generator . . . any time you do *any* work on the generator or regulator—anybody's regulator. It's very simple and quick . . . after you install the regulator and before you start the engine, just touch two ends of a wire to the A and B terminals of the regulator . . . a pair of pliers . . . anything of metal . . . count one, two, three, four and it's done. *What if you don't? . . . you'll be sorry, that's all. You'll burn up the cutout contacts and nobody will like you.*

DO read the instruction sheets . . . you may not put on a new regulator, but you won't kill it either. And, when you do put the new one on, it will stay put . . . it will work . . . just a little thing like a satisfied customer.

DON'T try to check a regulator when it's cold . . . it has to be at operating temperature, 145° to 150°. No thermometer? Try this: run it until it feels hot to the touch and too hot to hold on to.

all of this applies to any regulator . . . anybody's make

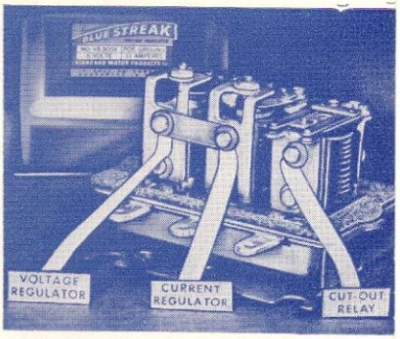
A VOLTAGE REGULATOR is on the car just for one purpose . . . to keep a normal generator battery system in balance. Yes, a normal system, a system that has a good battery, a good generator, no loose or high resistance connections . . . a system that is 100% O.K.

It gives the battery a high charge . . . a lot of juice—when the battery is low, it cuts down the charge as the battery gets filled up.

THE VOLTAGE REGULATOR CONSISTS OF 3 UNITS:

The Cutout . . . *that's the one on the end with a heavy winding.*

The Voltage Control . . . *that's the one on the other end without a heavy winding.*



The Current Control . . . *that's always in the middle.*

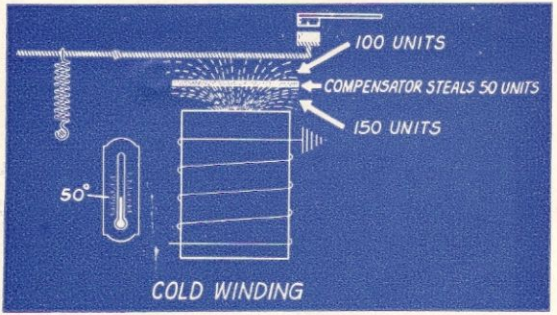
THE CUTOUT:

Just an automatic switch . . . has nothing to do with actual voltage regulation. It's there to connect and disconnect the generator and the battery to and from each other at the proper time.

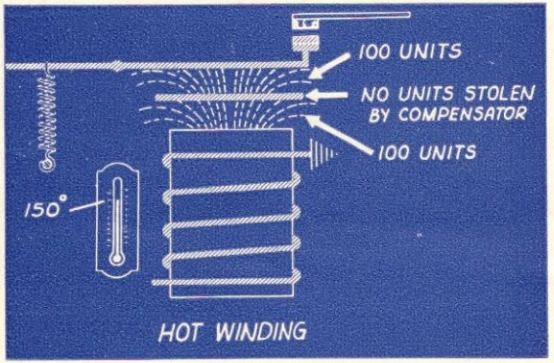
It works like this:

The generator creates all the electrical energy available in the car system. It creates energy only

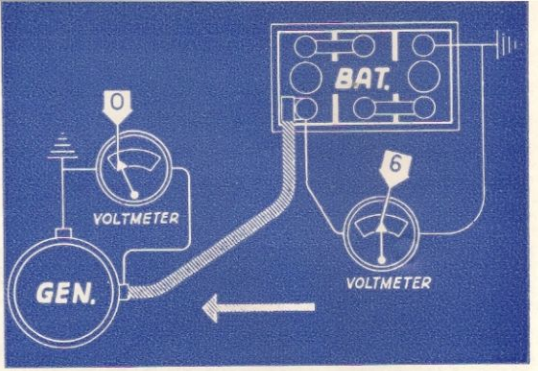
good magnet and shorts out or actually steals 50 units out of the 150. Only 100 units reach the armature . . . just what we need.



After a while the winding gets hot . . . the resistance increases . . . the winding weakens and produces only 100 units of magnetism. At the same time, the compensator also heats up . . . It is not a magnet anymore . . . it steals no more units and the whole 100 units reaches the armature. That is again what we need.



That's all there is to the mystery box, the voltage regulator.



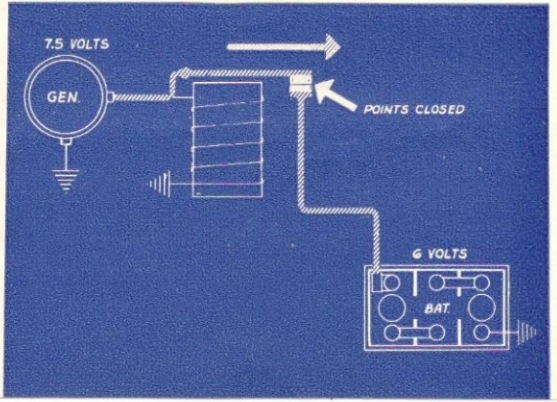
So —

(A) We must arrange to connect the generator to the battery when the generator operates.

(B) We must separate the generator from the battery when the generator is idle.

The Cutout does it this way:

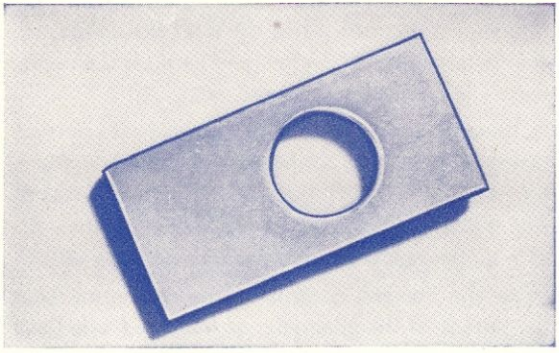
The generator operates . . . sends current through the winding of the cutout . . . the winding becomes an electromagnet . . . attracts the armature . . . this closes the two points . . . current now flows from the generator to the battery.



TEMPERATURE COMPENSATION

That's another thing we have to take care of to keep a regulator working through thick and thin, hot and cold. That's it . . . hot and cold . . . the regulator starts cold and gradually gets hot. That's where the snag comes in . . . it would work differently at different temperatures if we didn't do something about it. It's those regulator windings we were talking about. They're really like spools of fine copper wire with an iron core in the center. Like all electrical conductors, copper wire has a low resistance when it's cold and a high resistance when it's hot.

Low resistance, a lot of current . . . a lot of current, a lot of magnetism . . . a lot of magnetism, a strong pull on the armature. And vice versa. So if we don't take care of this hot and cold business, the regulator armature will go crazy trying to keep up with the winding. So we add the compensator . . . a sort of temperature sneak thief.



This compensator is a plain looking piece of

So: When we want to send a lot of current to the battery, we make the field coil stronger and vice versa.

How?—Resistance!—You know how it is: Put resistance into an electrical circuit and you cut down the current in it . . . cut out the resistance and you increase the current. *Just what the doctor ordered for the voltage regulator. Here is the prescription:*

Take one generator armature . . . connect it to the battery and also to a magnetic winding. Add one armature over the winding with a contact at one end and a spring on the other end . . . the spring tries to pull the armature up, away from the winding . . . the winding, when it gets enough current, will try to pull the armature down, against the pull of the spring.

When the armature is up, its contact closes against a mating contact above it—when the armature is down, the contacts are open. Now add one set of generator field coils. To operate, the field coils must be provided with a path to ground. We will provide the path but in our own way.

Now connect the field to the regulator armature. Connect the upper contact of the regulator to ground. Now we start the engine. The generator is turning over fast enough to send out current. Let it run while you take a look at the diagram to see what is happening.

Right now the regulator armature is up . . . the contacts are closed, and you see that the generator field has no trouble at all getting to