SERVICE BULLETIN No. 76-54

EXCESSIVE BUMPER BLOCK WEAR

Here's how we can kill this GREMLIN!

We have received a number of inquiries regarding excessive wear of breaker arm bumper blocks. Some of the inquiries were in the form of complaints, where our bumper blocks were blamed for the wear, many others were requests for help and information, as the inquirers frankly said that they experienced this trouble with all makes of breaker arms.

This situation is by no means new, as can be shown by referring to our BLUE STREAK Service Bulletin #46-46, written in 1946, the first paragraph of which reads as follows:

> *"Reports have been coming in of ignition failures due to the rapid wearing of the Bakelite bumper blocks on breaker arms. Careful investigation shows that this complaint is not limited to any particular make of breaker arm but is general in scope. From a number of worn specimens and from experiments performed in our laboratory, we have been able to determine the cause as well as the cure for the failures".*

This problem is aggravated more and more and is apt to show up more frequently due to the tough requirements of the present day, such as ever increasing engine speeds and changes in cams.

We have done, and are still doing, a terrific amount of research into bumper block behavior in our laboratory and also in the field. In this bulletin we will give you the results of our findings and tests and will also tell you how to eliminate this trouble, *as the entire problem revolves around proper installation procedure.*

It will be of interest to you that so far as we know that there are only two manufacturers of Bakelite bumper blocks, who furnish them to all manufacturers of ignition systems and parts including original equipment. Our bumper blocks are made by the same manufacturer, of the same material, in the same molds and by the same processes as are the blocks you find on original equipment breaker arms. We know this to be an absolute fact.

In our laboratory we are constantly conducting tests on our products for the purpose of maintaining and improving their quality. For bumper block tests, we have a set-up of multiple distributors, in which original equipment arms and our arms are run side by side, 24 hours a day, 7 days a week, at a speed corresponding to approximately 70 miles per hour of car service. We found that under the proper operating conditions, that is, with the points properly installed, with a good cam, with correct spring tension and proper lubrication, all points, original and ours, work satisfactorily for over 50,000 miles under this severe test. *But, when we disturbed any of the above requirements for proper operation, bumper block wear increased immediately and the distributor became inoperative in a short time, regardless of whether the points were of original equipment manufacture or ours.*

The four factors which affect bumper block wear are:

1. **Proper installation of breaker points.**
2. **Condition of the distributor cams.**
3. **Spring tension.**
4. **Lubrication.**

Let us now take up these four factors in detail, with the understanding that if any one of them is not adhered to when points are being installed, you will have trouble with the installation and *the manufacturer of the points will not be able to help you.*

1 **PROPER INSTALLATION.** This particularly refers to the present types of Delco-Remy points. Our Service Bulletin #59-49 describes and illustrates the proper and improper ways of installing these points. In addition, we pack an illustrated instruction sheet with each set of these points. (DR-1236, DR-1836, DR-1237, DR-1837, DR-2236, DR-2237). Yet, our examination of thousands of these points and our experience in the field when we watch mechanics installing them, discloses the sad fact that many of them are incorrectly installed. An incorrect installation of these points produces double the correct spring tension, with resulting excessive bumper block wear and, often, broken breaker arms in the high speed types like DR-112 or DR-122.

Nothing, absolutely nothing, will help you if you install these points incorrectly. They just will not work. It will not make the slightest bit of difference who the manufacturer of the points is.

2 **THE PROPER CAM.** The cam story was given in the recent Service Bulletin #72-53, in which we described the results of our research on Bakelite bumper wear as well as cam wear in the recent Auto-Lite distributors. This still holds true, and we believe we can dispel

(Continued) EXCESSIVE BUMPER BLOCK WEAR

any doubts regarding this matter by informing you that the newest Auto-Lite distributors now have a solid cam and that the newest replacement cams for the older distributors are also of the solid type.

3 **SPRING TENSION.** This is the grand-daddy of bumper block wear trouble. In our Service Bulletin #62-50, written in 1950, we explained the importance of checking the spring tension of breaker arms during installation and quoted Delco-Remy and Auto-Lite Manuals pointing out the same thing. We explained that, while our own springs were individually calibrated to the correct tension with a tolerance of plus or minus two ounces, this did not guarantee correct spring tension in the distributor, as the same arm when installed on different types of distributors using this arm, will have different tensions. Do you want to know just how different the tensions will be in different distributors, then listen to this. We installed an original equipment set of points in a new distributor and found the spring tension to be 22½ ounces, which was 1½ ounces higher than the specified tension. We then installed this same set of points in another type distributor which uses these points and checked the tension at 32 ounces, 11 ounces too high. Our own set of breaker points gave 20½ ounces (within the specifications) and 25 ounces respectively. What does this mean to you? Without any ifs or buts, *this means that the breaker arm spring tension must be individually adjusted every time you install a set of points, otherwise you will have persistent complaints of bumper block wear.*

There is just no getting away from it—you have to do it. ***(Our Service Bulletin #62-50 tells you how).***

While we have kept away from handling testing equipment, as a matter of policy, we feel that the breaker arm spring tension is of such vital importance that we are now making an exception to this rule. We are now handling a high quality spring tension gauge under our Catalog **#STG-10** and cannot urge you too strongly to use either this gauge or some other spring tension gauge in every point installation.

4 **LUBRICATION.** In our Service Bulletins #5-37A and #46-46 we describe the importance of lubrication and the proper lubricating methods and material. We find that many mechanics now use lubricants properly, but that there are still too many who do not. We come across new points that are as dry as a bone and others that are soaked with oil to an extent that the points refuse to fire through the burnt-up oil film. Of course, the dry points will cause excessive bumper block wear, while using oil to lubricate the cam is even worse, as the oil gets tossed off by the cam in service, leaving the cam dry and the tungsten contacts wet. This adds insult to injury by giving you worn bumper blocks plus burnt tungsten contacts.

Just as this bulletin was being written, we were handed a January 1954 issue of the "Buick Parts News", published by the Buick Motor Car Company. Under "Buick Factory Recommended Service Procedures" they have an article "Replacement of Distributor Contact Points or Condenser". Let us give you some high-lights of this article, written in 1954.

"Breaker Arm Spring Tension is very important. Weak tension will cause breaker arm to flutter and bounce at high speed, resulting in engine missing. **Excessive spring tension will cause wear of breaker arm, rubbing block and cam,** resulting in insufficient contact point opening. Excessive spring tension can cause tilting of the breaker base plate, which would affect contact point opening".

Sounds familiar, doesn't it? It should be — our Service Bulletin #62-50, written in 1950 tells you this in practically the same words.

We quote further from the Buick bulletin:

"Attach connector lead, breaker arm spring, lock and terminal connector lead to insulating block on contact support by means of the screw and nut. The head of the screw and condenser lead terminal must be on the inner side of the block toward contact points, and *the breaker arm spring*, lock, connector lead terminal and nut *must be on the other side of block* in the order shown in figure".

Just look at Service Bulletin #59-49, written in 1949, and the little instruction sheet packed with our points used on Buick.

Another quotation from Buick:

"With points closed, inspect for square contact between mating surfaces of the two points. Carefully bend support, if necessary, to make points meet squarely".

Our 1939 Service Bulletin #16-39.

To quote further from the Buick instructions:

"Adjust breaker arm spring tension to specified limits by shifting the attaching screw in the slot in insulating lock, then securely tighten the screw and recheck tension. If slot does not provide sufficient range for adjustment, bend the breaker arm spring with pliers applied at curved section, but use care to avoid nicking or distorting the spring".

Our 1950 Service Bulletin #62-50.

And a final quote:

"Work a *small amount* of high temperature ball bearing grease into a clean cloth, then hold cloth against distributor cam while it is rotating. Caution: excessive grease may throw off into contact points when hot. Petroleum jelly is not suitable for temperature reached by distributor cam".

Our 1939 Service Bulletin #9-39.

So you see that the Buick Motor Company, who of course use original equipment breaker points seem to feel that certain procedures must be followed for proper point operation and they are not fooling!

We *must* all face the stern fact that we cannot take this matter lightly and that when points are installed the way they *should and must be, none* of us will have any trouble, and your customer will be satisfied.

SERVICE BULLETIN No. 77-54

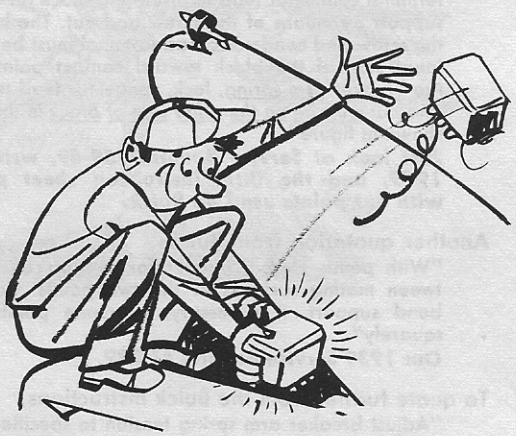
SERVICING VOLTAGE REGULATORS

PART 1 – *misconceptions??*

The present type of voltage regulator, that is the vibrating-contact type, has been in use for about 15 years, but we find that serious misconceptions still exist regarding the role the regulator plays in the generator-battery system, and these misconceptions account for most of the so-called regulator troubles.

MISCONCEPTION NO. 1 *(and also Enemy No. 1)*

is the idea that the voltage regulator is a cure-all; that whenever something is wrong in the charging circuit, all



you have to do is to replace the voltage regulator. Forgotten is the undeniable fact that long before voltage regulators came into use, generator armatures burned out, generator field coils shorted out, wiring shorts developed and batteries went bad. Believe us when we tell you that these things still occur, and that the replacement of the voltage regulator will not correct a single one of these defects.

We have issued a number of BLUE STREAK Service Bulletins on this subject; hundreds of articles have been published by trade magazines – all pointing to the necessity of trouble shooting and correct analysis of generator-battery troubles before a regulator is replaced, but it seems that all of these warnings and instructions go unheeded and wild-guess methods go merrily on and on.

In this Bulletin we will quote well-known authorities, whose names are familiar to practically every mechanic in one way or another.

In the Allen News of February 1952, a publication issued by the Allen Electric & Equipment Co., who manufacture the Allen line of testing equipment, you will find the following two typical instances, reported by their field men:

(A) "The owner of a 1951 car had made four 'comeback' calls to his dealer during his first 2,000 miles. Each time the complaint was the same: 'The lights flare up.'

"On the fourth call, the dealer spent several wasted hours of labor on the car. New regulator and new cables were installed. They did not correct the trouble, so the old ones were re-installed.

"Finally, an electrical diagnosis was made with Dial-Chek. Voltage loss in the charging circuit was found to be 1½ volts, with an allowable loss of .75 volts.

"When ammeter connections were tightened, a recheck showed .4 volts' loss and excessive light flare was permanently licked!

(B) "A mechanic attending an Allen regulator clinic remarked that his 'tough one' was a '47 car. Three regulators and two generators had been installed and still the battery wouldn't stay up!

"Next day, a Dial-Chek diagnosis uncovered a 1.3 volts' loss in the charging circuit. The lead from starter terminal to ammeter was loose and corroded at the starter terminal.

"A clean, tight connection was made and the complaint ended. Chalk up another score for Dial-Chek!"

We are quite sure that the American Automobile Association is well known to you. This is what the AAA Bulletin of July 1953 has to say:

"PROPER SERVICE PROCEDURE: The customer makes one of the comments: 'The battery goes dead', 'The battery uses too much water', 'Generator charges high all the time', 'Ammeter hand is unsteady', 'Ammeter hand stops at zero', 'Lights flare up excessively', 'Lights are dim'.

"Check the voltage regulator – but – don't check regulator until you have done the following in this order:

1. Check voltage at battery.
2. Check voltage drop in ground strap.
3. Check voltage drop in starter cable.
4. Check voltage drop in charging circuit.
5. Check voltage drop in generator ground to battery ground.
6. Check voltage drop in generator regulator ground.
7. Test Cut-out relay.
8. Test Vibrating Voltage Regulator.
9. Test Current Regulator.

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SERVICING VOLTAGE REGULATORS

PART 1 *misconceptions??*

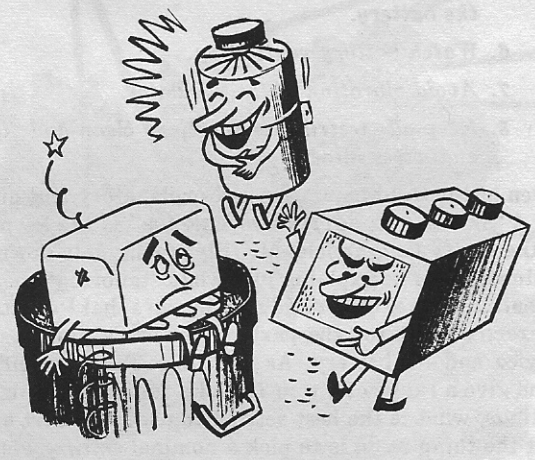
> "Unless you make tests number 1 through number 7 you may replace the regulator without finding the real cause of the customer's complaint. Avoid come-backs and give the car owner better satisfaction by following the proper technical procedure."

(The last three paragraphs of our Service Bulletin No. 9-38 tell you how to make these tests).

You will note that both the Allen and AAA tests involve the use of a voltmeter. We cannot emphasize too strongly that without at least a voltmeter, you are completely helpless in trying to service the generator-battery system of the car.

MISCONCEPTION NO. 2.

The idea is erroneous that you can install a new regulator, even when the replacement is justified, just as it comes in the manufacturer's box, without adapting it to the individual characteristics of the particular car. Here, again, we will quote from an article by Mr. H. B. Birt, Technical Editor of Delco-Remy, which appeared in the August 1952 issue of the Commercial Car Journal. The article is entitled: "The Battery Side of Voltage Regulation".



Throughout the article, Mr. Birt develops the idea that it is the battery and its condition that determines what is actually going to happen to the charging rate under various battery conditions. He shows one chart, for instance, that at a certain regulator voltage setting a "healthy" battery will accept various charging rates, depending upon its state of charge or discharge. But, he states further on, that there are surprising differences between batteries and that "different charge voltage characteristics may be found on new batteries of different makes". This means, of course, that if you use the same regulator on two new batteries of different makes, the charging rates may differ with the same voltage setting of the regulator. Mr. Birt adds this enlightening paragraph:

> *"Since the battery is essentially a chemical product, its charging properties are often altered by chemical changes within the battery itself. Changes of this kind may be brought about deliberately by the manufacturer or they may result from abuse, too strong electrolyte, prolonged operation at high temperatures, and the addition of impurities. Any significant change made in the charge voltage characteristics of a battery will definitely affect regulation and may be responsible for early failure if overlooked. Sulfation, of course, is a very common and very troublesome form of chemical change. Since sulfation is likely to occur whenever batteries are neglected for a period of time it can, and does, occur frequently in new batteries as well as in used ones."*

Another angle that sometimes completely knocks out voltage regulation is the temperature of the battery, according to Mr. Birt. His chart shows that a fully charged battery with a voltage regulator setting of 7.4 volts, will take less than 1 ampere at 0°, about 4 amperes at 80° and 20 amperes at 120°. Again, the voltage regulator is unable to control the charging rate, and we quote Mr. Birt further:

> *"Extremes of temperature can completely upset the pattern of charge voltages based on a state of charge at 80°F. This is a serious matter in actual car operation, since various parts of our country are subject to wide variations in temperature".*

He says also:

> *"On applications where extreme heat is encountered the battery may show serious overcharging even at fairly low regulator settings. When in this condition the battery is unable to reduce the charging rate to a safe value and thus continues to get even hotter. This condition normally indicates the need for a still lower setting of the voltage regulator or better ventilation of the battery or both—If the battery continues to overcharge seriously after adequate ventilation has been provided and the voltage setting has been reduced, it is likely that the battery already has been permanently damaged by continued overheating and for overcharging. In such a case, of course, the only remedy is a new battery".*

On our own behalf we want to remark that placing the battery in the engine compartment, as is done on practically all cars nowadays, certainly does not help to keep the battery cool and probably accounts for a great deal of battery overheating.

Just how serious this problem is is evident by the fact that the Willard Storage Battery Co. recently introduced a new type of battery with "Key Operated Climate Control". By means of a special key, this battery can be adjusted for summer or winter operation by changing the strength of the electrolyte (acid gravity). The manufacturer claims that, among other things, the reduced acid gravity in hot weather will keep the battery *cooler*, and provide greater battery protection from summer overcharging.

Thus we see that the internal condition and temperature of the battery are critical enough in the charging circuit to justify special battery construction in an attempt to minimize the undesirable effects of high temperature.

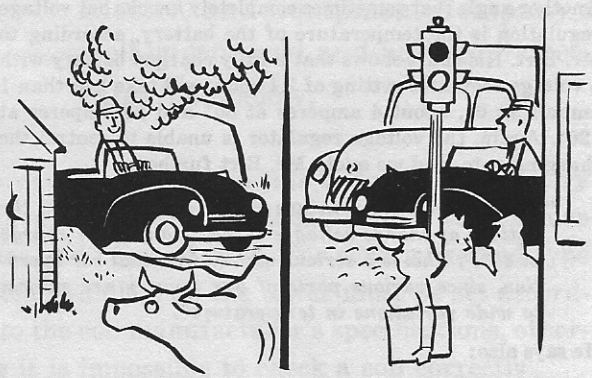
(To be continued in Service Bulletin #78-54, which will contain additional startling information regarding voltage regulators.)

SERVICE BULLETIN No. 78-54

SERVICING VOLTAGE REGULATORS

PART 2 – *tailor the setting to the job!!*

Coming back to the Birt, Delco-Remy article in Service Bulletin #77-54, he tells us that regulator settings must be changed to correspond to the type of service the particular



car is used in. On salesmen's cars, cross county buses and long distance trucks, the voltage regulator must be adjusted to a lower setting if overcharging is to be avoided. By the same token, vehicles which are driven too little, too slowly or which encounter low battery temperatures may often suffer from undercharging, and a higher voltage setting of the regulator is required. Severe and persistent undercharging requires periodical recharging from an outside source.

In the same article Mr. Birt takes up the voltage regulator itself. He points out that all adjustments and checks must be made with the regulator *hot* and with the cover on. He says:

> *"Settings made without observing the specified conditions are erratic and difficult to reproduce. Failure to realize this is responsible for most of the complaints about regulators failing to hold adjustment".*

Mr. Birt further explains that even the location of the regulator on the vehicle has to be considered; that a regulator mounted on the firewall will operate differently than if mounted elsewhere, depending upon the temperature of the various locations and how close to or far from the fan and engine the location is.

Attention is directed by him to the fact that excessive vibration of the regulator mounting surface can cause the regulator to operate differently than it was set at the factory.

Mr. Birt sums up his article in the following 8 points:

1. *Remember that the battery is the basis of regulation.*
2. *Remember that anything which affects the battery or regulator affects regulation.*
3. *Remember that all regulator checks and adjustments must be made under specified conditions.*
4. ***Tailor the setting to the job.***
5. *Whenever possible, keep a follow-up record on the battery.*
6. *Watch battery ventilation.*
7. *Avoid vibration of the regulator.*
8. *Keep all electrical connections clean and tight and wires intact.*

Seven of the eight points are self-explanatory, but number 4 "TAILOR THE SETTING TO THE JOB" is the keynote of the entire long article. Mr. Birt really gets down to business when he explains just what "tailoring" means in installing a regulator and making sure that its setting is *exactly* right for the particular vehicle, its type of service and its battery. As the Delco-Remy specifications give a range of 7.0 to 7.7 volts for their regulator settings, what is the best setting to use? Mr. Birt says that the thing to do is to pick a nominal setting within the 7.0 to 7.7 volts range, let us say 7.4 volts, and then make frequent checks of the battery for a few thousand miles. If the battery loses an abnormal amount of water per cell weekly, the regulator setting should be reduced. If, on the other hand, the battery falls below a ¾ charge, the setting should be raised.

However, we believe that this method, while practical for a fleet owner who has complete control of his vehicles, would be too troublesome for the average serviceman and therefore recommend the following simple procedure. When the new regulator is installed, run the engine at charging speed and turn on enough accessories

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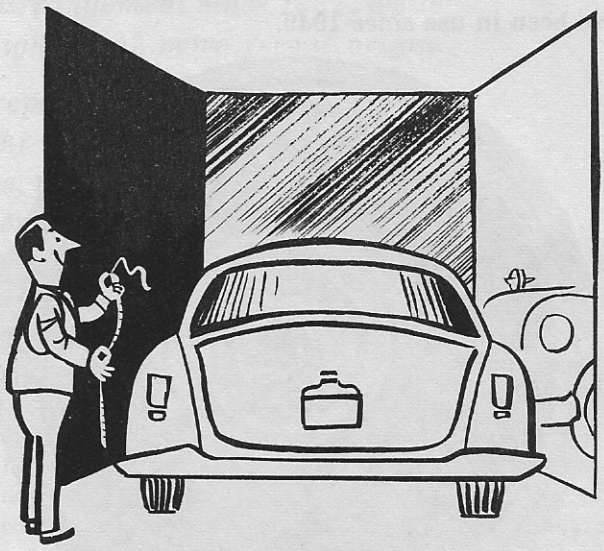
SERVICING VOLTAGE REGULATORS

PART 2 *tailor the setting to the job!!*

to operate the regulator at at least one-half the maximum charging rate. Run the engine for fifteen to twenty minutes at this charging rate to bring the battery and regulator to approximately operating temperature. When the regulator is hot, connect one terminal of the voltmeter to the "B" terminal of the regulator and the other voltmeter terminal to the nearest good ground. If you get a reading of 7.1 to 7.6 volts, which you will get in most cases, check the job out; if the reading is outside of these limits, adjust the regulator to bring the reading within this range. In the majority of cases this is all you will have to do, but should the car owner complain at a later date of either overcharge or undercharge, you can then readjust the regulator accordingly, thus *"tailoring the setting to the job"*.

And so you have it: A bright red danger signal from four authorities in the different branches of the automotive field. FROM DELCO-REMY, who manufacture both regulators and batteries; FROM WILLARD, a battery manufacturer; FROM ALLEN EQUIPMENT, whose business is testing equipment and the teaching of methods for using it; FROM AAA, a service organization interested in the welfare of the car owner. All of these authorities agree that *the successful servicing of the generator-battery system calls for more than just installing a new regulator of any make and hoping that all would be well.* All of them point out in one way or another *that thorough analysis must be made in each and every case of charging trouble and that it must be done not by guesswork but by means of instruments and with an understanding of the problems.*



It is also clear from the information we have gathered for you in this Bulletin that the manufacturers' setting of voltage regulators, no matter how carefully and precisely done, is subject to many vagaries and changes in actual service over which the manufacturer of the regulator has no control. While the manufacturer's setting is often correct for the average application, the mechanic must be equipped to change the setting to suit a particular application, a seasonal or climatic change or a battery condition.