

Special Supercharger Issue



THE VW AUTOIST

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More Boost for the Bug

Listen to a VW enthusiast, and he'll tell you his little gem is the greatest car in the world. Buy him a drink, get a little chummy, and he'll admit that his VW engine may be slightly undernourished. Get him drunk, and he'll blurt out that the damned ole bug struggles just to climb over a white line in the road.

There doesn't seem to be any doubt that the VW engine could use more power. While the 36 horses sitting over the rear wheels are adequate for straightaway acceleration and for most steady, high-speed driving, a good steep hill can make a VW puff and snort.

In an effort to convert the VW's bunnypower into something resembling adequate horsepower, industrious owners have tried various means to give more boost to the bug. Some tried a Porsche engine (those lucky souls who could find a Porsche engine) and the results, in most cases, were spectacular. Those who couldn't scout up a Porsche engine tried modification, and ended up with a high acceleration curve and a flat wallet. A third group turned to one of the superchargers available for the VW. The fourth group, the majority of VW owners, settled for a stock engine and the dream of someday owning a Porsche.

For the VW owner who must have more power, with the least inconvenience and least expense, supercharging seems to be the most logical answer. On the basis of inquiries from members over the past 18 months, there is no doubt that you are more interested in supercharging than in any other single subject.

In this issue you'll find articles on the principles of supercharging (including a rundown on the three different types of superchargers), a list of available makes of superchargers for the VW, a comparison of stock vs. supercharged performance, reports of club members who have supercharged, a study of the pros and cons of supercharging, and finally, a

The Principles of Supercharging

Credits

THE VW AUTOIST would like to thank the following for their help in putting together this special supercharger issue:

1) Charles and Haddon Judson, for information, data and loan of a supercharger.

2) Sports Cars Illustrated and writer Roger Huntington, for information and data in a three-part supercharging article in the August, September and October (1956) issues of Sports Cars Illustrated.

3) Road & Track, for information and data in an article in the October, 1955, issue of Road & Track on a supercharged VW.

4) Club officers, who have done so much in collecting and preparing these articles—specifically club president Web Glidden who wrote most of this issue and prepared all the charts and technical sketches.

5) Club members, for their response, help, and encouragement.

re-statement of the club policy on supercharging.

A supercharger or "blower" is simply an air compressor inserted between the carburetor and the intake manifold. In an unsupercharged engine, the piston (on its intake stroke) sucks the gas-air mixture into the cylinder. In a supercharged engine, the supercharger forces the gas-air mixture into the cylinder.

Basically there are three types of superchargers: only two of these are made for the VW, so we will discuss them first. The two are the Roots-type and the sliding vane type. Both are what is known as positive displacement blowers: for each revolution of the blower, a specific volume of gas-air mixture is forced into the intake manifold. This specific volume is always slightly more than the displacement of the engine.

In designing a supercharger, one of the fundamental requirements is to determine how much pressure is needed at full operating speeds. Indianapolis racing cars, for example, require as much as 20 to 30 psi (pounds per square inch over atmospheric pressure). This kind of pressure is obviously applicable only to

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Principles of Supercharging

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racing cars, where long engine life is not as much a factor as peak performance. In a VW, we know that a six-pound boost (6 psi) is sufficient to overcome the engine's inadequate "breathing" but still keep engine fatigue to a minimum.

One more fact must be covered before we get to a supercharging formula. Every blower has a displacement of its own, usually well below the displacement of the engine itself. In the case of superchargers for the VW, their displacement usually ranges from 600 to 800 cc.

Now for the supercharging formula. It's simple:

$$R \text{ equals } \frac{PD}{1.6V}$$

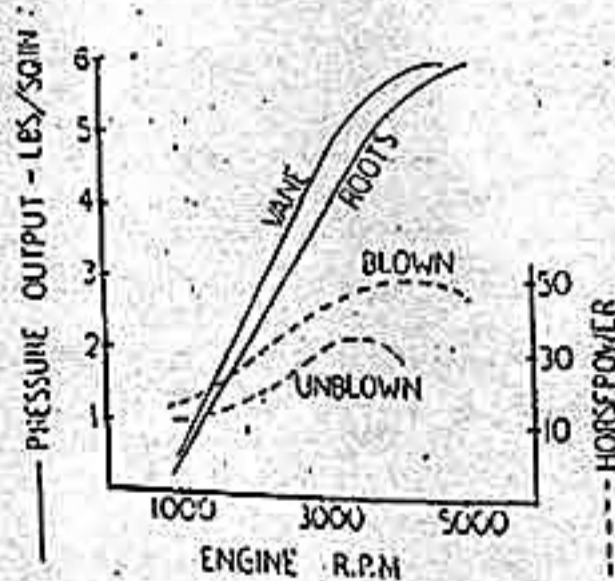
In this formula, R equals the drive pulley ratio, P equals pressure ratio (the ratio of the absolute manifold pressure to absolute atmospheric pressure), D equals engine displacement, V equals displacement of the supercharger, and 1.6 is a volumetric constant.

Now let's turn the mental crank. In the case of a supercharger with a six pound boost, P equals 1.41. The VW displacement (on 1954 and later models) is 1192 cc. Assuming blower displacement as 800 cc, we get the following:

$$R \text{ equals } \frac{1.41 \times 1192}{800 \times 1.6}$$

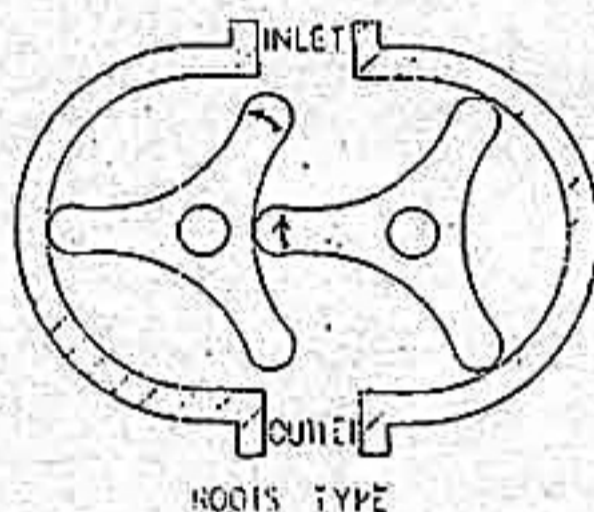
Don't reach for that slide rule! The answer is R equals 1.31. This means simply that the blower shaft should revolve 1.31 revolutions for every single revolution of the engine crankshaft. Thus if your blower pulley is three inches in diameter, your crankshaft pulley must be 3.93 inches in diameter.

This formula, of course, works in



reverse. If your pulley diameters are fixed, you can vary the blower displacement or the pressure and still come up with the right proportions. What we're trying to get at is that different superchargers are built differently, but by varying these factors, they still generally fall within this same formula.

Now that you're an expert on supercharging mathematics, let's consider how the different types of superchargers work. The Roots-type has twin shafts and multiple lobes (see cut). The shafts are driven by a matched set of gears. Both the gears and the lobes are closely meshed, so that tolerance of a few ten-thousandths of an inch are maintained. To add to this, the lobes are similarly



matched to the blower housing. Thus, with these close tolerances, little air can slip out between the lobes and blower housing.

As air enters the Roots-type supercharger, it is picked up in the two pockets formed by the lobes, carried around the blower housing, and forced out the other side, into the manifold. It is forced out at a faster rate than the engine can accept it, and thus a pressure is built up in the manifold.

Theoretically, this pressure is a constant value, but even with these close tolerances, there is still a small amount of air leaking by the edge of the lobes. This leaking will be greatest at slower speeds; at faster speeds, the air has less time to leak past the lobes. Thus the efficiency of the blower is definitely related to engine speed (see chart at left).

The second type of supercharger is the sliding vane type, somewhat simpler in design. It is essentially a cylinder with a drum inside it, posi-

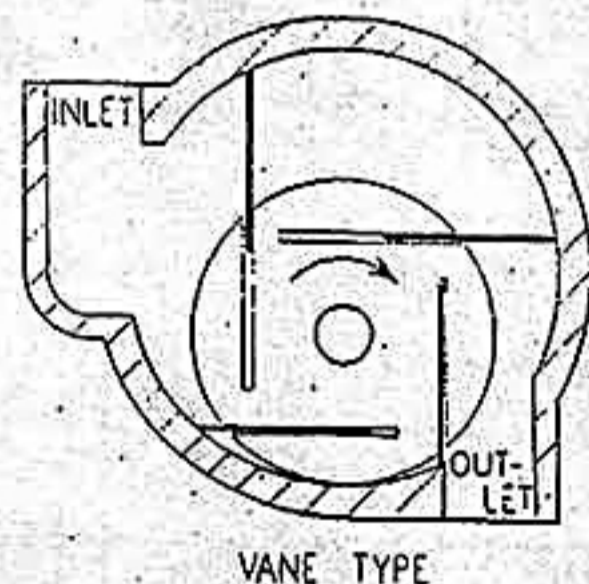
tioned off center (see cut). The drum is slotted lengthwise, with flat vanes fitted freely into these slots. As the drum revolves, centrifugal force makes these vanes fly out until they make contact with the cylinder wall.

At the point of intake, the compartment formed by the vanes is large, and the gas-air mixture is gulped in. As the drum rotates, the vanes carry the air to the outlet. But at the same time, the compartment becomes smaller, compressing the mixture. The compressed mixture is then delivered to the manifold where, again, pressure is built up faster than the engine can use it.

Here again, a small amount of air escapes past the vanes; so the efficiency of the blower is still related to engine speed.

The third type of blower previously mentioned is known as the centrifugal blower. We're not covering it in any detail, because so far as we know, no centrifugal blowers are made for the VW. This blower works on much the same principle as the fan which cools your VW engine. Granted, it is much more efficient than a house fan or your VW cooling fan, but is essentially the same. It just gives the gas-air mixture a push.

If you've managed to struggle through all this, you merit the degree we now confer upon you: B.S.—Bachelor of Supercharging. If you have any further questions on the subject, don't ask us—you know as much about it now as we do!



Sell or Swap

FOR SALE: Judson supercharger for the VW, complete with detailed instructions for installation, all necessary linkage, air cleaner, electric fuel pump and gas lines. In excellent condition. \$100 or best offer. Write Roger Eastman, 503 New York Drive, Pensacola, Fla.

Pro & Con

There are many things to be said in favor of supercharging—and about as many things to be said against it. Here is a summary of pros and cons on the subject of “blowing” the VW:

Pros

- Supercharger increases driving flexibility in both city and highway driving.
- Horsepower at the rear wheels is increased by about 30% (from 25 hp to approximately 40).
- Cruising speed can be maintained without shifting on hills up to about 5% grade.
- Acceleration approaches that of most American cars.
- Winter starting is easier, because of increased cylinder pressure.
- Engine torque is increased by supercharger's effect of raising compression ratio from 6.5 to 1 to 8.5 to 1.
- Top speed is increased by about 10 mph.
- Engine less affected by climatic changes and altitude changes.
- Carburetion problems due to long manifold overcome by pressurization effect of supercharger.

Cons

- Supercharger creates necessity for

constant maintenance and tune-up care.

- Additional combustion charge creates additional cooling problem—the cooling fan's capability is taxed by the increase in cylinder heat.
- Higher compression ratio requires use of premium fuels to prevent detonation.
- Additional horsepower magnifies any inherent weaknesses in the engine, and can lead to premature engine repairs.
- Driving habits must be changed, to prevent over-driving the car or over-revving the engine.
- Fuel consumption is increased significantly.
- Installation (except for the MAG) does not permit use of the stock VW oil bath cleaner—exposing the engine to adverse dust and water conditions.
- Noise level inside the car increased significantly, due to added engine stress.
- To supercharge either a Karman-Ghia or Transporter, body alterations must be made.
- Factory warranty and responsibility ceases when a supercharger is installed.

Problems from Supercharging

The mechanical device has never been made that isn't subject to breakdown, even under ideal conditions. A VW engine, good as it is, can fail—and so can the best-made superchargers.

This naturally brings up the question of whether or not a supercharger increases the likelihood of VW engine failure—and what, if any, those failures are likely to be.

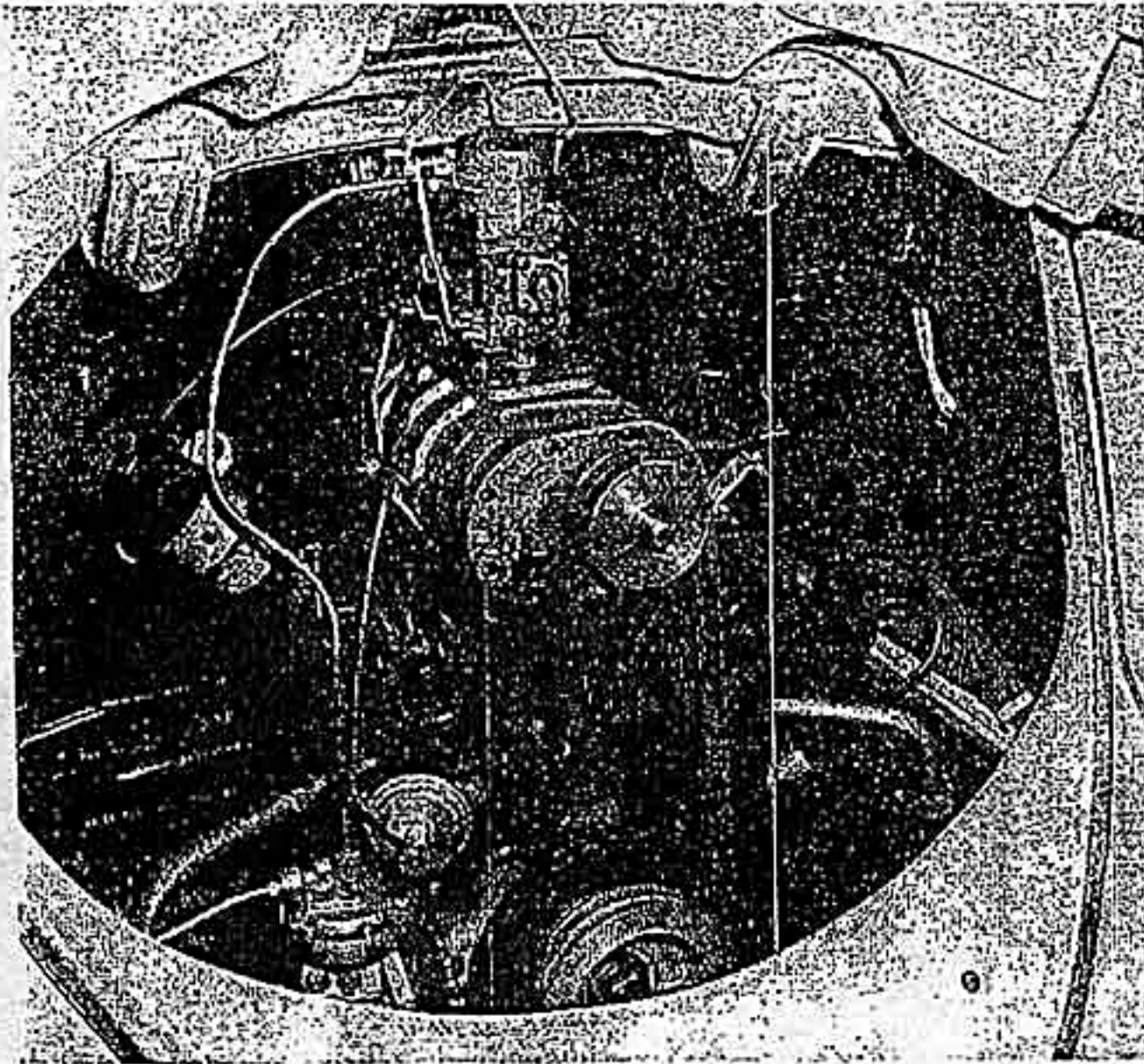
You may have heard that many supercharged VW's have ended up with broken crankshafts, and of course the blower is suspected as the cause. But does squeezing more horsepower out of the VW engine automatically mean danger to the crankshaft? The 1300 cc. Porsche, until 1955, used a VW crankshaft at very high RPM's and under considerably greater stress than in a stock VW engine, and seldom was the worse for it. It stands to reason that if the crankshaft can stand up in a 1300 Porsche, it can stand up in a “blown” VW.

That does not alter the fact, however, that many supercharged VW's have had broken crankshafts. It is probably more than coincidence, however, that these crankshaft failures began on late 1955 and early 1956 model VW's—just the time that Volkswagenwerk was really stepping up production.

What does this have to do with crankshaft failures? Well, two theories have been advanced on this, and both seem logical. First, the increased production rate at Wolfsburg may mean that heat treating of the crankshaft before and during the forging process is deficient. Any such deficiency has a tendency to create a non-homogenous grain structure in the heavier cross-sections of the crankshaft. This inconsistent grain structure can cause a weakness in that part of the crankshaft. The possibility of a break, under the increased stress a supercharger offers, would therefore be more likely than in a crankshaft which got proper heat treatment.

The second theory is that due to some manufacturing discrepancy, the crankshaft support is not uniform throughout the entire length of the shaft. Consider what this might mean: suppose the second main bearing doesn't have as much support as bearings 1, 3 and 4. This lack of support could soon develop into excess bearing clearance, a noisy main bearing,

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PEPCO SUPERCHARGER

Problems from Supercharging

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a pounding main bearing, and eventually a broken crankshaft.

At this point you may well ask what has happened to Wolfsburg's quality control. Well, the two theories above are only theories, but they seem to have validity. It just seems to be an axiom with automobile manufacturers: the more emphasis on mass production, the less effective is quality control.

What are some of the other engine failures which may be associated with supercharging? Burned valves have often been mentioned. More than likely though, these would come from one of two things: too lean a gas mixture, or improper valve clearance adjustment. Neither can be blamed, therefore, on a blower.

You can prevent burned valves in a supercharged engine if you follow the tune-up hints and spark plug coloration advice in this issue, and pay close attention to valve clearances.

If a supercharged VW starts bucking at high RPM's, chances are it is being starved for fuel. If the carburetor isn't getting enough gas, or insufficient pressure, replace the regular spring, or put in an electric pump.

Another possible engine failure is piston seizure. This is usually caused by too much friction on the side wall of the cylinder. This excess friction generates considerable heat which, added to the normal temperatures of an internal combustion engine, is enough to soften the aluminum piston and literally melt it into the cylinder wall.

When this melting occurs, the piston will bind solidly into the cylinder. This means an engine overhaul, with at least one new piston and cylinder—and maybe more. The cause of seized pistons is usually too lean a mixture, which results in excess heat. The heat causes the piston to expand, resulting in more friction and even more heat. Adjusting for the proper gas-air mixture is the best way to prevent seized pistons.

The logical question that arises from a discussion of these engine failures is what relationship they have to supercharging. In our opinion, there is little, if any, relationship. Too often the blower is blamed for a breakdown that would have occurred anyway.

The only thing that you can possibly blame a blower for is that, in cases like this, a blower *might* speed up the process. *How much* it speeds

'Blowing' your VW

(Continued from page two)

factory in your owner's manual. Don't go to a colder plug unless you find the engine simply will not run properly on the factory-recommended heat range.

- **Coil.** The stock VW coil has proven adequate under normal conditions. However if you want a somewhat hotter spark, there is a more potent coil available, made by Bosch and painted blue. The Bosch part number is TK 6A4 and is usually available through most VW dealers. Before you invest in one, though, be sure that everything else is functioning properly—especially the fuel pump.

- **Points.** The point gap should be carefully checked, when the fibre block of the moveable point arm is resting on the highest point of the cam, and the gap should be .016". The thickness gauge should have a very slight drag when pulled between the point surfaces. They should be absolutely smooth, and if there is any pitting, the points should be replaced. Don't try to file the points smooth with a point file. Pitting points are not unusual in a VW, but they can indicate that the condenser is not operating properly. If you can possibly arrange it, have the point gap set on a Cam Dwell Indicator (or meter); it gives you a far more accurate setting than a feeler gauge.

- **Ignition timing.** Timing is one of

up the process is indeterminate—one of the calculated risks you run when you install a blower.

the simplest things to adjust on a VW, yet is all too often neglected. Get yourself a simple six-volt timing lamp, and it's no problem—follow the timing instructions suggested by the supercharger manufacturer; if none are offered, use the stock setting recommended in your owner's manual. A word of caution: don't experiment with various timing settings unless you know what you're doing. A wrong setting can cause costly damage.

- **Valve adjustment.** Perhaps the most important item in a tune-up is the valve clearance adjustment. It can be the key to good performance and long engine life. If valves are adjusted properly, the engine will run at the proper temperature, have the proper valve "overlap," and in general make for a good running engine. The most important thing in adjusting valves is to have the engine cold; adjusting valves on a hot or even slightly warm engine can cause expensive damage. The best way to guarantee that the engine is "stone cold" is to let the car sit all night and adjust the valves in the morning before you so much as put the key in the ignition. Valve clearance is .004", but unless you are familiar with the process of adjusting valves, we suggest you have it done at your VW dealer's.

- **Belts.** Follow the instructions provided by the supercharger manufacturer for play in the blower belts, and watch the play on your generator belt. If the belts are slipping, if there is too much play or too little, if the belt show signs of fraying, adjust them to the proper tension.

THE VW AUTOIST

Box 43

Leonia, N. J.

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Members' Experiences with Supercharging

One of the best ways to evaluate any product is to check with people who have tried it. Of our more than 1,000 members, many have installed superchargers, and several months ago we asked for reports on their experiences. They responded generously, providing a valuable guide for other members considering supercharging their VW's.

The majority of superchargers installed by members are Judsons, although the following reports include installation of MAG, Pepco and Corcy-Pepco superchargers.

In general, our members seem more satisfied than not with their superchargers. However there are few members who don't have at least one complaint with their superchargers. Opinions on supercharging are mixed: some members are so pleased with the added acceleration and performance that they're more than willing to overlook some supercharger disadvantages. Other members complain about installation problems, increased noise, lower mileage, detonation, increased maintenance required, necessity for strict adherence to the red lines on the speedometer, poor belt adjustment, and similar problems. Then, of course, there are members who have no complaints whatsoever, and only the greatest praise for supercharging.

Here, for your study, are a series of reports from some members on supercharging:

Thomas D. Hess, Agawam, Mass.—Installed a Judson at 15,700 miles. Very pleased with it. Indicated 0-60 reduced from 29.7 to 17.3. Over-all mileage reduced from 34-35 to 31-32. General engine noise seems a little higher. No increase in oil consumption, no problems with overheating. Neither supercharger nor engine has shown the slightest sign of distress

after 5,300 miles.

Charles Beidler, Langhorne, Pa.—Installed Judson supercharger at 9662 miles. has now been on for 1539 miles. Mileage has averaged 27-28 mpg. 0-60 time about 17.7, top speed in 30's. Acceleration time from 45-60 is the biggest advantage. Have tried colder plugs, hotter coil, still get detonation. The oiler furnished with the kit is a pain to adjust. Must check maintenance more frequently and more carefully. You can't just install a blower and forget about it. They have a tendency to cause harmful detonation if the slightest thing goes off. Especially critical are timing and induction system. There have also been troubles with fuel induction system leaks, fuel starvation problems, and also with the blowers themselves. If a fellow is willing to experiment, the blower will certainly give performance. On those long cross-country trips, you can maintain 65 mph in a stock VW, but you worry a little in a blown VW.

Charles Niesley, Wayne P. O., Pa.—Installed Judson blower at 18,039 miles. has run for 4,599 miles. Mileage varies as high as 36, as low as 26. I had many difficulties until the car ran right. First was detonation, tried new coil, colder plugs, retarding spark, blocking heat risers, now operates quite normally. Method of tightening drive belt on the blower is poor. Performance is little short of amazing. Summing up, I am completely satisfied, would heartily recommend providing buyer doesn't mind drop in gas mileage and is willing to take a chance on engine reliability.

Ralph H. Wetherbee, Jr., Springfield, Ohio—Installed a Pepco blower. have run it for 9600 miles. Had trouble only once, believe blower caused leak in oil cooler, covered engine compartment with oil, but oil cooler was replaced and have had no trouble

The Factory on 'Blowing'

You are undoubtedly aware of Volkswagenwerk's policy on supercharging: they are unalterably opposed to it. They go so far as to state that installation of a supercharger voids the factory warranty, and they do their best to discourage dealers from either stocking or installing blowers.

While we have never seen a factory directive explaining this policy, we can understand the reasoning behind it. First, the factory believes that the VW engine has adequate power and torque under all road conditions and in all gears, and that a supercharger is therefore unnecessary.

Second, the VW was designed to offer economy, durability and long life. Anything which reduces these—as a supercharger is likely to—is opposed by the factory.

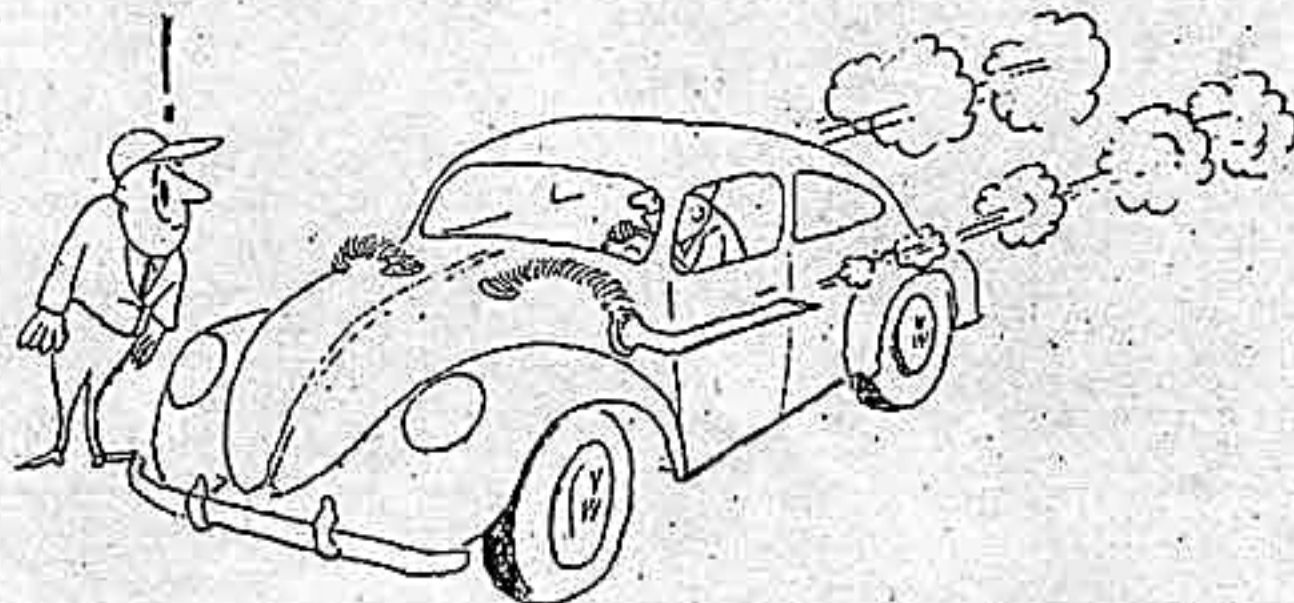
Third, the VW is considered by its manufacturer as a family passenger car, not a sports car. It wants to develop the car's reputation as a reliable family vehicle, not a high-performance racing car. Anything, such as supercharging or modifying, which tends to change the public's impression of the VW, is therefore vehemently opposed.

Whether you agree or disagree with this policy is your decision. We simply felt you should be aware of it, in case you are considering supercharging. We do make one recommendation: if you do decide to supercharge, don't do it until your warranty has expired. If anything goes bad before the warranty has expired, and your VW is supercharged, most dealers will not honor the warranty.

since. Performance is excellent, top speed increased from 70 to 80, much better torque at passing speeds. Mileage suffers, dropped from 30 to about 21. I don't think a supercharger is worth the money for the additional performance; I do not recommend installing a blower on a VW.

Geoffrey W. Esty, Princeton, N. J.—Installed Judson supercharger at 13,000 miles have run 4,000 since blower installation. No difficulties except set screw holding air cleaner came loose and dropped off, replaced with larger screws, no trouble since. Performance greatly improved, better

(Continued on next page)



Members' Experiences

(Continued from page 6)

passing performance, idling and low speed smooth and free from bucking, really digs out from a traffic light. Mileage dropped from 32-33 to 28-29. I definitely recommend this supercharger, should not harm engine provided you don't over-rev through gears or at top speed. Suggest regular checking of fan belt: if this breaks, requires removal of entire supercharger to replace.

Floyd A. Timberlake, Palatine, Ill. — Installed Judson supercharger, have run it about 2,000 miles. Only difficulty so far is insufficient fuel pressure, even with the stronger fuel pump spring provided by Judson. My 1956 convertible will now do 0-60 in 16 seconds, top speed is restricted to 75 because I run out of fuel pressure. Mileage at steady 65 mph was 27 mpg, no maintenance problems. I like the blower very much, would recommend it for improved acceleration. Only caution: don't over-rev.

Robert L. Marvin, Boston, Mass. — Installed Corey-Pepco supercharger. Actual 0-60 time down to 17 seconds, hill climbing notably improved. Mileage reduced from 28 to 23 mpg. My complaints: no room for oil-bath cleaner, must idle too high or stalls out when clutch is engaged, tappet clearance gets out of adjustment too frequently, bolts holding supercharger need tightening. I don't consider my complaints too serious, I'm quite satisfied with the supercharger.

Donald G. Stallman, Spokane, Wash. — Installed Judson supercharger, have driven it 3,000 miles. Difficulties: set screws holding air cleaner loosen up quickly, engine tends to ping when hot, even with premium fuel. Performance: little difference is felt if driving normally around town, but takes hold fast if you stomp on the accelerator. The higher the RPM's, the more pronounced the pick-up. Acceleration greatly improved, especially for passing. I notice the greatest improvement in climbing hills. Mileage with blower is 26-27 in city, 30-31 on the highway. My impression of the supercharger is favorable but would only recommend it to members if they feel additional acceleration is needed, if they're willing to part with \$160 and also sacrifice mileage.

Father Leon-Maurice Pepin, Saint Jean, Quebec, Canada — Installed Judson supercharger, advise that installation be done only by a VW mechanic. Radio condenser was disconnected in installation, re-connect-

ed to wrong terminal, ruined generator and voltage regulator. Performance is remarkable, car keeps its zip right up to higher speeds now more easily reached. Mileage (Imperial gallons) down from 44 to 33 mpg. Engine starts easier in cold weather with supercharger. I certainly recommend the Judson if the engine is kept in top tune and driven intelligently.

Don Luttrell, San Leandro, Calif. — Installed MAG blower, had trouble with Bosch 240 plugs fouling, changed to Bosch 225 plugs. Drive belt strikes distributor if too much slack is allowed. Engine runs cooler with blower. Mileage is about the same (34 mpg) running on premium gas as stock engine gave on regular gas. Major advantages: better flexibility in traffic, 50% increase in passing speeds (40-60) — ability to take steep grades in fourth gear. No signs of engine overstress so far, after 8,000 miles with blower.

Raymond Dunlap, Philadelphia, Pa. — Installed Judson supercharger, have run it for 6,000 miles. Only difficulty: plugs misfired at high speeds, have since replaced with colder plugs, no more trouble. Performance is so much better. I would not be without the blower. Mileage averages 27.7 mpg., no maintenance problems. I think it is best way to get better performance and more horsepower for least money, recommend it to any VW owner who wants better performance.

Harry Loughlin, Haledon, N. J. — Installed Judson supercharger on my Karman-Ghia, run it 2,500 miles. Installation required cutting 4" by 6" hole in rear deck baffle and removal

of carburetor choke butterfly, outward appearance unchanged. Difficulties: in sustained use of third gear, fuel pump cannot supply enough fuel even with heavy diaphragm spring furnished. Suggest electric fuel pump. Advise don't display Judson decal indicating car is supercharged—every cop on the road follows you. Performance beyond expectations: acceleration excellent, top speed 87 mph, amazing power for climbing hills, smoother idling, mileage about 30.8 mpg. Despite fact that I can't use air cleaner and can hear vanes at idling speeds, still recommend unqualifiedly.

James N. Payne, Inglewood, Calif. Installed Judson supercharger myself, after VW service shops refused to, although they saw no reason not to install blower. Have driven it 1,200 miles, no difficulties or maintenance problem of any kind so far. Slight increase in idling noise, more like a clatter. Performance: blown VW behaves like an entirely new car. Mileage, down from 26-28 to 24-26 mpg. I'm delighted with increased performance, would recommend it for increased low-speed performance and added safety of additional snap for passing.

Stock vs. Blown

The following statistics show comparative performance between a stock and blown VW. They are taken from one car, and are substantiated by previously published road tests and from reports from our members. All speeds reported are indicated speedometer reading; to correct to actual speed, multiply mph by 0.955.

	Stock	Supercharged	Members' Reports
0-50 mph (2 runs)	19.5 secs.	11.6 secs.	—
0-60 mph (2 runs)	30.2 secs.	16.8 secs.	17.5 secs.
40-50 (4th gear, 2 runs)	21.0 secs.	10.8 secs.	—
50-60 (4th gear, 2 runs)	12.5 secs.	8.2 secs.	10 secs.
Top speed (1st run)	78.0 mph	84.0 mph (est.)	—
Top speed (2nd run)	74.0 mph	—	—
Top speed (2-way avg)	76.0 mph	84.0 mph (est.)	80.2 mph
Engine temperature	210 degrees F	230 degrees F	—
Gas mileage	32 mpg	28 mpg	28.4 mpg
Maximum speed attainable, 3% grade	52 mph	65 mph	65 mph

THE VW AUTOIST

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Box 43
Leonia, N. J.

Dedicated to helping the Volkswagen owner
enjoy his car to the fullest
Founded by Sterling Parks, Jr.

Alvin W. Outcalt, Editor

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A Few Conclusions

After you read this issue, you will probably make up your mind about whether or not to supercharge. Our purpose is not to encourage you one way or another—the decision must be left up to you. All we can do is tell you the advantages and disadvantages.

If you remember the editorial on club policy on modifying two issues back, you'll recall that we said modifying is fine, but . . . Meaning that modifying is okay if you happen to have money you can spare, and are willing to sacrifice some of the dependability, economy and long life that a stock VW offers.

The same thing pertains to supercharging. Under certain conditions, a supercharger is an excellent means of providing added power at a reasonable cost with fewer inconveniences.

But it all depends on what you do with the power.

Here are some of our opinions on supercharging:

1) You can't quarrel with the performance of a supercharged VW. It offers sparkling acceleration that will startle you, that will flatten out hills and eliminate any complaints you ever had on horsepower.

2) A supercharged VW requires much, much more attention, tuning and maintenance than a stock VW. You can expect to pay more for upkeep in the long run if your VW is supercharged.

3) You can't drive a supercharged VW as hard for long periods as a stock VW without eventually running into trouble. Driven conservatively, a supercharged VW isn't likely to create problems. Driven over the red lines, and pushing the car steadily, sooner or later you'll be paying repair bills.

4) Few drivers can resist the temp-

'Blowing' Your VW

Installing a supercharger in a VW is essentially a simple job. If you decide to supercharge, though, we recommend that you *not* try to do the installation yourself. Have your dealer install it, or get a VW mechanic to put it in and pay him for the job. You'll save yourself money in the long run.

There are several things you should know before you put a blower on your VW. First, the VW carburetor is adequate under stock conditions, but will not be capable without modifications of delivering proper gas requirements at the increased speeds a blower attains.

Judson supplies with its blower a new air correction jet, to correct the amount of gas dispersed by the carburetor because of the higher air velocity through it. Judson also supplies a stronger fuel pump spring, which assures that the fuel pump delivers sufficient fuel at high speeds.

These changes are necessary in a supercharged VW because the stock VW was designed to be undernourished. To correct the undernourishment, you have to change the VW's diet.

Ideally, you should probably install an electric fuel pump instead of the stock mechanical pump. An electric fuel pump guarantees adequate fuel at the highest RPM's. But actually the addition of a stronger fuel pump spring will deliver sufficient fuel—unless you consistently drive over 4500 RPM.

Once the carburetor receives enough fuel from the fuel pump, it must be able to mix it properly. The increased

tation to take advantage of the greatly increased power, a supercharger offers. If you allow this added power to tempt you too often, you may end up in a ditch. On the other hand, the added power can get you out of hairy situations that every driver gets into occasionally.

That's about it. There are arguments on both sides, and the decision has to be your own. We have only one final word of advice: if you buy a supercharger, you had better be capable of sustaining the loss of the cost of the supercharger, or capable of paying for other engine repairs for damage a supercharger may cause. If you cannot stand such expense *without strain*, keep it stock! If you feel you can afford it, go to it. And wave to us as you pass.

velocity of air requires that a 160 air correction jet be used. Changing to a 160 air correction jet has little effect at low speed, but it insures a proper mixture at higher speeds.

Many club members who have supercharged have written in to say they've used a larger main jet to get a better balance between high and low speeds. The stock main jet is 117.51 we suggest trying a 120.0—or if you want to go overboard, a 122.5. Actually you will find that a 120 will be the best compromise between performance and economy.

Once you've solved the problems of fuel pressure and carburetion, you have other things to consider. A supercharger functions at peak efficiency only when the engine is in proper tune, and this means spark plugs, coil, point gap, ignition timing and valve adjustment need more frequent attention than in a stock engine.

First of all, you can count on cutting in half the amount of mileage you can go between tune-ups, check-ups and adjustments. If your owner's manual calls for certain engine maintenance at 6,000 miles, you'd better plan to do it (or have it done) every 3,000 miles—and so on down the list.

Second, it is extremely important to use factory specifications for all adjustments. Superchargers for the VW are designed to operate best on an engine tuned to factory specs, and you'll only get the best out of your blower when you stick to factory recommendations:

Third, when we say check, we mean check — *not necessarily readjust*. Some engines get out of tune easier than others, and you may find that certain things on your engine do *not* get out of tune. Check everything, but adjust only when it needs it. In short, don't tinker.

Let's take some of the tune-up points in turn:

• *Plugs.* Spark plugs should be kept in top condition. When you check the porcelain in the center, it should be very lighted coated with a light grey-brown powdery residue. If they are black and sooty, the carburetor is feeding too much gas; if they are reddish-brown (or after some use, almost white), the gas mixture is too lean. Check the plug gap: if it's too wide or too narrow, adjust it. Factory specs are .024" to .028"; we recommend .025" for best performance. Use the plugs recommended by the

(Continued on page eight)

Superchargers for VW

There are three well-known makes of superchargers available for the VW in the U. S.

1) The Judson supercharger, manufactured and sold by Judson Research & Mfg. Co., Conshohocken, Pa. Price: \$144, plus installation.

2) MAG Kompressor, made in Switzerland and imported into the U. S. by Sports Cars of Carmel, 598 Fremont St., Monterey, Calif. Price: \$195, plus installation.

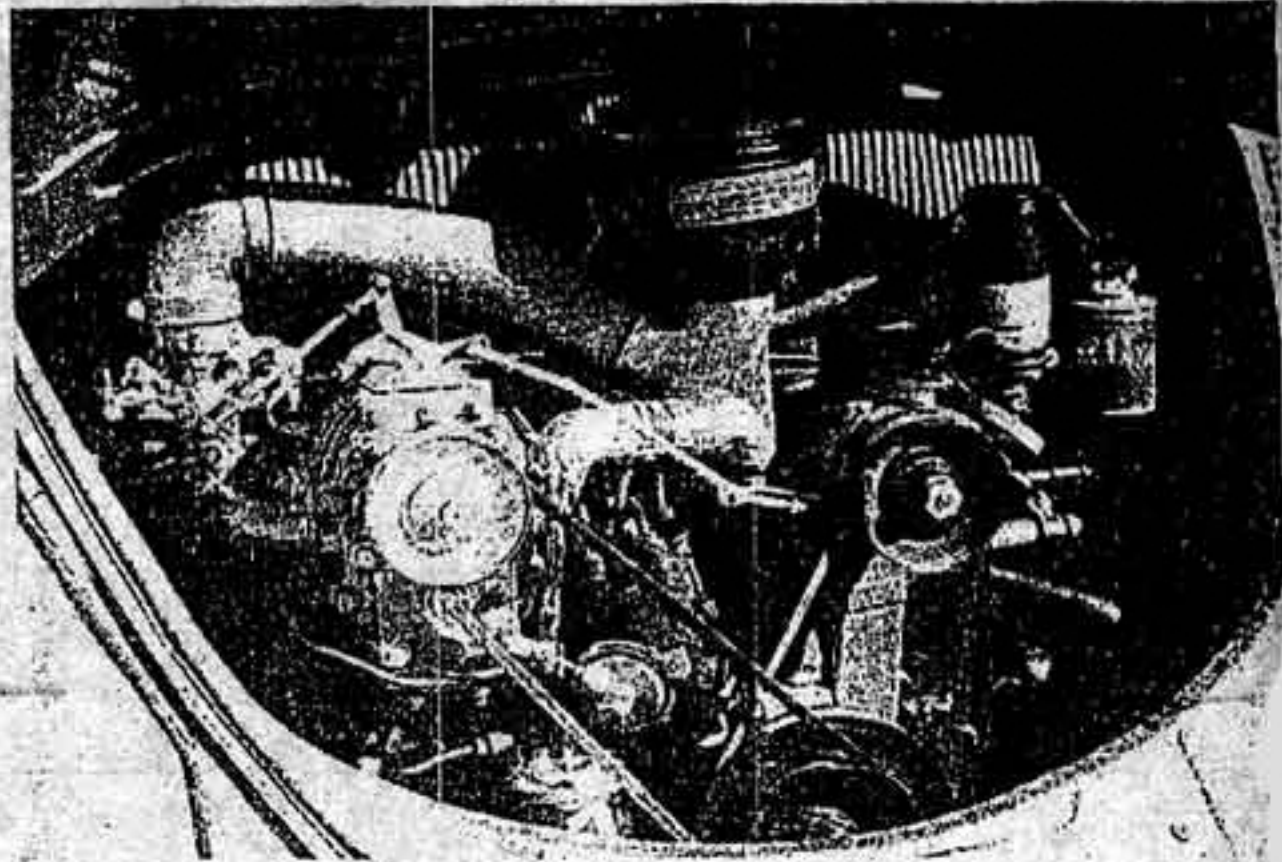
3) Pepco Supercharger, manufactured and sold by Pepco, Inc., 647 W. South St., Akron, Ohio. Price: \$149, plus installation.

To our knowledge, the above superchargers are readily available from these manufacturers or their dealers. The prices quoted are subject to state and local taxes, freight charges, and any changes by the manufacturers.

Both the MAG and Pepco are Roots-type, positive displacement blowers. Though the basic design is the same, the method of installation differs. The Pepco (see cut) mounts directly on the manifold where the carburetor normally sits; after installing the Pepco, the carburetor is placed directly atop the blower.

One drawback of the Pepco should thus be obvious: no air cleaner on the carburetor. In fact, the rear deck lid barely closes with the carburetor mounted on the Pepco.

In installing the MAG, the blower



MAG SUPERCHARGER

is mounted to the left of the distributor (see cut). The carburetor is mounted to the left of the blower. The major disadvantage here is the necessity for considerable tubing. One advantage is that the manifold attachment allows use of the stock VW oil bath cleaner.

The Judson supercharger is the vane type. It is mounted in much the same position as the Pepco, except that it includes a special air cleaner supplied with the supercharger (see cut).

There are many details common to the installation of all three blowers. Each gets its drive from a pair of V belts. The drive pulley is bolted to the engine crankshaft in front of the generator drive pulley. The throttle linkage and choke wire require either an extension or relocation, or complex linkages to allow the carburetor to operate properly.

Info on Superchargers

The following list includes the names and addresses of supercharger manufacturers.

Only three of them—the first three—manufacture superchargers for the VW. We're providing you with this list in case you want to do further research on supercharging.

These manufacturers will be happy to provide you with any information, data or statistics on supercharging, and to help you with any technical problems you may have involving supercharging.

Judson Research & Mfg. Co., Conshohocken, Pa.

Pepco, Inc., 647 W. South Street, Akron, Ohio.

MAG, Sports Cars of Carmel, 598 Fremont St., Monterey, Calif.

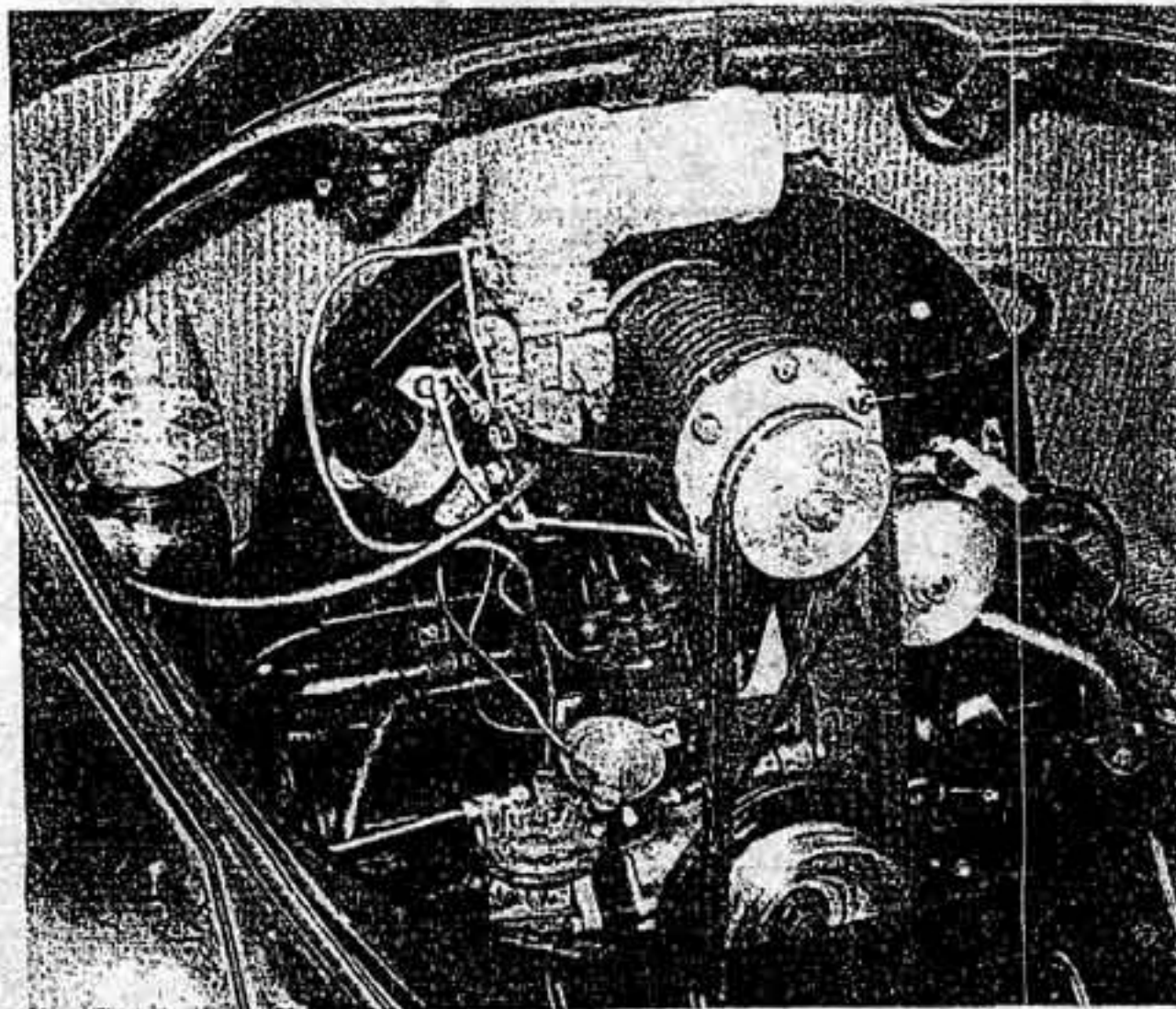
General Motors Corp., Detroit Diesel Engine Division, Detroit 28, Mich.

Borg-Warner, Maehle-Dexter Superchargers, 100 Fourth St., Racine, Wis.

Marshall-Nordeck, 4868 Milwaukee Ave., Chicago 30, Ill.

Wade Engineering, Ltd., Gatwick Airport, Horley, Surrey, England.

Autocessories, Ltd., Warsaw, Ind.
Paxton Products (McCullough), 827 W. Olive St., Inglewood, Calif.



JUDSON SUPERCHARGER