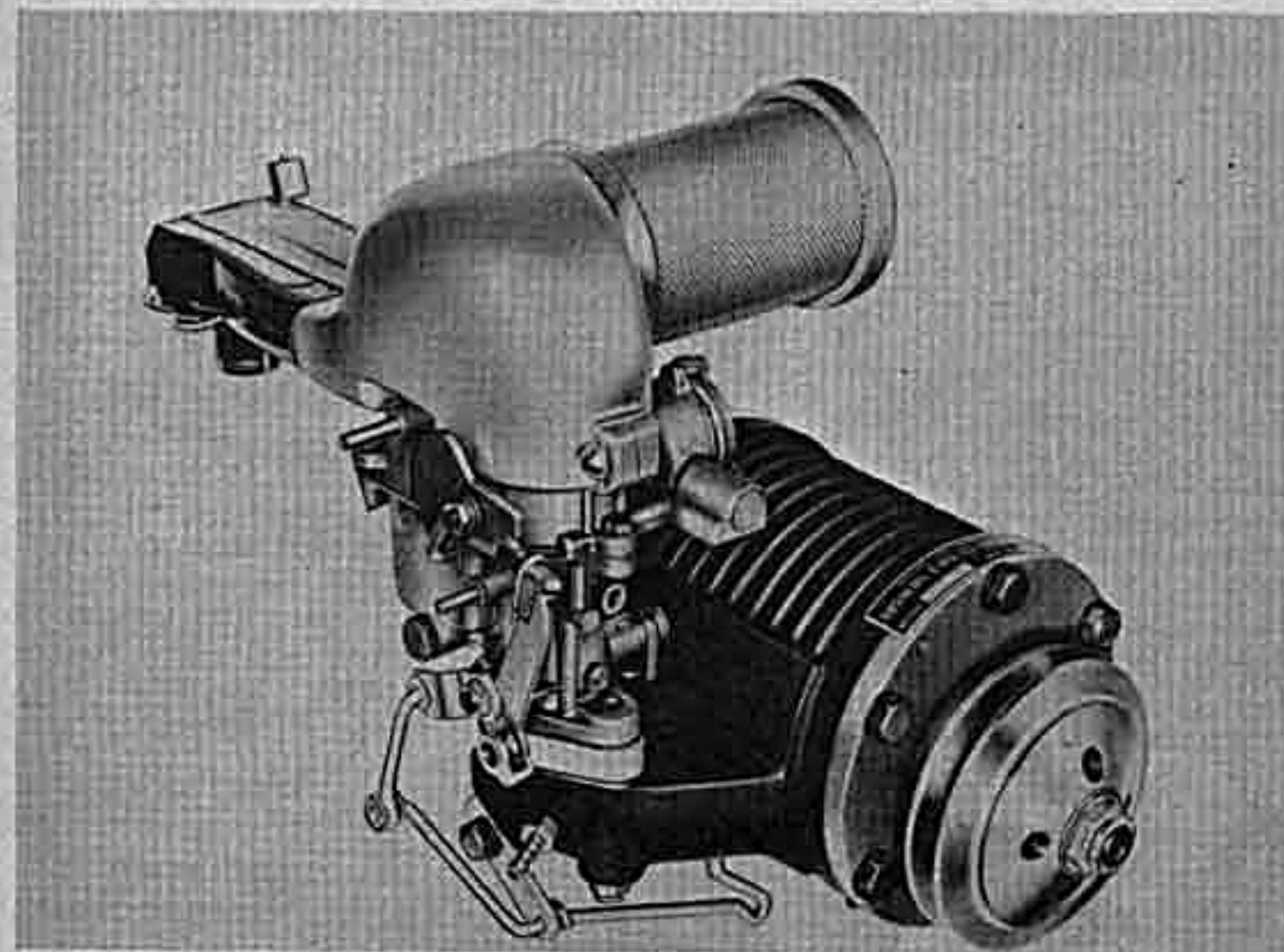
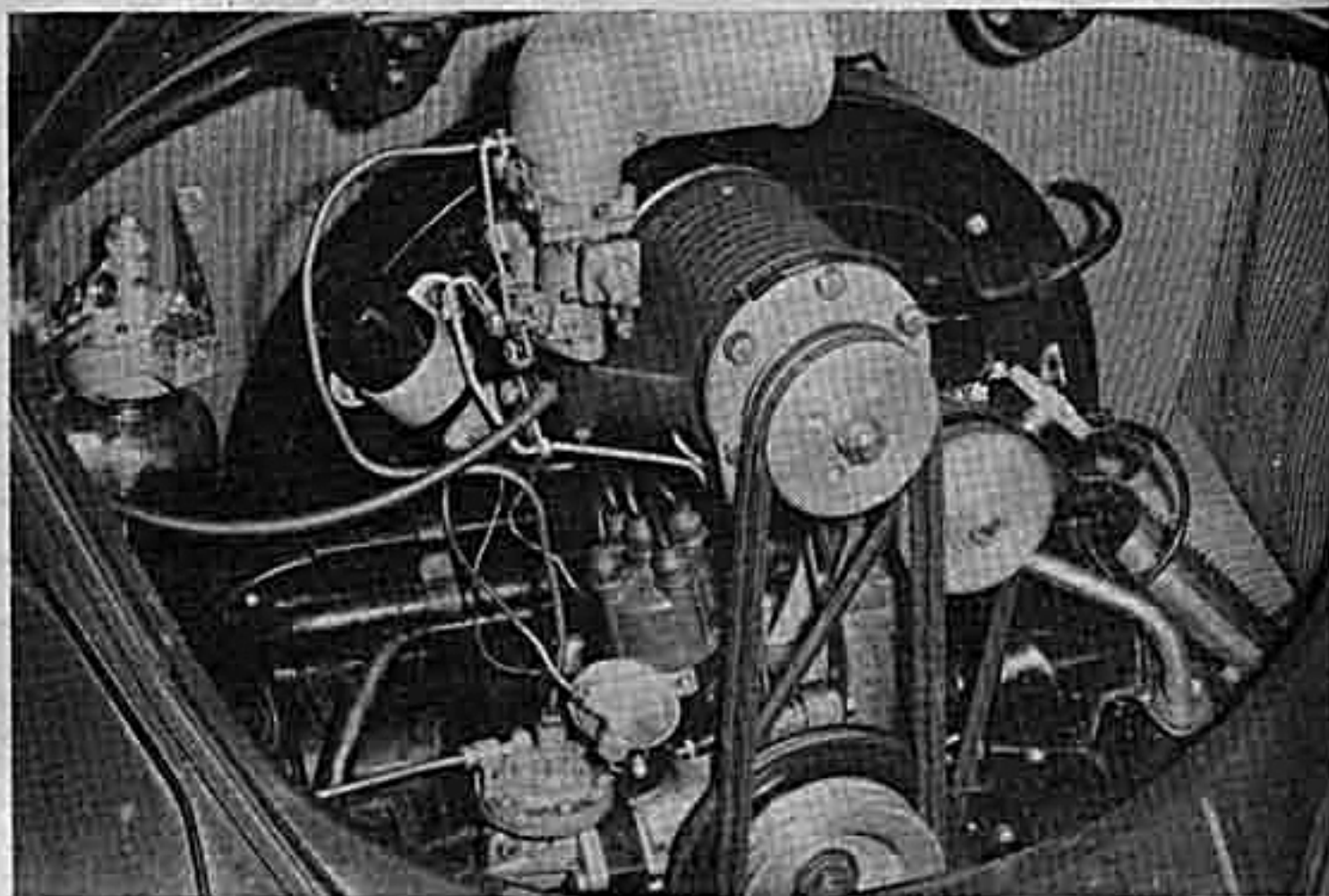


SUPERCHARGE YOUR BEETLE

What you get in better performance and how to live with a supercharger without having mechanical problems.

By A. C. BENEDICT
and D. C. BENEDICT

Pre-1961 VW with 36 hp engine plus supercharger looks like this when everything is in place.



Complete supercharger and air cleaner for 40 hp VW of 1961 and after is basically the same as earlier model but differs in detail so the two are not directly interchangeable.

► Slap on a supercharger? Sure. Your cousin knows someone who's had a blower on his VW for years. But your neighbor put one on his six-month-old VW and totalled the engine within a week.

Contradictory reports like these have been a puzzle to VW owners for years, ever since superchargers began to sell in large numbers. One result: hot arguments pro and con blowers every time two or more car nuts start talking ways to convert urge to surge in the modest Wolfsburg machinery.

Confusion on the subject just isn't necessary. The matter comes down to simply this: Yes, blowers can do a successful job; and, yes, you can break up a supercharged engine.

This is the heart of the matter: a good blower, installed right on a well-maintained engine can increase torque

throughout the machine's useful operating rpm range without trouble and as long as it's not overrun. Blowlers, particularly on the low powered VW, can do a power-boosting job, but they have no self-limiting upper end. That is, they can let an engine overrun itself before the blower's efficiency is passed to feed large wads of air-fuel vapor to the machine. And poor maintenance or an uncorrected engine deficiency will merely pull down that speed point and hasten that critical wear point at which the works give up. So it can be done and, sure, you can also break up your engine like anything else that's overworked and under maintained.

There's no need to avoid superchargers on the basis that they must invariably wreck an engine. I operated a blower on a '61 VW for many thousands of miles with good results

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and without any blower-induced engine problems at all.

It helped on hills, reduced gearshift rowing and generally provided enough extra push to raise the VW from the dreary to the adequate category. But this was without trying to conduct a Salt-Flats revolution; rather, the blower served as a moderate assist alone, as it is designed for on the VW engine.

A quick review, then some detailed looks at what it takes to do the job right will help you decide pro or con about a blower in your own situation. The ten blower commandments listed in the box tell the story in brief; read

TEN SUPERCHARGER COMMANDMENTS

1. Thou shalt start with a good engine.
2. Thou shalt have and hold it in proper tune.
3. Thou shalt bolt unto it only a good blower in fairest working order.
4. Thou shalt make sure the blower model is right for thine own engine.
5. Thou shalt follow the maker's installation covenants exactly, yea, even unto the finest detail and hindmost point.
6. Thou shalt watch over the assembled rig as it runneth through the land with instruments which are always wondrous to have and joyful to behold anyway.
7. Thou shalt tend the whole works closely and with firm but tender loving care like unto keeping happy a beautiful, swinging woman.
8. Thou shalt tread with a wise foot upon the gas, most of all when bugging out in low gear; yea, verily, forsake thy clumsy, lead shoes and leave them always in the barn.
9. Thou shalt not covet thy neighbor's mythical ET to the next stop light.
10. Thou shalt thus—and only thus—dwell happily forever after with thine supercharged machinery in one single, humming piece.

on here for a closer treatment and the reasons why.

BLOWERS WILL

It's worth repeating: a blower on the VW can increase its torque over the Koshier operating range. The dividend to you is more flexibility and less shuffling with gears.

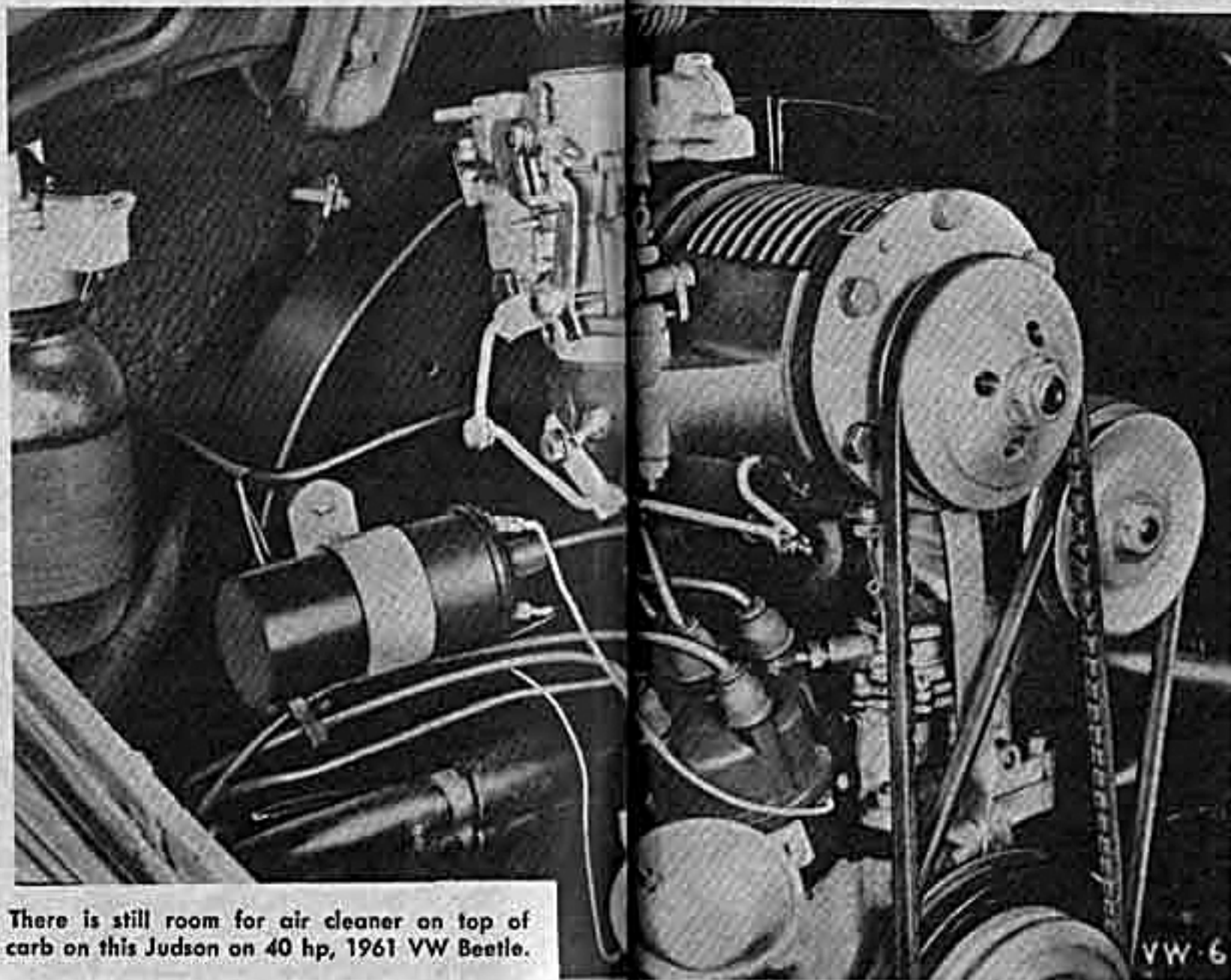
BLOWERS WON'T

A supercharger won't raise the effective rpm range of your VW more than a few hundred at most. The limit is strictly a function of the design characteristics, materials, and tolerances built into the engine itself. And Wolfsburg does a first class job in this category to begin with. Thus you can work safely only within the limits originally built into the ma-

chine. Neither will a supercharger turn your VW into a drag strip dragon with dazzling acceleration; the blower's inertia and the fluid dynamics of gas flow in and out of the engine eliminate radical acceleration in a nominally bolt-on street version of the VW cum-'charger.

So don't mistake what you're doing for yourself. Blowers are attractive because at about \$200 and up new, you make a bolt-on performance improvement without going into the engine itself.

But if you're not going into the engine, it must then be in good order to make the add-on worthwhile and to keep from overstressing the engine regardless of how carefully you run it. On the one hand, don't 'charge a brand new engine; it needs mileage



There is still room for air cleaner on top of carb on this Judson on 40 hp, 1961 VW Beetle.

SO WHAT'S A BLOWER?

As you know, blowers basically force-feed more air-fuel vapor into an engine's cylinders on intake stroke than its pistons would suck in by themselves. And with higher blower pressures, more vapor will be crammed into the cylinders on each loading.

There are practical limits to this vapor packing: ability of the piston and its connected mechanical train to handle the extra work produced when the extra vapor is ignited; ability of valves to cope with higher temperatures produced by burning more vapor per work cycle; efficiency of the blower, of the engine and of the two together.

This last item—efficiency—reads out as money. More money means more engine refinement, additional quality built in and thus more ability to handle greater working loads. More money also means more efficient superchargers, able to drive more vapor into the engine per horsepower taken out to run them. Thus there's no profit to putting a high altitude, aircraft 'charger on a 2CV Citroën; nor is there any balance in adding an economy-engine blower to your next year Indi machine.

BLOWER TYPES

There are three basic types of blowers; each has its best application. Centrifugal 'chargers fling air off the tips of their rotor blades; they're most useful at high, sustained speeds since their efficiency drops radically on either side of a comparatively narrow speed range.

Roots blowers forcefully displace air trapped between their meshing impellers. These are close-tolerance works from start to finish with a correspondingly high price.

And you have the rotary, sliding vane blowers. These revolve a fat, slotted shaft off center in a barrel; free floating vanes in the shaft slots pick up intake air on the "wide" side of the barrel, compress it as the shaft and vanes turn, and expel it on the "narrow" side of the barrel.

Judson makes a blower of this type with a mild input pressure boost. And EMPI on the West Coast sells an English Shorrock rotary vane unit of the same type. Both companies say their units are designed specifically for the mild, standard VW engine and with its operating characteristics in mind.

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RIGHT: Staged in Holland, this acceleration comparison pitted supercharged sunroof against unsupercharged solid roof VW.



to bed-in for the added work a blower will have it do. Wait at least 3,000 miles, or better yet, until it's out of warranty at 6,000.

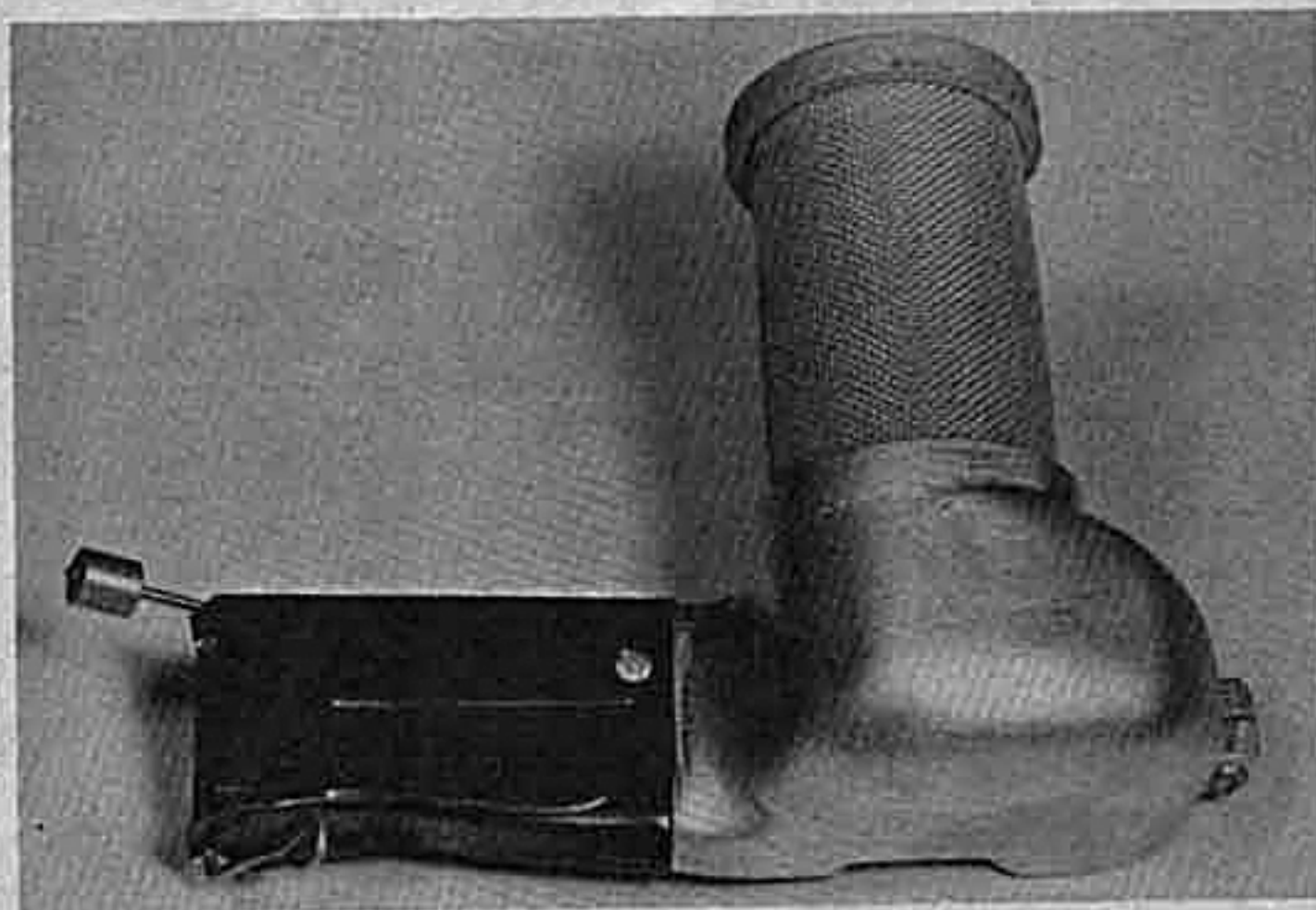
On the other hand, it's useless strapping a blower on a tired four-banger that can barely wheeze around the block; this machine needs inside work before it can even go it alone, much less with added draft through its works.

If your engine is in this shape,

look on it as an opportunity, not as a terminal illness. By adding a comparatively small sum to the cost of a proper rebuild, you could have it balanced, perhaps beefed up and even recammed, race-valved . . . Ah, well, you see the point, it's a question of how much bread.

Bear in mind, too, that with the premise of NOT going into the engine, you are accepting its existing toler-

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New air intake and air cleaner bolt onto stock VW carb which is rejiggered for supercharging.



After 5 seconds, the supercharged sunroof has already jumped into the lead by a noticeable amount.



Cars approach 250 meter mark (not quite the length of a football field), the supercharged car is 2.2 seconds ahead at 16.8 seconds compared with 19 seconds for the stock Beetle.



Photographer got this sequence of shots from a 1.6 Porsche Convertible shooting at 5 second intervals very early one misty morning.



At 500 meters the difference was a good 4 seconds for the supercharged car the first time around and even more on a second run made without the photographer.

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Judson Supercharger for 40 HP Volkswagen, \$30. B. Doman, 1227 Leahy Rd., Monterey, Calif.

Supercharger Judson \$119 for 40 Horsepower Volkswagen. Paul Ruslicka, 4339 194th St., Flushing, N. Y.

really worried about something happening, spend more time checking your VW's oil level, and watching its hard-to-see oil pressure warning light.

We recently found another drawback to having too many dials and gadgets. While testing a 1966 Mercedes 200, we missed a turn on a superhighway because we were fooling with the unfamiliar goodies on the dashboard and not paying enough attention to the road.

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DOWN BACK ROADS

(Continued from Page 9)

thing like brake lining replacement quite a while back might take longer to find. Last month's grease job is usually right on top which makes it easy. Although this system is not the greatest, it does work and it gets kept which more than some others I've tried have done.

Taking a leaf out of the truck fleet operators' books, one way to keep track of major repairs is to tag the actual part. One of the tape punchers does his very nicely and easily. And it is usually possible to attach the tape permanently where it will be out of the way. Using this system, you can easily see how long a starter, generator, brake shoe, or some other relatively long lived part has lasted. Just wipe the dirt off the tag and check it out. As with the truckers, you'll soon see if something is not holding up very well pointing to a need for better maintenance, or perhaps it would work best to use quality part than the original.

If you tend to operate informally, perhaps it would work best to use all three techniques together. The slate in the garage could tell you when to change the oil and grease the chassis (or have it done). A notebook or slips on a spindle could become your sort of master record, and tags on parts you replace would make it easy to keep track of major components.

If all of this sounds too much like work, consider having a new car every couple of years and paying for freedom from mechanical trouble with money instead of time, effort, skill. But if you do, you won't ever get to know your car as well, and won't develop the ability to care for it which can both save you money and give you a skill you can learn no other way than by working on your

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car yourself. And some sort of a record system can save you time and money when you care for your back road bomber yourself. ●

SUPERCHARGE

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ances and balance. VW assembles its engines carefully and within a highly respected tolerance range. As sold, the engines do a first class job in the economy class of low-stress operation; they are not Novi Specials. You're saying "OK, I'll live with it as is." This means that to be successful you gotta keep the factory tolerances and balance in mind when you're cranking up the blowered machine on the road.

Factory tolerances—and whatever foibles you've worn into the works—will let the mill run and run and run. As long as it isn't overworked. Conversely, the wailing, blown VWs turning wild ETs in drag competition are not, repeat not, bolt-on productions. Rather, they've been rebuilt from the ground up, honed, miked, balanced to a fraction of an ounce-inch and are rebuilt at the flicker of a 1/6-second lost on the Quarter Mile. These machines are money on wheels. You just want help, not immortality.

HOW TO DO IT RIGHT

If you decide to supercharge, it doesn't matter how sanely you run the machine if you don't assemble the package right to begin with. Start with a good engine and have it in proper tune. Likewise, make sure that the blower is a good one, in proper working order and that it's the right model for your own engine.

These last points deserve emphasis since there are so many used blowers available on the market now. Lots of people have bought 'em, thrown 'em on, not followed directions, and then been disillusioned because they thought it was the machinery rather

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than mechanic and/or driver that caused The Trouble.

So check with the manufacturer about proper match of a blower to your engine before you buy a used one. Make sure the blower hasn't been run dry and burnt its vanes. And be sure you have or get a full set of the right directions before you start work. Of course, one good way around all this is to buy a new unit. You pay your money and takes your choice.

Do what the directions say and never mind the bright, expert tip from your neighbor. It's even worth the cost of a long distance call to the maker's plant to clear up any questions considering the \$200-plus cost you've invested and the value of your machinery to begin with.

Maintain the supercharged engine carefully; plugs, timing, valves and carburetion all become additionally important since you are taking extra work out of the machine.

Good lubrication—for the engine and for the blower—will make a sizable difference. A heavy duty racing oil in the sump and a castor oil in the blower's lubricant bottle aren't essential but will help.

INSTRUMENTS ESSENTIAL

You can't avoid the fact that a blower will raise the engine's temperature, particularly on extended, high speed runs. This, and the capability of over-revving, particularly in low gear, means you should put on instruments as an integral part of the blower job. You need a tach to help keep yourself from over-revving the engine if you put all that money in preparation and installation of the blower assembly, you're best off protecting your investment with something to tell you what's happening.

An oil temperature gauge is as essential on a blown engine as gas in the tank or lubricant in the blower. Install one before you put on the 'charger; run with it a while. You will quickly see the normal operating temperature range for your engine.

Use it as a comparison base when the blower has been installed and to spot the rise to higher temperature which calls for letting up on the machine.

There's one more thing to consider in putting the package together. Just as you should at least change carburetor jets and fine tune the input side of the machinery, so, too, it makes sense to balance this with change on the output side. Either open up the standard exhaust or change it for a free-flow exhaust system. In either case, be sure to check instruments or manufacturer for proper action here.

Finally, watch maintenance more closely than without the blower. ●

FORMULA VEE

(Continued from Page 26)

other Classes at various races where it appeared, but not until the beginning of the 1964 season was it officially adopted by the Sports Car Club of America as a respectable racing Class. Two years later it had grown to the point where it was the head of the family—there were more Vee entries in SCCA events than of any of the other classes in 1965!

To reconcile this record with the car that is responsible for it is absolutely impossible. In fact, the car itself is impossible! The wheels are too big and the tires too small. The front suspension, despite its efficiency, looks like anything but part of a race car. The older models look like outmoded Indy racers and the later ones like poor imitations of a modern Formula car, spoiled by the addition of an ugly hump behind the driver. It sounds like an old Harley Davidson motorcycle. It costs nearly as much as a Sprite if homemade, and as much as an MG if bought complete.

What, then, can possibly account for its phenomenal success? Well, there are a number of points in its favor, too. It is, contrary to its early publicity, reasonably fast—top speed over 100 miles an hour. Experience

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