SERVICE BULLETIN No. 48-46

THE INSTRUCTION SHEET REALLY TELLS YOU HOW

Despite the numerous Service Bulletins issued by us on the subject of voltage regulators, we learn from reports and inquiries that the servicing of regulators is still being done in a haphazard way and the consequent results are far from satisfactory, both to the mechanic and to his customers.

Surprising as it may seem, we encounter any number of cases where the wrong analysis of the trouble and the failure of a voltage regulator can be traced directly to the astonishing fact that the mechanic chooses the expensive and uncertain guesswork method in preference to the quick and simple method of following the instruction sheet.

Let us take the matter of polarizing the generator whenever a regulator is installed. It is an established fact that failure to polarize the generator will damage the contact points of the regulator. We try to call this matter to the attention of the mechanic in a forceful manner by service bulletins and by complete and detailed instruction sheets. In addition, when the mechanic removes one of our regulators from its box, he finds a paper band fastened around the cover of the regulator. On this band, among other instructions, is printed the following: "BE SURE TO POLARIZE THE GENERATOR (See instructions)". The instruction sheet then explains in detail the method of polarizing the generator, which is a very simple process in spite of its difficult-sounding name.

Even with these precautions, we have come across case after case in actual personal consultation with mechanics, where it was brought to light that they neither read the instruction sheet, nor polarized the generator—and thereby got into trouble.

A word about our voltage regulator instruction sheet. When we made up our instruction sheet for voltage regulators, we decided not to limit its scope to our own regulators, but rather, to make of it a piece of general educational literature that would apply to all phases of voltage regulator servicing and to all makes of regulators. In other words, if you follow the general instructions given in our sheet, you can service any popular model regulator.

We want to bring our instruction sheet to your attention once more. The first page, excepting some data concerning the application of the particular regulator, consists of general information of the servicing of regulators.

It tells you, for instance, that it is useless to install a new regulator before you find out what is wrong with the old one or whether the trouble is in the regulator at all and not in the battery or generator; it tells you how to determine this with the aid of just a piece of wire and without instruments of any kind; it tells you how to prevent a newly-installed regulator from failing in the same manner as the old one did.

AND IT TELLS YOU HOW TO POLARIZE THE GENERATOR.

In a word, you can avoid most of the pitfalls that trip up the unwary mechanic who simply installs the new regulator in a hit-or-miss manner in the hopes of curing the customer's car, while the trouble may be anything but the regulator and is therefore not cured at all.

SERVICE BULLETIN No. 28-40

TROUBLE SHOOTING WITH A LOW-READING VOLTMETER

We have always advocated the use of a good low-reading voltmeter for quickly locating electrical troubles on the car. To give you an idea of the saving in time and labor that may be effected through the use of this meter instead of guessing at the trouble, we list below several tests and the method of testing.

TO TEST THE GENERATOR CUTOUT ON THE CAR

Start the motor.

Put the voltmeter prod on the generator side of the cutout, if the battery is grounded on the negative post.

Put the handle prod on any convenient clean ground.

(If the battery is grounded on the positive post, reverse the above connection).

Do not depress the switch button at the side of the voltmeter.

Gradually increase the speed of the motor while watching the voltmeter. When the needle reads between 7 and 7.5 volts on the top scale, the cutout points should close, which will be indicated on the meter by a slight drop of the needle. If the points do not close at 8 volts, the cutout is not adjusted properly and it is advisable to replace it.

TO QUICKLY CHECK THE VOLTAGE REGULATOR

Run the motor at maximum charging rate for about ten minutes. Put the voltmeter prod on the "A" or "G" terminal of the voltage regulator.

Put the handle prod on the "B" terminal of the voltage regulator.

Depress the switch button at the side of the voltmeter.

If the reading on the bottom scale of the voltmeter is more than .2 volts, the indication is that the voltage regulator is not operating properly.

TO TEST A DISTRIBUTOR AND BREAKER POINTS

Very often an overhauled distributor apparently fails after a short time of service. Many such failures are due to excessive use of oil on the distributor cam. After the car leaves

the service station in apparently good condition, the rotation of the cam throws the oil in all directions and some of the oil gets on the tungsten surface of the points. This covers the contact with an insulating film and causes failure.

It is recommended that all distributors be checked with the Hoyt voltmeter as per the following instructions. In the case of a bench overhauled distributor, run the motor at medium speed for ten minutes after the distributor is installed and then checked.

Turn on the ignition but do not start the motor. See that the breaker points are open.

Put the voltmeter prod on the distriubtor side of the ignition coil, if the battery is grounded on the negative post.

Put the handle prod on any clean convenient ground.

(If the battery is grounded on the positive post, reverse the above connections.)

Do not depress the switch button on the side of the voltmeter.

The reading on the top scale of the voltmeter should be about 6 volts. A reading of less than 6 volts indicates a loose connection inside the ignition switch, or between the switch and distributor.

Repeat this test between the distributor stud to which is connected the coil wire, and on the insulated breaker arm. A reading of less than about 6 volts on the top scale indicates an imperfect connection. No reading indicates a complete open or a ground in the insulated bushing that goes through the distributor case.

Now close the breaker points and put the two prods across the points. There should be no reading on the voltmeter. Any reading whatsoever indicates the presence of dirt or oil between the contacts.

With the points still closed, test between the insulated breaker arm and the motor. There should be no reading on the voltmeter. A reading would indicate that the distributor is not making a good electrical contact with the motor, which wlil result in poor performance.

A remedy for this condition is to connect a piece of wire between the distributor body and the nearest convenient spot on the motor, in other words, an artificial ground to replace the defective ground.

These tests are typical of the many uses to which a good voltmeter can be put.

SERVICE BULLETIN No. 58-49

YOU MUST MATCH THE REGULATOR TO THE GENERATOR.

It seems that no matter how much information is disseminated regarding Voltage Regulators, the trade manages to introduce new angles that cause trouble. It is done in the weirdest manner that cannot be foreseen by the educator or engineer.

Just listen to this one, and see whether you could have guessed what the trouble was. A complaint is received from a large fleet owner who operates a number of Dodge trucks that the Voltage Regulators on these trucks go bad in two weeks of operation. The Regulators are sent in to us and show signs of abnormal arcing of the voltage control contacts, actual fusing in some cases. The fleet owner obligingly specifies the year and model of the trucks, and a check-up shows the type of regulator used is the correct one for that truck.

Where do we go from there? Theoretically the problem is very simple: we know that excessive arcing of regulator contacts is always due either to the use of the wrong type of regulator for the particular application, or to an unbalance in the generator-battery circuit: a high resistance connection, a sulfated battery, etc. According to the customer's report, the type of regulator used was apparently the correct one for the application, which did away with the first possibility. As for the second probable cause, we could not say that *all* of the trucks had unbalanced systems.

Evidently the crystal-ball type of trouble chasing would not work in this case. Fortunately, one of our field engineers was then in that vicinity, so we instructed him to pay a visit to the fleet owner.

He did so, and then came the answer to the puzzle! Yes, the regulator was the right type for the particular trucks, but... just before the trouble developed, the fleet owner purchased a lot of surplus Cadillac generators and had them installed on the Dodge trucks. There was absolutely nothing wrong with this, except that a regulator designed to operate with a Dodge truck generator will not work with a Cadillac generator. The correct regulator for a Cadillac generator was installed, and the trouble disappeared.

It is the generator that determines the proper regulator to be used and not the car or truck model.

Here is another one. A Chevrolet developed generator trouble, and the mechanic installed a rebuilt generator and a three-unit voltage-and-current control regulator. In 40 miles of travelling, the generator overheated and "threw solder". Another regulator was installed and the trouble disappeared.

A clear case of defective regulator, you'd say? So would anyone, if the story were permitted to end at this stage. But an investigation brought out this tale of regulator mayhem: the three-unit regulator was the correct one for the particular Chevrolet, but the rebuilt generator that was installed was a three-brush generator designed for an earlier Chevrolet model and intended to operate with a *two-unit* regulator. (The second regulator that apparently cured the trouble was the correct two-unit type).

We could go on forever describing actual cases of voltage regulator trouble brought about by failure to match the regulator to the generator, but we believe that the above cases are sufficient to illustrate the cast iron rule: *with each generator use only the regulator designed for it.* The instruction sheet we furnish with our BLUE STREAK Voltage Regulator distinctly specifies the model numbers of the generators to be used with it, and you can't go wrong if you consult this sheet before you install a regulator.

When it comes to rebuilt generators, the problem is not so simple, as we have come across many cases where the name plate of the generator was the only part left unchanged by the rebuilder. Autolite type armatures were built into Delco-Remy generators and vice versa, so that the name plate on the generator did not correspond to the actual make up of it. In such cases, trouble will be experienced with voltage regulators and the moral is that extreme caution must be exercised in the handling of rebuilt generators when they are purchased from doubtful sources.

SERVICE BULLETIN No. 60-49

THE HOOD ON MY CAR DOESN'T CLOSE,— SHOULD I REPLACE THE VOLTAGE REGULATOR?

Sounds silly, doesn't it? But it could and has actually happened.

Our good luck in being able to trace down the following case, will serve as a fine demonstration of the care that must be exercised in analyzing electrical trouble on the car.

Soon after this particular car was "winterized", the car owner, Mr. X, became aware of the fact that the ammeter on his car showed a constant high charging rate. While his daily driving consisted of a ten mile trip to and from work, he was used to seeing his ammeter needle register a full charge after starting the car and a reduction of the charging rate after a short distance of travel.

After a few days of this, apparently abnormal charge, the driver became alarmed and brought his car to a service station. You guessed it — without any hesitation whatsoever, the service station mechanic pronounced his verdict: the voltage regulator was shot. A new voltage regulator was put on and the car owner drove off, feeling happy.

But it did not work. The ammeter needle still indicated a continuous high-charging rate and, what's more, after a couple of days, the starter acted sluggish in the morning, as if the battery were undercharged. Although not very familiar with the electrical system of the car, Mr. X had a logical mind and could not see why the battery should be undercharged, with the ammeter showing a constant high-charge, under which condition he expected an overcharged rather than an undercharged battery.

So he went back to the service station and told the story. With just as little investigation and just as much certainty as before, he was told by the mechanic that now the *battery* was shot. What could Mr. X do? If the battery is gone it must be replaced, although he began to suspect that he was being used as a guinea pig. He did figure out, however, that if the trouble was really in the battery, why did he have to pay for a voltage regulator, which was evidently not at fault.

At his insistence, the old regulator was put back and he drove off with the new battery and with his fingers crossed. With the new battery, things were normal for a few days and then the trouble started all over again.

Thoroughly disgusted, Mr. X went to another mechanic with his tale of woe. This man was not certain of the cause of the trouble but said he would make a check-up. He checked the regulator and found it to be operating at the proper voltage. Although the battery was new, he checked it anyway with a hydrometer and a load test, and found it to be O.K. He used his voltmeter on all the connections in the generator-battery circuit looking for a possible loose or high resistance connection, but was unable to find anything wrong.

He finally disconnected the ground strap from the battery post, and connected a portable ammeter between the ground strap and the battery, making sure that everything electrical on the car was turned off, and there he got his first clue: he got a reading on the ammeter, whereas with nothing on the car drawing current, the ammeter should have shown a zero reading. This meant that somewhere current was being used while the car was apparently dead.

He looked around further and noted that there was a trouble light in the engine compartment of the car and that the light was on, as this happened to be a car equipped with a trouble light that goes on automatically when the car hood is raised and goes off when the hood is closed. He took the bulb out of the trouble light, and immediately the ammeter between the ground strap and the battery showed a zero reading.

The mechanic then knew that the trouble had something to do with the engine trouble light. He put back the bulb and closed the hood, but found that the hood did not go all the way down. Peeping into the engine compartment, he found that the trouble light was still on. *That was it! That was the whole trouble!* With the trouble light burning all the time, the battery was being drained overnight and also while the car was parked through the day, and the ten miles the car was being driven through traffic each way daily was not sufficient to make up for the constant drain.

He adjusted the hood catch so that the hood closed tightly thus operating the trouble light switch and turning off the light. He was quite sure that he had located the trouble and asked the car owner to try the car for a day or so assuring him that the trouble was cured and that the charging rate would come down to normal in about that period. *That is exactly what happened.*

The car owner did not go back to the first mechanic, as winter was coming and he figured that he was better off with a new battery anyway. Besides, and here is the moral: he never wanted to go near that mechanic again for any reason.

What happened to the new voltage regulator that the first mechanic had put on and taken off again? Oh, he just brought it back to the jobber and asked for a refund claiming it was defective. *Does that sound familiar?*

SERVICE BULLETIN No. 53-47

VOLTAGE REGULATORS AND "RUSSIAN ROULETTE"

The Russians used to play a game called "Russian Roulette," where a revolver was passed around among the players to demonstrate their courage and luck. Of the six chambers in the revolver, only one was loaded, and the player would spin the cylinder, put the revolver to his head and pull the trigger. The odds for his survival were six to one, yet there were plenty of happy warriors who never lived to tell the tale.

We believe that this game has been outlawed in Russia, but it seems to be very popular in this country except that it is played with voltage regulators instead of revolvers, and the fatality rate is pretty high. A survey of the voltage regulator situation produces the startling and alarming fact that at least 10% of all new voltage regulator installations result in the ruin of the new regulator. In other words, of every ten newly installed regulators, one is positively ruined and of the remaining nine, at least five remain operative just as a matter of luck and not due to anything constructive done by the installing mechanic, any more than the survivor of "Russian Roulette" controls the chances of his survival.

Let us give you an actual case of such "luck" and the chain reaction it sets off. A Pontiac owner complained to his mechanic that his battery was undercharged. The mechanic noted that the charge indicator showed very little charge coming through at any time, so without any more ado he installed a new regulator. This did not change the condition, so he returned the new regulator to his jobber as defective and got a replacement which he installed on the Pontiac. By a coincidence, the second regulator was adjusted about one-tenth of a volt higher than the first one (the standard allowable variation being from two to three-tenths of a volt), and the charge indicator showed a little more charge. He thereupon concluded that everything was shipshape, and sent the customer on his way for a trip of some one hundred miles. Pretty soon the driver noticed that his engine was overheating and was compelled to stop at another service station on the road. There it was discovered that the fan belt was very loose and slipping. A quick adjustment tightened the fan belt, and the engine stopped overheating and, as you probably guessed by now, the driver was delighted to find his charge indicator acting normally. Thus it was luck and not the mechanic's effort that kept the new regulator in service. With less luck, the fan belt might have been tight enough to keep the water pump working yet loose enough to slip on the generator pulley, which would have resulted in an undercharged battery again. Without the luck element, but with proper investigation on the part of the mechanic, the old regulator would have remained in operation and one new regulator would not have been condemned and returned to the jobber.

To follow through, let us see what happened to the returned regulator. The jobber naturally returned it to the manufacturer as defective; the manufacturer examined it, tested it, put it through its paces and could find absolutely nothing wrong with it. Although unused and actually new, the regulator showed installation marks and when the manufacturer returned the regulator to the jobber, the latter found himself in somewhat of a difficulty. He had given a new regulator to the mechanic and had failed to mark the returned regulator with the mechanic's name; he now had on his hands a perfectly good regulator but still not saleable as a new one on account of the installation marks; he could not charge the mechanic with this regulator, nor could he blame the manufacturer for returning to him an unjustly condemned regulator. The final outcome is of no importance, but the trouble it caused is.

How could all of this have been prevented? Very simply, so simply in fact, that it is almost a shame that it has to be told, after having been told so many times. The mechanic should have unfolded the instruction sheet which was packed with the first regulator he got. A quick glance would have shown him a section "No Charge or Low Charge."

"If the complaint is that the charge does not come through or the rate is low with a low battery, start the engine and run it about 25 M.P.H. Touch one end of the piece of wire to the regulator base and the other end to a good ground. If this corrects the trouble, it is obvious that a good ground is all that is necessary. If not, touch one end of the piece of wire to the "F" terminal of the regulator and the other end to the nearest ground. If the charge now comes through or the rate becomes normal, replace the regulator. If not, touch one end of the wire to the "A" terminal of the regulator and the other end to the "B" terminal. If the charge now comes through, replace the regulator. If not, the trouble is in the generator, battery or wiring."

If he had followed these instructions, he would have discovered immediately that it was probably the generator that was not delivering the charge, and not the regulator. In working around the generator, he would have come across the loose fan belt, which is usually apparent to the naked eye, and would have corrected the trouble right then and there. The customer, the jobber and the manufacturer would have been saved expense and trouble and the mechanic would have retained a satisfied customer.

Now let us take an example where a Roulette player was not so lucky and really pulled the trigger on a loaded chamber. With the very same indications of no charge coming through, this might have happened. The generator field coils developed a ground—a not infrequent trouble—and the generator consequently ran wild and put out an abnormal charge which the regulator had to carry but could not control, as the grounding of the field coils automatically by-passed the controls of the regulator. The regulator became overloaded and burned out, so that the battery received no further charge and became undercharged. Again, the mechanic did not investigate, but put on a new regulator. The new regulator, being new, operated long enough to apparently show a charge on the charge indicator but would also burn out sometime during the customer's trip. What would happen after that may vary, but it may be taken for granted that the

customer would eventually get back to the mechanic and confront him with the ruined regulator. Again, the instruction sheet would have saved all this trouble, had it been read and followed; this holds true for any trouble that may develop in the generator-battery system of the car.

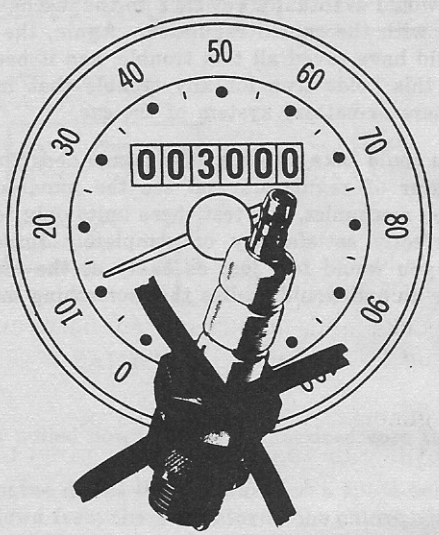
If you could take a look at the return department of any manufacturer of regulators and see the hundreds of units returned by mechanics, and test these units only to find them either perfectly satisfactory or completely ruined by mishandling, you would feel just as badly as the manufacturer and jobber do and would realize that something must be done about it.

Don't you think it is about time to stop playing games with regulators and to realize that guesswork will not do? If this haphazard method of handling regulators continues much longer, the whole industry will suffer and a profitable business will be diverted to just a pitifully few expert mechanics who have taken the trouble to study up on regulators and to learn how to handle them.

Yes, it is extremely sad that each and every mechanic does not avail himself of the opportunity of becoming a real expert by reading and following the instruction sheet packed with each regulator. It cannot locate the trouble for you, but it can and does tell you whether the regulator is at fault.

SERVICE BULLETIN No. 67-52

WHAT? CHANGE SPARK PLUGS AT 3000 MILES???



We were just as shocked as you are when we learned that at the present time automobile and spark plug manufacturers' engineers are completely baffled by the difficulty of keeping high compression engines operating properly without skips and misses at higher speeds, unless spark plugs are replaced about every 3000 miles.

We, ourselves, have been receiving complaints and requests for advice regarding engine skipping or missing. Sometimes the complainant would blame our points or coils and sometimes he was not so sure that he could attribute the trouble to our parts and would frankly ask for advice, admitting that he had experienced the same trouble with other makes of ignition parts on the troublesome cars.

The car manufacturers also have been worried about the increasing number of complaints they have been receiving regarding the sub-standard performance of engines due to missing and skipping at the higher speeds. Their elaborate and extensive research brought to light the fact that the fault lay in spark plug performance and that in order to keep the engine running efficiently, the SPARK PLUGS REALLY HAVE TO BE EITHER CLEANED OR CHANGED AFTER ABOUT 3000 MILES OF OPERATION.

What causes spark plugs to go bad after an unreasonably short service life of only 3000 miles? According to some car manufacturers and a well known spark plug manufacturer, the answer is: "LEAD FOULING". This means that the gasoline used at present, which contains lead, leaves a deposit on the insulator in which the center electrode of the plug is contained, and this deposit is electrically conductive, so that part of the high tension current is short circuited to the grounded metal shell of the plug, and the plug does not fire.

According to the car manufacturer, the lead fouling occurs mostly during periods of slow driving, so that most of the complaints originate in metropolitan areas. The way it works out is something like this: A car is driven for a considerable period of time at slow speed in city traffic; then, when the driver attempts to put on a burst of speed, the engine begins to miss. Therefore, it is recommended that slow speed driving be mixed with occasional high speed operation for short periods. This will not cure the trouble, but will alleviate it to some extent.

Both the car manufacturer and the spark plug manufacturer seem to agree on the necessity for cleaning or replacing spark plugs at 3000 mile intervals. Both realize that this is not a desirable situation and results in dissatisfaction on the part of the car owner, and are therefore conducting continuous and extensive research in order to find a remedy. Until the remedy is found, we want to urge the trade to be careful in analyzing engine misses and to tackle the spark plugs first before changing points, condensers, or coils, as the trouble most likely is not in these units but in the lead-fouled spark plugs.

Another possible cause for misses, even with new or cleaned spark plugs, is found in the newer high compression engines due to induced currents between the high tension wires. As the compression is increased, the voltage necessary to fire the spark plugs under the high compression is also increased. Therefore, the high tension wires carry higher voltages and when they are placed close to each other, leakages and currents are induced between them. To eliminate this type of trouble, it is necessary to separate the high tension wires.

The information we are giving you in this Bulletin should prove invaluable whenever you service modern cars. Whenever you come across cases of misses or skips in the engine, especially at the higher speeds, examine the spark plugs first. If you find traces of foreign material on that part of the spark plug insulator which is normally in the combustion chamber, you will most likely have found the trouble. Clean off the foreign material, square off the center electrode and you will probably cure the trouble right then and there. In many cases, though, you may have to replace the plugs, as the cleaning and adjusting may not be sufficient or only cure the trouble for a very short while. Also remember the tip about separating the high tension wires.

As this information is fresh, hot off the griddle, and very few mechanics are aware of it, you can use it advantageously to cure the troubles the other fellows can't and gain prestige with your customers.