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ROAD TEST OF THE JUDSON SUPERCHARGED 190 SL

by KEN BARTLETT



The Mercedes-Benz Star's ambition has always been to try and get the news first. With this in mind, a constant stream of correspondence has been flowing between the Judson Research and Manufacturing Company and 29 Brookside Terrace. As a result we are able to bring you the first actual driver's report of the Judson Supercharged 190 SL to be published anywhere. Mr. Charles Judson was good enough to bring the car up to N. J. twice, giving me ample time to drive the car and to ask questions. I am most grateful to Mr. Judson, not only for his cooperation in making this test possible but for not losing patience with my persistence.

Normally the amount of air-fuel mixture that is burned in an engine is determined by the downward intake stroke of the piston simply sucking the mixture in. A supercharger reverses all this by creating a positive pressure and forcing the mixture into the cylinders. More air-fuel mixture is burned and more power is produced. The Judson is a sliding vane type of supercharger as opposed to Roots and centrifical types, and for a high-revving sports car engine, has many advantages over these other methods.

The Judson is basically a drum with a shaft placed off-center. A series of vanes rotate with this shaft

and are arranged so they can slide in and out, maintain contact with the outer edge of the drum. If you then visualize an intake, with carburetor, on the portion of the drum where the chamber formed between the vanes is largest, and an outlet where they are smallest, you have an over-simplification of a sliding vane supercharger. As the air is picked up at the intake it is not only "blown" it is compressed. Because of this compression and the close fit of the vanes, this type of supercharger is not only very efficient but probably the most effective at low RPM.

The unit is completely new, designed and tailored for use on the 190 SL engine and has been well over a year in development. The workmanship is so good that it could well have been built by the factory itself and the whole thing looks right at home. Practically everything you can see is cast aluminum. The shaft of the supercharger runs on New Departure high-speed ball bearings and the carburetor is a recalibrated Holley of the type used on the Ford 6. The supercharger is supplied with everything needed for its installation right down to the last bolt and comes with complete illustrated instructions.

As to the actual installation, while it is not an hour's job for the amateur, it could probably be accomplished by any owner used to doing a good deal of his own work. First, the air manifold and carburetors must be removed along with the radiator. A new pulley is installed on the crankshaft and a spacer placed beneath the fan. The radiator is reinstalled about an inch further forward using brackets provided in the kit. The supercharger itself is then bolted to the intake manifold and the top oiler is attached to the fire wall just in front of the battery. The primary purpose of the top oiler is internal lubrication of the supercharger. The balance of the installation consists of details such as connecting throttle linkage and the gas line. The stock air cleaner is retained and the fuel pump need not be changed as its flow has been found to be more than adequate.

Now that we have the Judson Supercharger installed on the car, let's take it out on the road. The car really goes! Taking off in first gear gives you the feeling that you are in a 300 SL instead of a 190. There is no lag and wheel spin can be induced without difficulty. This supercharger is noiseless at all times and those who may remember the scream of SS's and 540 K's will find this something new in "blown" Mercedes'. If you have a 190 SL with the not uncommon flat spot in acceleration, this is a sure cure. There is no interruption of the power flow anywhere, and the engine is actually smoother with almost no trace of torsional vibration. The balance of the car is not effected since the Judson weighs only 24 lbs. and this added weight is partially offset by the removal of the Solexes and the air manifold. Handling (if effected at all, is improved because real POWER is available when needed. Having the car on familiar roads was a real advantage. One hill that I am forced to climb daily in third gear in my unsupercharged car, was easily negotiated in fourth. Throttle response is instantaneous and the power available gives you the feeling of being in the next lower gear.



Mr. Judson and His 190SL

To provide you with some more factual data a Perfrometer was installed in my unsupercharged 190 SL and on the Judson Supercharged car. This instrument will give you a reading of the rate of acceleration and was described in some detail in the Feb. issue of "Road and Track." For the purpose of this article the figures were read directly from the dial and no attempt was made to translate them into G's or any other form and they will serve only to show you the relative improvement in acceleration.

My 190 SL used in this test is a '57 and could be considered moderately fast having taken second place in the acceleration runs at South Bend last summer. Judson's car was an early 1956 and it had the old gear box with the high ratio third gear. Since this higher

Ken Takes to the Road



gear will give less acceleration, the readings for third gear in the two cars will not be comparable. The actual reading for the supercharged car in third gear was 22 but in the chart I have substituted an estimate of the reading that could be expected from a car with a later gear box, based on the performance improvement in the remaining three gears.

Car	First	Second	Third	Fourth
Unsupercharged	32	25	19	11.5
Judson Supercharged	45	33	26	17.5

From this chart you can see that the response of the supercharged car in any gear is approximately equal to the response of the unsupercharged car in the next lower gear, and that the driving impressions mentioned previously are truly correct. It is also apparent that the manufacturers claim of a 40% or better increase in horsepower is valid. Maximum readings occur at about 2300 RPM indicating that the torque curve of the engine must really be something to see. From 4800 to 6000 RPM goes so quickly in first and second gears that the power seems continuous. I did try a few runs in third gear and found that the performance edge of the supercharged engine seems to fall off at these high engine speeds. What is happening is that the cam, which is quite wild, is so efficient at these speeds that it is actually scavenging some of the boost pressure out the exhaust. While this appears on the surface to be a fault it has some advantages. It provides good fuel atomization, probably helps exhaust valve cooling and lowers boost pressure at these very high engine speeds. Performance at these revs is still better than stock, but this appears to be one of the problems connected with adding a supercharger to an engine not basically designed for it. It does lead to some very

interesting speculation about the results that would be achieved when the unit is installed on the lower compression ratio, milder cammed 190 sedan, and about the possibilities of installing the supercharger and the 190 sedan cam on the 190SL. For the record no kits are being made for the sedan at this time, and the cam switch is an idea and not a recommendation.

Our test car was equipped with a manifold vacuum and pressure gauge. At idle the gauge showed 18 inches of manifold vacuum and when the throttle was floored it showed 5 lbs. of boost pressure. With a closed or partially open throttle and the engine not under load, the car runs on manifold vacuum as if it were not supercharged. When accelerating or climbing a grade the boost pressure comes on and the engine is supercharged.

Since supercharging is producing a boost pressure only when demanded, gas mileage will be effected in direct proportion to the use you make of this extra horse power. Fuel flow checks show that with average driving it can be expected to drop about 2 miles per gallon. While we were unable to take measurements, it is fairly safe to guess that a 0 to 60 time of 9½ seconds could be turned in. Mr. Judson's figures give 0 to 60 in 9.8 and the standing quarter mile in 14. Top speed will be increased but not in proportion to the acceleration times since you are limited here only by the engine speed and rear axle ratio.

At about this point you may be saying to yourself, this is fine but what will it do to my engine's reliability? This unfortunately is a question no one can honestly answer until many thousands of miles of experience have been logged on actual installations. The Judson Company has sold over 50,000 superchargers of this type for use on VW's, Renaults, and MG's and certainly have the knowledge to assure that the supercharger itself will be trouble free. Two things I can point out are that the already too small clutch of the 190 SL will probably suffer from the increased torque that it must take, and that the factory will probably not honor the warranty on supercharged engines. In his own defense, Mr. Judson points out that the Judson is a a low boost supercharger and the bad name of supercharging has been made by units using very high pressures; the boost is used only on demand; and of all the engines for which they have designed superchargers, the 190 SL is far and away the most rugged. He fully expects that

it will take the additional stresses with little or no trouble since they will be below the designed safety limits of the parts involved.

If you have tried or are about to try "hopping up your 190 SL" in any form, or, if you would like added performance, this is for you. The stock 190 SL engine develops over 1 HP per cubic inch which is real sports car output. This is, in fact, just about the most powerful two litre production engine you can buy. Until this time there has been nothing we know of in the way of cams, carburetors or ordinary "hop up" procedures that will work. The engine has defied all normal attempts, and those that may have effected a slight edge have caused idle trouble and/or low end power losses. The Judson idles at 800 RPM, pulls better than stock throughout the whole speed range and its increases are not academic, they can really be felt. It is the only modification I can recommed that you try on your engine if you want increased performance.

Personally I thoroughly enjoyed my two days with the car. It is a new experience in 190 SL driving and really transforms it into a sporting machine. Not only would I install one on my car, but I am looking forward to the time that I can. In all fairness it must be said that the true story of engine durability with the supercharger installed will be some time in the telling, but driving it is habit forming and tends to make little details like this unimportant.

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The following pages are the follow up (Dec 1960) to the above Road Test articles. At this early stage opinions were divided on the effects of the Judson 190 on the Mercedes engine.



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The Judson Supercharger for the 190SL has been the cause of some mighty strong feelings on the part of Mercedes owners — pro and con — as evidenced by Ken Bartlett's two articles in THE STAR.

Now, two club members in Indiana have entered the controversy. Herb Levinson, Indianapolis Section Chairman, an early advocate for the Judson, remains essentially favorable and said so in his local newsletter "Starlight." Dr. Walter A. Compton of Elkhart has come to a completely different conclusion shown by letters sent THE STAR.

First, here's what Herb has to say:

"I have had several members ask me how I like the Judson supercharger on my 190SL. There have been two articles written by our past president, Ken Bartlett in the MERCEDES-BENZ STAR on this subject, and technically, there is nothing I could add to these articles. I thought you might like to hear my personal experiences with this device.

"The Judson supercharger was introduced a little less than two years ago, for the 190SL, and actually is the first modification to have any effect whatever on this car. Ken and I were among the first in the country to install these blowers in early 1959 and the correspondence flew thick and fast between Ken in New Jersey, myself, and the Judson factory in Conshohocken, Pennsylvania. Daimler-Benz, of course, frowned on the entire proceedings, taking the position that if the 190SL needed more power, that they would be the ones to give it. The Holley carburetor provided with the kit is not enough pot, and despite protests from Judson, this was immediately evident. Proof of the pudding is that on Judson's own car, on which Ken based his original article, he has a Fish carb. It idled very rough, but it went. Several people in the east have tried Webbers and even the dual Solexes that come as stock, but to what end I do not know. I finally ended up with a large Solex such as is used on the Porsche 1600 Super.

"After going through several sets of belts, a scored cylinder wall, a set of rings, a set of connecting rod bearings, and other miscellaneous items, I now have a smooth, well behaved car. However, this has taken a year and one half to achieve. Judson claims a horsepower boost of 40% and this is doubtful. They also claim a 0 to 60 time of 9.7 seconds. Mine dropped from 17 to 14 and this is the best I can do. They also say that a competent mechanic can bolt this blower on in four hours flat, but Sam Mustard in Indianapolis is a more than competent mechanic and the job took closer to sixteen hours. The radiator must be removed and moved 11½" forward. Considerable work must be done reworking the throttle linkages, the manifold spacers, the fuel line and various other plumbing. The belt pulleys provided were not of factory quality and were replaced free of charge at a later date.

"After reading this, you probably think I am ready to take an Abarth exhaust system (I have one of these, too) down my throat, but this is not the case at all. I am not saying that I would be willing to go through all of this again, but given the choice between the blown

and the unblown car, I would definitely take mine 'Mit kompressor'. As Ken points out in his second article, The Judson Supercharger Reappraised (May - June, 1960) 'Many of the advantages realized from this device are not things that show up on a performance data sheet, such as increased cruising acceleration, less down-shifting, easier climbing of hills, etc. If you can justify the time, possible aggravation and money involved, the Judson blower is a definite asset to the person who does a lot of city driving.' The unit itself is trouble free, the quality is excellent and the only noise given off is a sort of a hollow flute whistle, which I like, ham that I am. Enough said."

Then, on the other hand, Dr. Compton — who included a picture of one of the pistons and a letter from his local Mercedes dealer, W. W. Lusher. We turn the floor over to Dr. Compton:

"I am a member of MBCA and have been driving a 190-SL since 1957. I have noted with interest and some emotional reaction the various articles on the Judson Supercharger in view of my sad experience with this instrument. I enclose a copy of a letter from my local Mercedes-Benz Service Manager who is a highly experienced mechanic in combustion engines of many years duration and has had training in the South Bend plant. I also enclose a photograph of the piston from this car and am happy to add a post script that since removal of the Judson and installation of a new piston and bearings, and of course restoration of the original carburetion, with careful break-in, the car is once more performing beautifully and seems not to have suffered any permanent chronic trouble from its temporary severe illness.

"I may add to the mechanic's notes that I had noticed when the Judson was on the car that as soon as one got to speeds over fifty there would be an occasional cough of the engine and momentary hesitation much like that found with a partially clogged gas fuel line or when one is just beginning to run out of gas, and this was called repeatedly to garage attention but, of course, they could do nothing about it since the Judson carburetor did not permit adjustment.

"The whole matter was referred to Mr. Judson's attention by telephone and the Supercharger sent to him for examination. His report to me was that it was wholly normal in every respect and he disclaimed any



"Piston from Dr. Compton's 190SL"

responsibility for the problem with the car. Nonetheless, I am wholly convinced that not only is the Judson Supercharger without any special merit for this automobile but that it can be — and was at least in my experience — highly damaging."

Plus, the letter Dr. Compton received from his dealer:

Dear Sir:

Last December the engine in your 190SL Mercedes-Benz, Serial 7500926, mileage 9655, had to be reconditioned due to the fact that #4 piston and cylinder wall were scored and the rings stuck on that piston.

We believe that this damage was the result of excessive combustion temperature resulting from a lean carburetor mixture. The condition of the combustion chambers, valves, and spark plugs all indicated a lean mixture. A thorough inspection showed no leaks in the intake system which might have caused this condition.

In June, 1959 we installed a Judson supercharger on this car. The carburetor was a part of this assembly and came pre-adjusted, and as stated previously, we are of the opinion that this unit was running lean at high speed of 70 to 95 miles per hour.

W. W. LUSHER, INC., Elkhart, Ind.
Per T. A. Forrester
Service Manager Mercedes-Benz Divn.

In the May/June 1960 issue of "The Star" Ken Bartlett follows up his initial road test with a report that addresses some of the issues raised in the first test.

JUDSON SUPERCHARGER FOR THE 190SL

REAPPRAISED

Is it possible to gain a 50% increase in maximum Tapley readings on a given car and still not greatly increase acceleration times? It sure is, and that's just part of what we have learned in the last eight months following our first road tests of the Judson Supercharger. Perhaps the biggest thing we learned is that a car cannot be evaluated in a few hours, or for that matter even weeks, and this is one reason why our promised road test series has not been forthcoming.

The Judson does produce 50% better readings in all gears but the hitch is that it falls off in the higher ranges. We will use fourth gear readings for the purpose of this example to try and show you what happens, but the effect is the same in all. These readings quoted will be from an instrument known as a Perfometer, which is the same as the well known Tapley meter but has different calibrations. The readings then can be used only as a relative measure of accelerative ability. Unsupercharged the 190SL reaches a maximum reading of 10.5 at 3000 RPM. At 5000 RPM it is still reading 10. The supercharged car reaches a maximum reading of 17 at about 2200 RPM but at 5000 it is down to 11. From 5 to 6 thousand the cars are almost even.

What does all this mean in performance and in everyday driving? For average around town driving and for climbing hills it means that the Judson supercharged car can climb hills in fourth that the stock car must use third gear for, and it means that acceleration and throttle response from 2000 to 3,500 RPM is remarkably better. Acceleration from a dead start is outstanding in first gear. Just step on the gas and you are off. Those familiar with the stock 190SL will know that for a really good start the engine must be revved to 3500 or better and the clutch snapped out. This is a heart rend-

ing affair at best and is responsible for much clutch failure. With the Judson it is not needed.

For all out acceleration however the picture is very different. Placing the two cars together in an acceleration test, at the start the blown car will leap ahead and peak out in first gear well ahead of the stocker, but, when the shift is made to second, after running over 6000 in first, both cars are in the engine speed range between 3500 and 4000 RPM. At this point things are very nearly equal and the cars run together, although the blown car keeps its slight lead. At Lime Rock '59 the figures for the standing 1/4 mile were 19.0 for the best strictly stock 190SL's and 18.4 for the blown cars.

Troubles with the blower itself have been minor. Some units have been bothered with vibration which can generally be traced to a loose or broken support bracket or to early recommendations that the stock rubber gaskets be used between the blower and the intake manifold. The unit itself has been quite trouble free. Engine damage has been minor and limited to a few cases of burned exhaust valves where engine revs have been held to the red line. One broken crank and one collapsed piston have been reported but in both of these cases the failures occurred at engine speeds over 6500, (probably nearer 7,000) and can hardly be blamed entirely on the blower. I would suggest that this can be prevented by using solid gaskets, using a number 50 main jet, and installing an electric fuel pump, just to be sure. This valve burning has got to be caused by a lean mixture and these three changes will pretty well rule it out.

After all this your gas mileage will suffer, not quite in proportion to the power increase but significantly.

City mileage dropped from 19-20 to 15 and trip mileage from 28 to 21-22.

Conclusions?, well they are hard to reach. If you do a lot of driving in town and seldom see over 4500 on the tach., and if you are dissatisfied with the performance of your 190SL as it now stands you will probably like it. If you do a lot of high speed driving and do use the upper rev ranges you will not like it at all. It completely changes the character of the engine and the car.

Speculation? Lots. It is my opinion that the Judson could have the answer but lacks development. Something is definitely wrong from 4 to 6,000, and anyone at all familiar with the 190SL knows that if you really want it to *go* the tach rarely falls below these figures. The very first car I drove in making the initial road test was equipped with a Fish carburetor and this car WENT. It would not, however, idle. I think the smaller Holley carb was substituted to cure the idle problem and that the installation with the Holley is undercarbureted at high RPM's. While several mem-

bers have indicated that they were going to try larger carbs we have no definite reports as yet. One planned to adapt one of the dual throat Solex's and this sounds like a good idea. In any event, if you want to explore the *maximum* performance potential of the Judson and to leave your unblown friends in the dust at the local "drag strip" Mr. Judson has left you room for experimentation.

It is not fair to close without saying that many owners will like the supercharger, and I am sure that the Judsons feel they are selling a very satisfactory product. I think their failure has come from not spending enough time in a stock car to discover that 62 to 6500 RPM can be used routinely if high performance is desired and that the character of the car is quite different over 4,000 than it is below that figure. With complete prejudice admitted, I cannot help but wonder if this oversight has not come from driving less exotic iron with tachometers red lined at 5,000 RPM, such as a Porsche.

—K. A. BARTLETT, JR.

