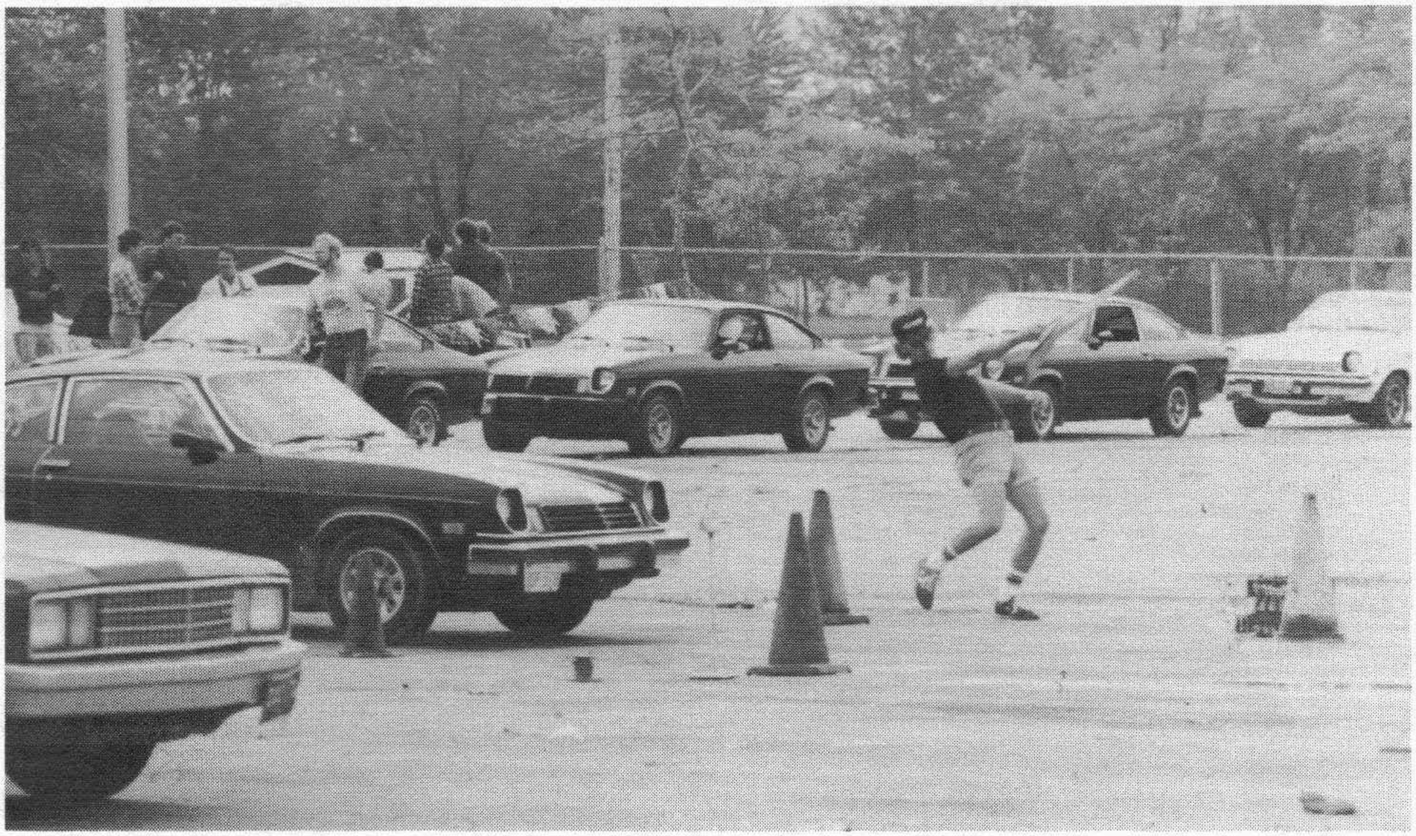
Cosworth Vega news

COSWORTH VEGA OWNER'S ASSOCIATION

NATIONAL HEADQUARTERS, P.O. Box 910, El Toro, California 92630 (714) 770-1305

SPECIAL DOUBLE ISSUE — 32 PAGES!

DETROIT ROUNDUP '81



IN THIS ISSUE

Detroit Roundup '81 .... Cover
Editorial .... Page 2
Part II - Handling
(Springs and Shocks) .... Page 6
Mystery Cars .... Page 12
Regional News .... Page 14
Letters To The Editor .... Page 15
Classified Ads .... Page 31

Rain, rain, go away could have been the theme of Roundup '81 as grey, windy skies poured on the activities Thursday, Friday and most of Saturday. The gods looked upon us kindly on Sunday as the rain stopped just long enough for the driving event to be held in the large parking lot next to the Chrysler Assembly Plant just down the road from the host motel.

Roundup '81 was, for the hosts, John and Kathy Cowall and Paul and Stephanie Wicker, a series of problems that were overcome in the best tradition of American ingenuity. After several broken promises of tours of the Tech Center and having a local air base to run the driving event, Paul came through with a great tour of the Cadillac Assembly Plant as well as a well-planned private tour of the Henry Ford Museum at Greenfield Village in Dearborn. John and Kathy, meanwhile, arranged for our driving event to be timed and run through the help of the Detroit Triumph Sports Car Club. Although the results were initially confused, due to a misentered set of results, the final, official results are published later on in this story. We want to give a hearty cheer to Paul and Stephanie for all of the great food at the bar-b-que on Sunday, and to John for changing wheels and tires for some members who needed tires badly before heading home Monday morning.

(cont. on page 3)

COSWORTH VEGA OWNER'S ASSOCIATION NATIONAL HEADQUARTERS

Cosworth Vega news news

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LETTER FROM THE EDITOR

REGIONAL DIRECTORS FOR 1981-82

Region i
New England
Craig Day
91 Edwards Street
Quincy, MA 02169
(617) 479-5397

Region II
New York-New Jersey
Westchester County
Northern Pennsylvania
Mike Springall
58 Harrison Street
Milltown, NJ 08850
(201)524-4093

Region III
Mid-Atlantic
D. J. Martin, III
D. J. Martin Chevrolet
8000 Sudley Road
Manassas, VA 22110
(703) 368-2111

Region IV
Mid-South
Jim Martin
5157 Regent Street
Nashville, TN 37220
(615) 833-3165

Region V
Southern States
Melvin Ayers
5564 Davis Road
Walkertown, NC 27051
(919) 767-3335

Region VI
Florida
Ham and Diana Harper
919 Royal Palm Drive
New Port Ritchey, FL 33552
(813) 848-8932 (B)
(813) 849-4735 (R)

Region VII
Great Lakes Region
Mark and Barbra Rock
616 Bond Court
Cleveland, OH 44114
(216) 566-1600

Region VIII
Detroit-Michigan
John and Kathy Cowall
13141 Charest
Detroit, MI 48212
(313) 386-2880 (B)
(313) 892-6206 (R)

Region IX
Chicago-Wisconsin
Peter and Debbie Dirisamer
2405 Spring Street #4905
Woodridge, IL 60517
(312) 985-9107

Region X
Indiana
Phil and Shirley Rust
5005 North Illinois
Indianapolis, IN 46208
(317) 253-2591

Region XVI
Southern California
Kris Gebracht
154 Escalones #C
San Clemente, CA 92672
(714) 493-4511 (B)
(714) 492-4247 (R)

Region XI
Mid-West States
Mark Grimm
532 Nelson Street
Morton, IL 61550
(309) 263-8828

Region XII
Cowboy Country
Clark and Jean Kirby
5603 Edwards Drive
Arlington, TX 76017
(817) 465-6596

Region XIII
Rocky Mountains
Paul & Kaye Cornell
8421 East Cortez
Scottsdale, AZ 85260
(602) 948-3996

Region XIV
Northwest-WN-OR
Jay Eisenlohr
1916 S.W. Roxbury, Apt. 19
Portland, OR 97225
(503) 297-6547

Region XV
Northern California
Mike Schmidt
1860 Jackson Street
Apartment 402
San Francisco, CA
(415) 474-8215

EDITORIAL

This is an urgent letter to every member. Further on in the newsletter is a list of members who have not renewed their membership for the current year. If your name is on the list, PLEASE fill in the renewal form and sent it in NOW. Not next week, or when you get around to it. Your club needs the support of each and every member to continue the high quality of the club magazine, as well as to provide all of the services you have come to expect. All of those long distance calls about car problems cost money. Postage has increased 12%, printing costs are rising, and on and on.

The point of this is that this is YOUR club, established to help YOU with YOUR problems. The technical bulletins alone will save you more than the membership dues of $25.00 per year. Our Regional Directors are working their tails off to answer your questions and to get out a local newsletter, all at their own expense, because they believe in what we are doing.

We believe in the association too. In this, our third year, we can look back on some great times, two wonderful Roundups, and talking with hundreds of you on the phone. Let's all get behind your association. Renew your membership NOW. It's important to the survival of your car!

Thanks for listening, and Happy New Year to you all!

Bob Maloy

TECHNICAL ADVISORS

EAST	CENTRAL STATES	WEST
Bill Hutton	Mark Grimm	Ren Rugerbrink
Hutton Motor Engineering	Grimm Chevrolet	Down The Road Ent.
P.O. Box 3333	Morton, IL 61550	1182 Grove Street
Clarksville, TN 37040	(309) 263-2241	Anaheim, CA 92802
(615) 648-1119		(714) 630-7360

Detroit Roundup '81

(cont. from page 1)

The event was highlighted by two exceptional guest speakers, Tony Hossain of *Old Cars Magazine* and Jim Hall, Editor of *Road Test Magazine* and the owner of three Cosworth Vegas. They provided us with some terrific insights into the inner workings of the auto industry and what they believe to be the future for the Cosworth. Tony, in his address to the members on Saturday evening, pointed out that the collector car market as a whole is in a downturn brought on by the economic conditions in the country, but he also pointed out a very important fact: investing in an automobile in the hopes of making money is a very risky business. He cited examples of various cars that have appreciated in value over the years and are viewed as "collectables," and the investment would have done better in a savings account. He pointed out that the real reason to buy a special interest car is just that . . . it's special interest for the buyer. He believes that the Cosworth Vega is bound to take its place along with the first Corvettes and the 1969 Z-28's as a milestone in American automobile history, but not for some time to come. We often forget that the very *oldest* Cosworth is barely six years old, and that historically it takes at least ten to fifteen years for a special interest car to find its niche in history. In summmation, the Cosworth has to "wait its turn," and in five to ten years the cars will be recognized for what they are, the single most unique vehicle ever produced by a major automobile manufacturer.

Jim Hall arrived in a brand new 1982 Camaro coupe and gave us a preview look at the newest offering from Chevrolet. Jim's extensive background in the automobile industry provided us with some behind the scenes insight into the inner working of the corporate mind.

Jim is the owner of three Cosworths, the most notable of which is #1302. CV #1302 *really* is CV #0009, and this re-numbering came about at the time that the car was ready to be scrapped by Chevrolet engineering. The car had been specially prepared for automotive journalist testing . . . let's say "well-assembled." The plans were to scrap the car after testing was completed, since the car did not meet several of the emission standards for retail sale. Jim, who at the time was in Public Relations for Chevrolet, arranged to buy the car as scrap metal, and had it rechristened #1302.

Jim answered several questions from the audience, and here are a few of the most interesting. Q. Why do some cars have a velour headliner? A. Some of the Cosworth's were equipped with what is called the "Monza Hi-Style" interior, that had the velour headliner. Q. Why do some white 76's have a red dashboard? A. This is what is euphemistically called the "Style Appointment Option," a name dreamed up by somebody in advertising to cover up a dumb idea.

Jim went on to detail the problems that the Cosworth faced internally during its birth pangs. From the decision to go outside the corporation for the fuel injection to Bendix to the badly handled advertising campaign for the car, the Cosworth became Peck's Bad Boy of the Chevrolet Division. No one wanted to be associated with the car, or the problems that the vehicle faced upon it's introduction to the public. According to Jim, the car was placed in the wrong market segment to ever have an opportunity to succeed. That fact, coupled with the decision to cancel the production of the Vega with the 1977 model run assured the early demise of the car. As to why the Cosworth engine did not appear in a Monza body, Jim replied that the Monza was considerably heavier than the Cosworth, and that the V-6 engine had been planned to make a debut in the car in early 1977 to carry the performance image. The damage had been done and the Cosworth's fate was sealed even before the first car rolled off the production lines.

When asked for his list of the cars he would like to own, Jim revealed the following:

(cont. on page 4)

Detroit Roundup '81

(cont. from page 3)

Lamborgini Countach, Ferrari 365 California, LT-1 Corvette with a four speed, SD-455 Trans-Am, an early Shelby Mustang, a Renault 5 Turbo and an Open Senator Sedan.

Sunday morning the Tech Inspection began, with the usual complaints about what runs in what class. In the final analysis, it did not seem to make very much difference, as the times from class to class did not vary with much difference (at least between the stock and modified classes).

Bad luck seemed to plague Fred Thomas who brought his SCCA prepared Cosworth racer all the way from Des Moines only to have a rough running problem that went unresolved.

Bob Maloy, the perennial "no car this year guy" was the winner by acclaimation of the Tough Luck Award. He reported that in towing his killer Cosworth from California all the way to Detroit, both the tow car and the race car hit a piece of steel I-beam about fifty miles west of Omaha, causing both arms on the rear axle to break loose, causing the car to settle down on and destroy the complete rear suspension. The car was put on a flatbed tow truck and left in Omaha to be recovered on the return trip and taken to Mark Grimm's Chevrolet garage in Morton, IL, there to rest for the balance of the winter. Maloy had spent all summer in preparation of the car for Detroit, with the help of Gabe Soto and Ren at Down The Road. The specially built 148 cu. in. engine had been built with 14.5:1 compression, (a real wheel-stander). The only person to ever have driven the car was Gabe Soto on some test runs in Southern California where the car went into three perfect 360° spins when Gabe let the clutch out a bit too fast, and the gas pedal was pressed a tad too far. Oh well, there is always next year. The final results of the driving event are as follows:

STOCK CLASS

Bill Nichols	56.79
Mark Grimm	59.46
Bob Maloy	60.60(Y)
D.J. Martin	61.02
Bob Chin	61.08
Pete Dirisamer	61.14
Dave Gade	61.89
Rick Morris	61.39
Arvin Ayers	64.75
Tod Buegner	64.82
Dennis Strnad	65.39
Bill Edge	72.71
Vivian Edge	85.98(L)
Arnie Gibson	DNF(L)
Greg Gibson	DNF

MODIFIED CLASS

John Cowall	55.44
Phil Good	56.50
Jeff Romeo	57.13
Cliff Erosky	60.35
Dave Bower	60.44 (X)
Mark Rock	60.45
George Coon	61.59
R. Hirsch'lr	61.74
J. Masais'ski	63.30
Kathy Cowall	64.21Z(L)
Lou Marr	69.01
Harriet Marr	82.71(L)
June Erosky	83.67(L)

UNLIMITED CLASS

Graydon Obenour	49.15(FTD)
Doc Dougherty	50.45
*Fred Thomas	55.23
**Deb Thomas	59.03(L)
Tom Guyton	59.03
Gabe Soto	59.90
Pat Moore	67.05

Footnotes:

X — originally given time of 55.23, which belongs to Fred Thomas. Refuses to return trophy to rightful owner.

L — Ladies

***, ** —** denotes errors in the final recording by the scorers; therefore Deb Thomas owes her husband the Third Place Trophy. (However, Deb Thomas won the Fastest Woman In Detroit Trophy and from 35 drivers placed the 4th fastest time.)

Y — denotes Bob Maloy driving D.J. Martin's car, again! (Thanks D.J., I owe you a ride next year.)

FTD — Fastest Time of Day in Doc Doughtery's car.

Sunday evening brought us together for a beautifully prepared banquet with every imaginable kind of food from prime rib to cracked crab very elegantly prepared by the chef at the motel. It proved to be well worth the wait, although we were all still full to overflowing from the great chicken bar-b-que prepared by Paul and Stephanie Wicker who it is reported stayed up much of Friday and Saturday night making potato salad and cole slaw for the picnic.

The round of events we experienced at this year's Roundup in Detroit were very enjoyable — from the Sloan Museum in Flint where we saw Cosworth Vega #0001 and the prototype Corvega, the Renaissance Center luncheon atop the world's tallest hotel (the elevator ride was half the thrill), the Strohs Brewery tour, to the tour of the Cadillac Assembly Plant and the Henry Ford Museum. Thanks to the many people who worked to ensure that we had a great time in Detroit.

See you all next year. Where? MORTON, ILLINOIS!, late July and early August. Mark Grimm will be the host of the roundup for 1982. (We know for sure that Bob Maloy's car will be there.)

SPECIAL THANKS DEPARTMENT

John & Kathy Cowall, Paul & Stephanie Wicker — for hosting and making a super success of Detroit Roundup '81.

D.J. Martin III, Martin Chevrolet — for contributing door prizes.

Mark Grimm - Grimm Chevrolet — for contributing door prizes.

John Cowall, Goodyear Tire Co. — for contributing door prizes.

NGK Sparkplug Co. — for contributing door prizes.

Ren Rugerbrink, Down the Road — for the Fastest Time of the Day Trophy

Chevrolet Public Relations — for the beautiful Cosworth blowups.

Doug L. Surratt — for the use of his trailer.

Mark Grimm — for the use of his garage.

John Brevick, Mark Babcock and Bob Jacques of Cadillac Motor Car Division — for the excellent guided tour.

Maureen Maloy — for being a full-time Flagperson at the driving event and for keeping Gabe Soto awake on the long drive to Detroit.

Clark Kirby — winner of the Regional Director of the Year Award, and his new bride, Jean Kirby, for flying in from Dallas for the Roundup, and for his dedication to the Association.

Gabe Soto — for supervising Tech Inspection, for untold hours in helping to prepare #2150, and his good company this past summer.

And, finally to all of those unsung heros who helped put Roundup '81 together in the face of enormous odds.

GET READY FOR ROUNDUP '82

MORTON, IL

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MARK GRIMM, DIRECTOR

FRI. — SAT. — SUN.
AUG 6-7-8

PLAN YOUR VACATIONS NOW — FUN FOR THE ENTIRE FAMILY

DETAILS IN THE SPRING COSWORTH NEWS

Cosworth Vega Owner's Association

Technical Bulletin

DATE: 12-10-81

SUBJECT: Air Cleaner Part number correction

CORRECTION TO INFORMATION

On page five of the Summer, '81 newsletter, the part number for the Cosworth Vega air cleaner is incorrect. The correct number is:

GM PN1553690

Thanks to Craig Day

HANDLING–WHAT IT IS AND HOW TO GET IT

PART II — SPRINGS & SHOCKS

by Bob Maloy

This is the final in a two part series on handling, and how to get it. We hope you have enjoyed it as much as we have in putting it together for you. One thing certainly holds true, and that is that the last 10% of the perfection costs about 70% of the money you spend to achieve that level of perfection.

Whether you are looking for the ultimate in a competition machine, or just an improved and more predictable street car, all of the ingredients are here for your personal mixing. Good luck, and if you have any questions, feel free to call or write. We will try to help in any way we can.

SPRINGS

The basic characteristic of springs which makes them useful is the fact that they are springy. An uncompressed coil spring exerts no force as long as it is uncompressed. The more you compress it, the more it pushes back.

If it takes a force of 100 pounds to compress a coil spring one inch, then when compressed that much it can support a weight of 100 pounds. The behavior of coil springs is that it will require an additional 100 pounds to compress the spring another inch. Now, 200 pounds is resting on the spring and it has compressed or deflected a total of 2 inches.

If one corner of a car weighs 400 pounds and that corner is resting on this spring, it will compress 4 inches when the car is sitting still. If the car is driven and hits a bump, the spring should compress still more–perhaps another 4 inches before the suspension hits the bump stop on the frame. That's a total of 8 inches of spring travel, with the spring force ranging from zero to 800 pounds. Actually most coil springs still have some compression even when the suspension is fully extended–they are compressed to install them in the car–so the actual range of spring forces may be from 200 to 1000 pounds in this example.

A suspension travel of 8 inches is common on passenger cars but not suitable for most racing cars. Modified springs are sometimes helpful in improving the handling of a car. Generally spring modifications are for one of two reasons: to change the stiffness of the suspension, or to change the ride height of the car.

Because springs control so many factors in car handling, what you may think is a simple change can result in complex handling differences.

The basic purpose is to absorb bumps and irregularities in the pavement. Springs provide a reasonable degree of comfort for the occupants of the car, and they help maintain contact between tires and road. The wrong springs can reduce both ride quality and handling on bumpy surfaces.

In general, soft springs give the best ride and also the best traction on rough surfaces. The disadvantage of soft springs is a lot of up-and-down motion of the car on its suspension, resulting in inferior handling under certain conditions. For example soft springs will allow more nose dive under braking with greater camber change on an independent front suspension and a net loss of braking traction.

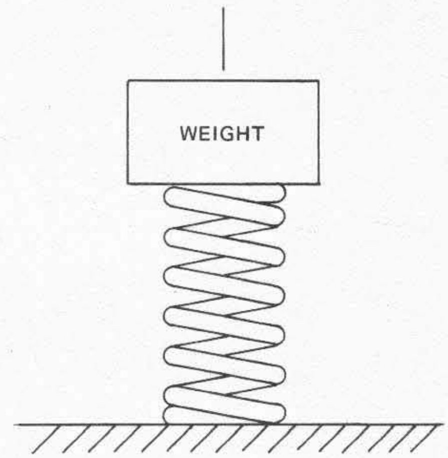
On banked corners, soft springs can allow the car to ride the bump stops, a very serious condition leading to poor handling. If large aerodynamic forces are acting on the car, soft springs will allow a large change of ride height with change in speed, and this can cause entirely different handling characteristics between low-speed and high-speed driving. Even though body roll in corners can be controlled by anti-roll bars, the springs are the only effective limit to vertical motion of the car on its suspension. A special case is the Z-bar described later in this section.

The usual modification to springs is to stiffen them for less vertical motion. This has the side effect of increasing roll stiffness of the suspension, so the car will have less roll in the turns. Increasing the spring stiffness has definite limits for both ride and handling. For racing use, the springs should be fairly stiff, so this modification may be just what you need. However, for drag racing, stiffening the springs will result in less lifting of the nose and thus less weight transfer to the rear tires. If only one end of the car is stiffened and not the other, the resulting change in relative roll stiffness may alter the steer characteristics. It may also cause uncomfortable fore-and-aft pitching motions on certain surfaces.

In every case, the ride will become harder with stiffer springs, and you will need stiffer shocks to control the springs properly.

No matter how you go about selecting springs for your car, you must eventually judge the result by a criterion common to all people and all cars–*how does it feel?*

Everybody has experienced the soft wallowing undulations of a large passenger car designed for a boulevard ride, and many have felt the harsh jiggling vertical motions of a stiffly sprung performance car.



If set into motion, the weight will bounce up and down on that spring for a long time. The bouncing will be at a steady rate called the natural frequency. Cars do the same thing.

The difference is how fast the body bounces or *oscillates* up and down on the suspension springs. Shock absorbers or dampers tend to mask the effect of vertical body movements because they oppose those movements. For analysis, we imagine that the shocks are disconnected, leaving only the two essentials which determine the rate of vertical oscillation. These are the weight of the chassis and the stiffness of the springs.

A natural characteristic of any weight associated with a spring is vibration or oscillation at some definite rate. This is done by a pendulum–where the springiness is contributed by gravity–or a tuning fork which has some weight and some springiness in each half. It is also a property of a weight hanging from a spring, or sitting on a spring. In all such mechanical systems, if the weight is moved away from its rest position and then released, it will oscillate back and forth, or up and down, at some steady rate or frequency.

You can probably see intuitively or by experiment that more weight tends to make the system oscillate at a lower *natural frequency* and a stiffer spring tends to make it vibrate faster.

Weight is a commonly used expression, but *stiffness* is not. If you test some coil springs for stiffness by compressing them between your hands, you will conclude that the springs which are less stiff compress more with the same force applied. Spring stiffness is the force applied to the spring divided by the amount the spring compresses or deflects as a result of that force. If force is measured in pounds and deflection in inches, spring stiffness is expressed in *pounds per inch.*

A common symbol used for spring stiffness is K, called *spring constant,* or *spring rate.*

$$K = \frac{\text{Force}}{\text{Deflection}}$$

The chassis of a car sits on springs. Disregarding the effect of shock absorbers, every bump in the road causes the chassis to bounce on its springs at some natural frequency determined by the weight of the chassis and the stiffness of the springs.

Because the stiffness of the front springs is not usually the same as the rear springs, and because the weight of the front end of the car is not usually the same as the weight at the rear, most cars have two natural frequencies of vertical oscillation—one at the front and a different rate at the rear.

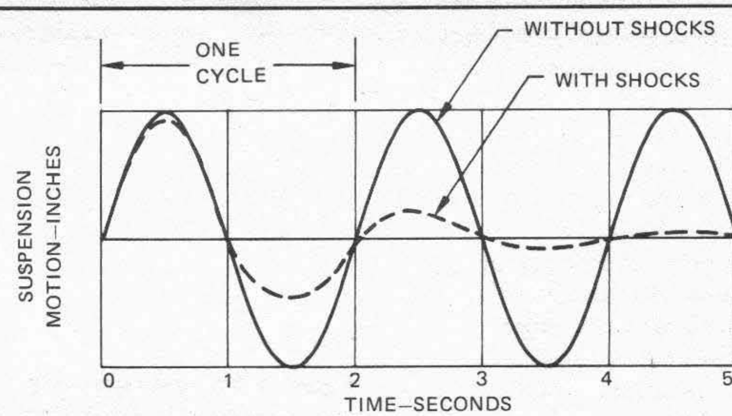
Natural frequency is expressed in cycles per second, where a cycle is one complete up-and-down motion of the car.

Imagine you are sitting in a car without shocks and someone bounces the springs. If the natural frequency is very low and the motion large, say 3 inches, you would not feel like you were in a car at all. Instead the slow up-and-down motion would resemble that of a boat gently rising and falling with the waves. The ride would possibly make you seasick.

If we increase the natural frequency of the suspension to 1 cycle per second and reduce the vertical motion, the ride would begin to feel better, more like a car. Increasing the natural frequency to 2 cycles per second would result in a jiggly ride like a truck or a racing car. A further increase to 10 cycles per second would blur your vision and vibrate your body to the point of total discomfort, like riding on a jackhammer. A car with no springs would have a natural frequency of about 10 cps. The car would be bouncing only on the tires.

There is a comfort zone which the human body likes best, and this is what most cars are designed for. Going far outside the limits results in a very uncomfortable ride.

If you plan to change the springs for better handling, you should first determine the natural frequency of your car's suspension. Then you can make an intelligent change that won't be a blind guess. To calculate natural frequency, you must find both the vertical stiffness of the suspension and the *sprung weight*—meaning the weight sitting on the springs.



Here is a graph of suspension motion after a wheel hits a bump. The solid line shows the motion without any shocks, the car continuing to bounce up and down a number of times. The dotted line shows how shock absorbers cause the motion to disappear very quickly. The natural frequency can be determined from this graph by seeing how many cycles occur in one second. In this example the suspension natural frequency is 1/2 cycle per second—which will make you seasick.

The *suspension vertical stiffness* —also called *wheel rate*—is the amount of vertical force at the wheel necessary to move the suspension one inch vertically.

You can find wheel rate by direct measurement. Add weight to the car so its effect on each wheel is known. If you place the weight directly between a pair of wheels, it will divide equally between the wheels. Then measure the vertical and aft after the weight is applied to eliminate scrub. Then measure the vertical movement of the suspension. The vertical stiffness is the added weight per wheel divided by the resulting suspension vertical movement.

If you place a 400-pound weight centered over the rear axle, it adds a force of 200 pounds to each rear wheel. If this makes the body of the car move one inch closer to the ground, the suspension vertical stiffness at *each* wheel is 200 pounds per inch.

Because of friction in the suspension, it is often difficult to do this job accurately. The best way is to remove the shocks and place a scale under each tire to accurately measure the change in weight on the wheel. If you like calculations, you can determine the suspension vertical stiffness by the following formula:

$$\textbf{Suspension vertical stiffness per wheel} = \frac{\textbf{Spring stiffness}}{(\textbf{Mechanical advantage})^2}$$

Some important ideas have been concealed in the last few paragraphs and they may not be obvious. Let's spend a minute on them.

First, the stiffness of a suspension is not the stiffness of the spring all by itself. The important stiffness is that "seen" by the wheel or the body, which may be different on account of leverage.

Also, suspension stiffness is the same whether "seen" by the chassis or the wheel. This is another way of saying that moving the chassis down 2 inches is the same as moving the wheel up 2 inches. It is often more convenient to consider wheel movements as you will see in just a minute.

Finally, there must be a reason that the mechanical advantage term is *squared* in the equation above for suspension vertical stiffness. You can tune chassis without ever knowing why, but if you are intrigued by such things, let's piece it together.

Mechanical advantage is another way of saying *leverage.* Imagine a front suspension using A-arms, with the wheel at the end of the A-arm and the coil spring exactly halfway between the wheel and the suspension pivot on the frame. When the wheel moves 2 inches, the coil spring will compress only one inch because of leverage or mechanical advantage.

The trick here is to recognize that a change in leverage changes *both* the amount of *force* at the end of the lever and the amount of *movement* at the end of the lever. Because spring stiffness is force divided by movement, using a lever to operate a spring causes a curious happening.

Let's assume two cases and calculate some forces and movements. Suppose the stiffness of the spring itself, measured all alone, is 800 pounds per inch. With the coil spring halfway between pivot and wheel, move the wheel upward one inch. The spring compresses only half an inch. If spring rate is 800 pounds per inch, compressing it by half an inch causes a force at the spring of 400 pounds. But because of the 2:1 leverage at the wheel, the force at the wheel is only 200 pounds.

As far as the *wheel* is concerned, the stiffness caused by the spring located somewhere else is still force at the wheel divided by deflection at the wheel. Two hundred pounds force divided by one inch of wheel movement is a stiffness at the wheel of 200 pounds per inch. Because that's what the wheel "sees," it is called *wheel rate.*

Now let's double the leverage so it is 4:1. When the wheel moves upward one inch as before, the spring will compress only 1/4 inch. That *same* spring will exert a force of 200 pounds when compressed only 1/4 inch because the rate is still 800 pounds per inch. The force of 200 pounds at the spring will become only 50 pounds at the wheel because the leverage is now 4:1.

What stiffness does the wheel experience? A force of 50 pounds divided by a movement of one inch is a wheel rate of 50 pounds per inch.

Doubling the leverage reduced the wheel rate by a factor of 4.

The mechanical advantage of a suspension is the amount of vertical movement at the tire to move the spring one inch. Movement of the spring is measured as shown in Figure A : along the centerline of a coil spring, vertically for a leaf spring, and in the direction of driving-arm motion for a torsion bar. The mechanical advantage can be measured or calculated. A direct measurement is usually easiest. Just move the suspension vertically by jacking up the car slightly. Measure the motion of the spring. Mechanical advantage is the vertical motion of the body divided by the movement of the spring.

When measuring mechanical advantage, do not use large motions or take measurements near the end of suspension travel. Mechanical advantage often changes with suspension motion, and is only significant when measured at or near the ride height position. Simple calculations for natural frequency assume a constant mechanical advantage, and this is nearly correct for small suspension movements near the ride height. Natural frequency calculations of variable-stiffness suspensions are too complex for this book.

Finally you can calculate natural frequency as follows:

$$\text{Natural frequency} = 3.13\sqrt{\frac{\text{Suspension vertical stiffness per wheel}}{\text{Sprung weight per wheel}}}$$

Another method for finding the natural frequency is to use the following formula:

$$\text{Natural Frequency} = \frac{3.133}{\sqrt{\text{Static Deflection}}}$$

Here the natural frequency is measured in cycles per second, and static deflection is measured in inches. The term *static deflection* is the vertical distance the car body has to be raised to take the load completely off the springs, starting at the ride height.

It is possible to measure the static deflection of your suspension and avoid calculating sprung weight and vertical-suspension stiffness. You must disconnect the shocks or other rebound straps from the car so the load can come completely off the springs when the body is raised. Then measure the ride height of the car, the distance from some reference point on the frame to the ground. Next jack up the car slowly until the load is completely off the springs. The spring should rattle around but just barely. Stop there and take another ride-height measurement. Subtract the first reading from this number to get the static deflection. This method is limited to coil springs or other designs where static deflection can be easily measured.

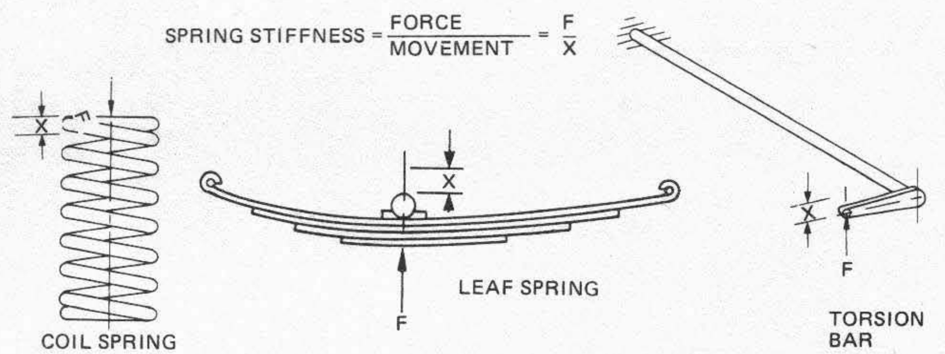


Figure A /Spring stiffness is the amount of force applied to the spring divided by the movement caused by that force. The directions of forces and spring movements are as shown. Measure both force and movement in the normal direction of spring motion. Spring stiffness is expressed in pounds per inch.

After you have measured or calculated the suspension vertical stiffness, you must determine the sprung weight. Often this is approximated by subtracting an estimated unsprung weight from the total weight per wheel. A more accurate unsprung weight figure can be obtained with a direct measurement. Place the car on jack stands under the frame, thus supporting all the sprung weight. Then disconnect the rebound limiting devices, usually the shocks or the leaf springs, and weigh the unsprung weight by placing a scale under each tire. The sprung weight at each wheel is the total weight on each wheel minus the measured unsprung weight. There is a small error in this procedure unless you remember to add in the contribution to unsprung weight of any moving parts disconnected from the suspension.

In this formula the suspension vertical stiffness is measured in pounds per inch. The sprung weight is in pounds. The natural frequency is cycles per second.

To avoid arithmetic you can determine

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the natural frequency from Figure B. Find the curve with your suspension vertical stiffness. Draw a horizontal line at the sprung weight per wheel, and note the point where this horizontal line intersects the curve. Then draw a vertical line down from this intersection point and read off the suspension natural frequency on the bottom of the graph.

Figure B is useful if you wish to change springs. You can select a natural frequency and see what vertical suspension stiffness is required with a certain amount of sprung weight. The new spring stiffness can be determined once you know the desired suspension vertical stiffness:

Spring stiffness =
(Suspension vertical stiffness per wheel)
x (Mechanical advantage)²

There is another interesting fact that can be determined from Figure B. Note that if you reduce the sprung weight of a car the natural frequency increases. This happens when you lighten a car for racing, so sometimes there is no need to change the stock springs. By lightening the car you get an effect similar to stiffening the springs.

The problem with this is: As sprung weight is reduced, the ride height goes up, resulting in a c.g. height increase. This may result in more weight transfer and less cornering power. Therefore, the free height of the springs should be less to maintain or lower the c.g. Here again, you must do everything carefully and in steps so you don't end up with the wrong ride height.

For example, if you take the body off your VW and convert it into a light dune-buggy, the sprung weight is reduced. If you leave the springs the same, the natural frequency goes up, and what was once a soft-riding sedan now has the ride of a racing car. Change the springs if you are making a large change in car weight and don't want the ride to change.

The only real comparison of suspension stiffness is natural frequency. A suspension with high natural frequency has a firm ride and a low natural frequency rides softly. Because sprung weight of the car enters into the calculation of natural frequency, changing sprung weight has the same effect as changing the spring stiffness.

The natural frequency of the suspension should fall in the range of one to two cycles per second. The lower limit is for soft-riding sedans and the upper limit is for racing cars. You can make a compromise, depending on how back-breaking you think you want the ride to be.

Traction on bumps will be better with softer springs, but smooth-pavement handling will be better with the stiffer springs. Decide these things before you start to modify springs.

Pitching is an uncomfortable fore-and-aft motion of the car, caused by one end of the car moving up on the suspension while the other end of the car is moving down.

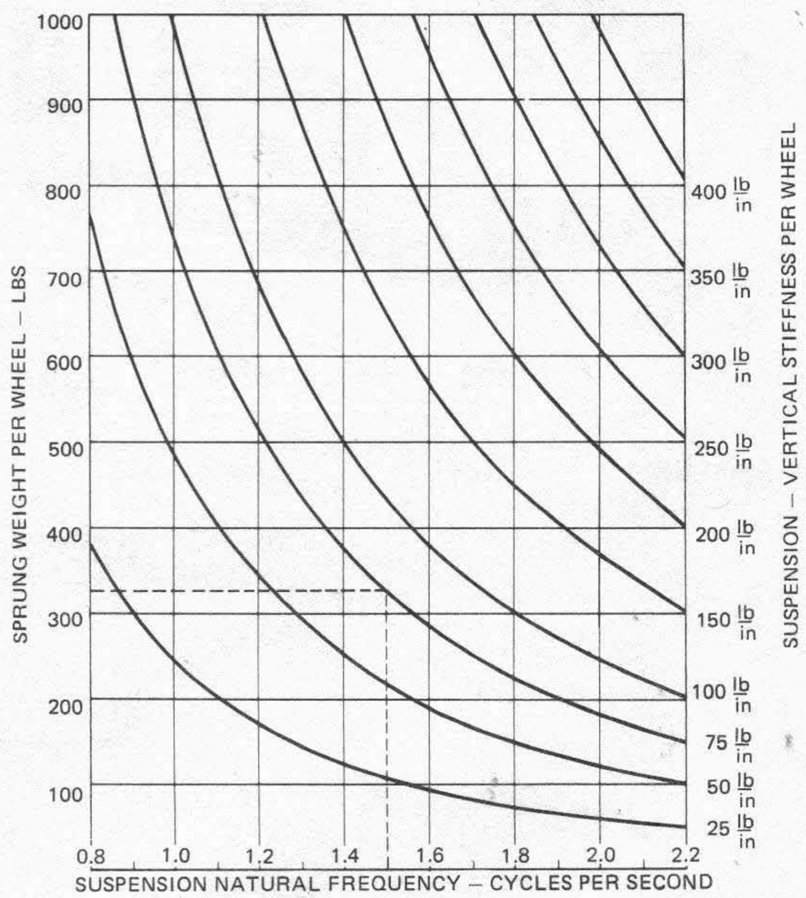


Figure B / If you know vertical suspension stiffness and sprung weight, you can find the natural frequency from this graph. Measure the vertical suspension stiffness per wheel and sprung weight per wheel as described in the text.

Use the graph as shown by dotted lines. With a suspension vertical stiffness per wheel of 75 pounds per inch and sprung weight per wheel of 325 pounds, the natural frequency of oscillation will be 1.5 cycles per second.

To minimize pitching motions, the front suspension should have a lower frequency than the rear suspension. Then the front takes longer for the rise and fall after hitting the bump, and the rear suspension "catches up" with the front. When the front and rear suspensions move simultaneously there is no pitching.

Pitching can be largely eliminated this way, but only at one road speed. Select the speed at which you would like the best ride, and design the springs to that condition. There will be some pitching at other speeds. For a road car 55 MPH is a typical cruising speed. For a racing car use the average speed of the typical race lap.

Knowing the car's wheelbase and the average speed, you can compute the time it takes for the rear wheels to hit a bump after the front wheels have hit it. The formula is as follows:

$$\text{Time to travel wheelbase} = \frac{.0568\ \text{Wheelbase}}{\text{Car speed}}$$

where time is in seconds, wheelbase is in inches, car speed is in miles per hour.

The time for one full cycle of motion must be determined for both the front and rear suspension. This time is called the *natural period,* and is equal to one divided by the natural frequency. The front natural period should be greater than the rear natural period by the time it takes for the car to travel its wheelbase length. Thus if you select the natural period for the rear, you then calculate the natural period for the front by merely adding the wheelbase travel time to it. One divided by the natural period is the natural frequency. To summarize;

$$\text{Natural Period} = \frac{1}{\text{Natural Frequency}}$$

Front natural period–Rear natural period = Time to travel wheelbase

$$\text{Natural Frequency} = \frac{1}{\text{Natural Period}}$$

when natural frequency is in cycles per second; natural period is in seconds per cycle.

As an example let's calculate the natural frequencies for a small racing car such as a Super Vee. Assume the wheelbase is 90 inches and the average speed for this class of car is 100 miles per hour. The time it takes for the car to travel its wheelbase is:

Time to travel wheelbase =

$$\frac{.0568 \times 90 \text{ inches}}{100 \text{ miles per hour}} = .0511 \text{ seconds}$$

For a desired rear suspension natural frequency of 1.8 cycles per second the natural period becomes:

Natural period =

$$\frac{1}{1.8} = .5556 \text{ seconds}$$

Adding the time to travel the wheelbase gives the natural period of the front suspension.

Natural period of front suspension =

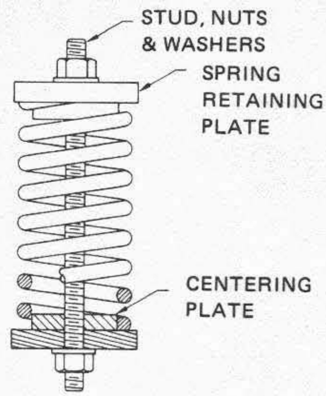
$$.5556 + .0511 = .6067 \text{ seconds per cycle}$$

Natural frequency of front suspension =

$$\frac{1}{.6067} = 1.65 \text{ cycles per second}$$

Besides suspension stiffness, springs are modified to change the ride height of the car. Usually you are trying to lower the CG.

On a coil spring of a certain wire size and coil diameter, stiffness is determined by the number of coils. Thus cutting the spring increases the stiffness and reduces ride height. If you only want to reduce ride height the spring can be shortened without changing its stiffness. A spring shop can do this for you, or you can try it at home. To do it yourself you need a spring compressor. This is a long large-diameter bolt and two thick metal plates. The plates should have a hole in the center for the bolt. Clamp the spring between the plates and compress it by tightening the bolt. Make sure it doesn't slip or you could kill yourself!



Here is a simple spring compressor that can be used for shortening a coil spring in an oven. The spring retaining plates should be thick steel with a clearance hole for the stud. The centering plates can be other material such as aluminum or plywood. The centering plates are necessary to keep the spring from slipping off center and bending the stud. If this happens the stud may break and the flying parts could easily kill someone! When designing this tool use *very* strong parts, particularly for big springs!

With the spring collapsed, put it in an oven at about 400 degrees F. Leave it in for a few minutes and take it out. Let it cool and remove the spring from the compressor. It will now be shorter by some amount. With luck it is not too short, and some additional time in the oven will make it more nearly correct. This trial-and-error process is used on the other spring. Any differences can be made up with metal shims when you install the springs on the car. It is disaster to try shortening springs by heating them with a torch–you will probably ruin the spring.

If you want to put stiffer springs on your car as well as lower it, these two changes tend to work against each other. A stiffer spring compresses less from zero load to its normal riding position. Thus cutting off the end of a coil spring will not lower the car as much as you removed, because the spring also got stiffer when you cut it.

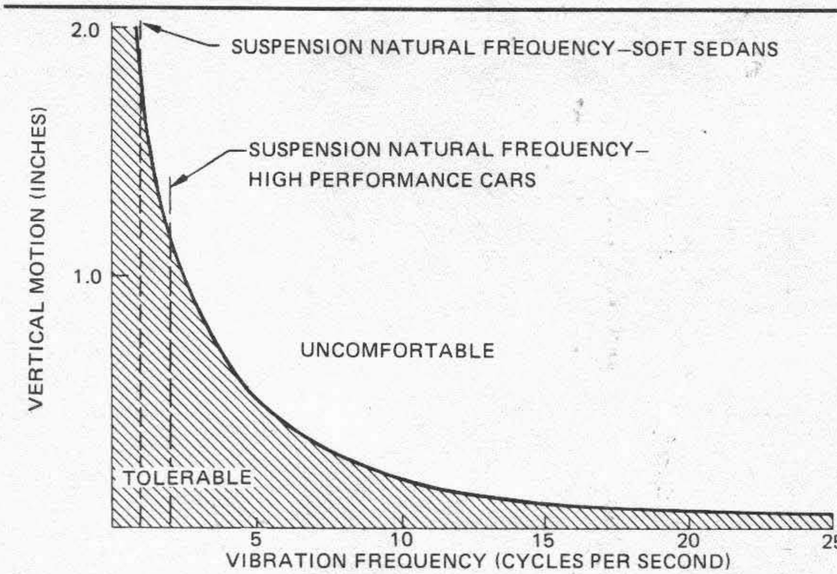
If mathematics is your bag, you can compute the stiffness of a coil spring. The formula is:

$$K = \frac{W^4 G}{8ND^3}$$

where:

- K = stiffness of the spring in lbs. per inch
- W = diameter of the spring wire, in inches
- G = 12,000,000 for steel springs
- N = number of active coils (number of free coils + 1/2)
- D = diameter of the coil measured to center of wire, in inches

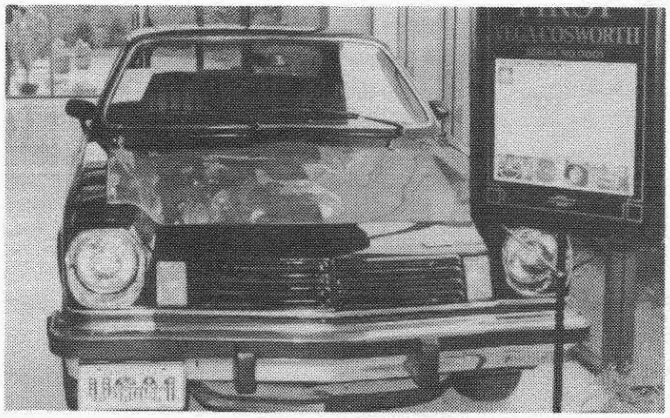
Notice how sensitive spring stiffness is to the diameter of the wire. If you double the diameter of the wire you multiply the stiffness of the spring by 16. It is also



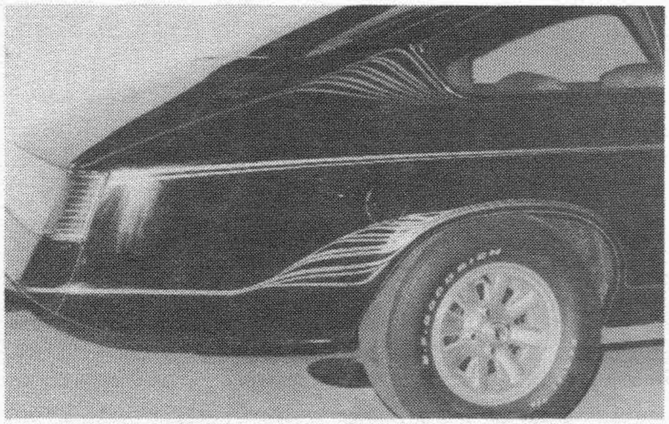
This graph shows combinations of vibration frequency and motion which the average person finds tolerable. Above the curve is the discomfort zone, which obviously is to be avoided. A typical sedan has a low-natural-frequency soft suspension so vertical motions of over 1 inch are not uncomfortable. A sports car or racing car requires less lean and variation in ride height, so a higher natural-frequency suspension is used. The stiffer racing suspension means less comfort. Typical suspension frequencies are shown as dashed lines on the graph.

WHAT EVER HAPPENED TO. . .

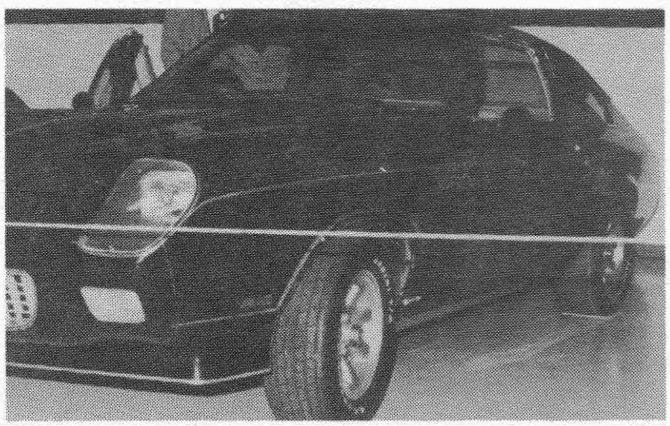
• CV000½ Cosvega Prototype • CV0001 1st Production Cosworth • CV0008 Car & Driver Rally Car



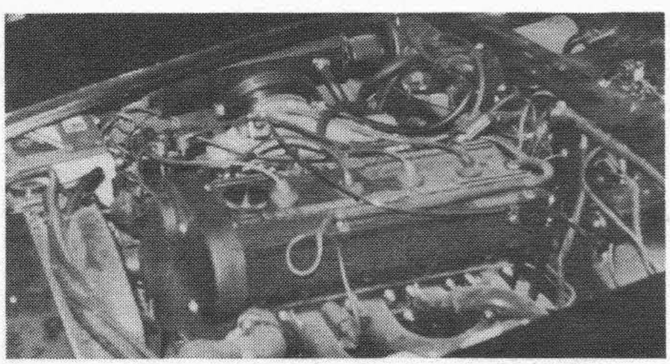
COSWORTH #0001



CORVEGA



CORVEGA



NOTE EARLY THROTTLE BODY DESIGN AND LACK OF PULSE AIR TUBES

Over the past six years the whereabouts of three very special Cosworth Vegas have been, for many of us, a source of concern. One of the three cars is the Corvega prototype built in 1971 by Chevrolet for the auto show circuit, and as far as we can tell, the first car to carry the fuel injected dual overhead cam Cosworth engine. The second Cosworth that we have finally located and one that we are asked about most often is Cosworth #0001, the first Cosworth ever produced. The third car is the car that *Car and Driver* magazine prepared for the Pro Rally circuit — #0008. This car is probably the most written about Cosworth in the history of the marque, and the development of the engine and chassis were documented in *Car and Driver* magazine in 1976. The whereabouts of this car has truly been a mystery since its disappearance from the automotive scene shortly after the London to Sydney transcontinental rally in 1977.

The Corvega, #000½

In 1971 when the concept of a twin-cam Vega engine blossomed in the minds of Cosworth of England and the idea caught on at Chevrolet, the design team at the GM Technical Center was given a very special project — to design an "H" bodied special to carry and display the Twin Cam motor on the auto show circuit. From this assignment came the Corvega. As you can see by the photos, the car is basically a Vega — but with some very special styling changes. The interior of the car has specially formed seats that are covered in a beautiful butter colored leather. The dash is not the final gold of the production Cosworth, rather it is engine-turned aluminum. The inner door sills are chrome-plated, as are all of the inner reveal areas. This is a very costly process, as it entails the stamping of a single piece of metal to place over the sill plates and the door jambs that has been chrome-plated for show purposes. The body work is absolutely beautiful, although there may have been excessive use of the gold striping on the paint. The rear end is a blend of Vega and Monza, and a well executed one. The front end has some of the "Ferrari Snoot" treatment so popular with the GM styling studios at that time. The 1972 Vega is a good example of the Americanized Italian school of auto styling, and this car is probably the best example. To those of you who have had an opportunity to visit the Sloane Museum in Flint, MI (as many of us did at the Roundup), the chance to see at the same time both Cosworth #0001, and this car — the Corvega is quite an experience. We have jokingly called this car Cosworth #000½.

Cosworth #0001

The place of honor in the Sloan Museum, directly to your right as you enter the lobby is occupied by Cosworth #0001. The odometer is showing 18 miles, and General Motors has outfitted the car with a clear plastic hood to allow a view inside. The car is equipped with all of the options that were available in 1975, except limited slip differential. AM-FM Delco radio, electrically heated rear window defogger, floor mats, and rear opening windows were the installed options on car number one. The curator told us that the car has occupied the place of honor by the front door for quite some time, and that it is the source of many questions from visitors who never heard of a twin cam Vega!

Cosworth #0008

The third and final mystery car is #0008. This car started its life by being totally dismantled and remanufactured by the staff of *Car and Driver* magazine. The goal was to prepare the perfect Pro-Rally car to run in the world famous Marquette Michigan 1000

(cont. on page 13)

Mystery Cars

(cont. from page 12)

Rally. We want to thank member Gene Von Gunten of the Capitol Cosworth Club for his letter about this car.

Gene explained that the car was featured in the December, 1976 issue of *Car and Driver* as the ultimate Cosworth. With a George Foltz prepared engine and a reinforced specially prepared chassis, the car had all the potential of being a real world beater. The *Car and Driver* staff, however, did not live up to the potential of the car, and it met an inglorious end against a tree in Northern Michigan.

Cosworth #0008 was purchased from *Car and Driver* by Tom Delashmutt, who is one of the owners of Summit Point Raceway at Summit Point, VA. The car was discovered by Gene while the Capitol Cosworth Club was on an outing at the raceway in 1981. Gene and D.J. Martin, III, our Regional Director, were approached by Carlos Niederhausen (who was storing the car for Tom Delashmutt) when he saw the large number of Cosworths at the track.

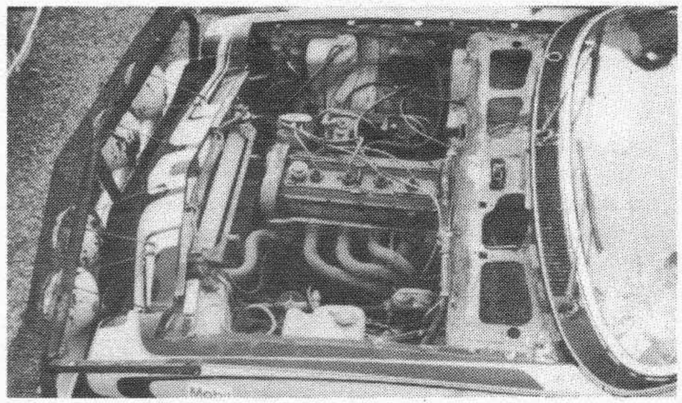
Carlos and Tom drove the car in the 1977 Singapore Airlines Rally which began in London and in Sydney, Australia. Carlos told of several disasters that befell them on the 7000 mile trek. The photos give some idea of the condition of the car after the rally. The heavy bar on the front is known as a "Roo Bar" to keep the kangaroos off the sheet metal! You can see what high speed and terrible roads can do to a car.

The most remarkable part of the story is that the Foltz prepared engine is still in excellent shape after two Rallies for *Car and Driver.* The car was driven across country from San Francisco to Charleston, WV after returning via ship from the Singpore Rally. The car has had only regular maintenance and never has caused the slightest bit of trouble.

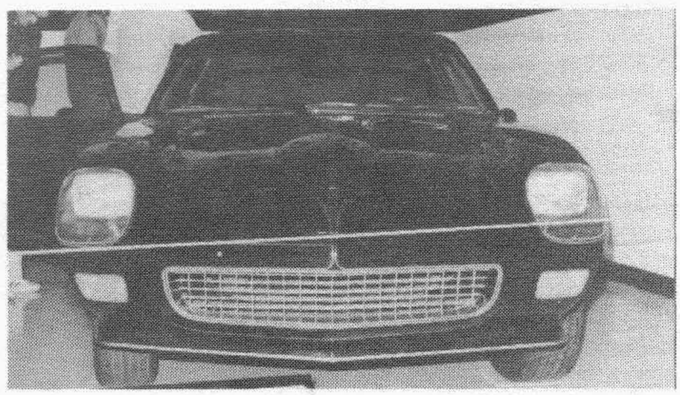
Carlos has promised to present a slide show to Region III at a future meeting, showing the trials and tribulations of a transcontinental (Asia and Europe) rally. The man pictured with the car is Carlos Niederhausen, who is the owner of Carlos Foreign Car Parts, 423 North Mildred Street, Ransom, WV 25438, (304) 725-2656. If you are in the area, be sure to call Carlos and thank him for letting us use these photos, and for providing us with the story.

And there we have it! The mystery cars are no longer a mystery to us. We are a few steps closer to understanding the beginnings of the Cosworth Vega story.

#0008



#0008



CORVEGA

REGIONAL NEWS

Region I, New England

Craig Day, our new Regional Director for New England, has written to say that he looks forward to an exciting program of events as soon as the snow thaws and the streets are clear again. Craig is one of our most avid members, and drove all the way from Boston to attend the National Roundup in Detroit this year.

Region II, New York, New Jersey

Mike Springall and his new bride arrived in Detroit with his usual big smile! Although Mike did not bring his Cosworth powered Vega wagon this year, he did have an opportunity to tell us that Region II, one of the association's largest and most active areas, can look forward to an even better year in 1982 with several tech help meetings and a rally and picnic planned for the early spring.

Region III, Mid-Atlantic

D.J. Martin, III and his wife displayed their usual southern hospitality by loaning Bob Maloy his car to drive in the autocross in Detroit. (AGAIN!) D.J. is planning a get together with the Jaquar Club early this spring at Summit Point Raceway for an all day outing, and a chance to drive the Cosworth on a real road racing course. Contact D.J. for details. By the way, D.J.'s Chevrolet dealership was awarded the "Best Service Faclity in the D.C. Area" by a local Washington, D.C. TV station.

Region IV, Mid-South

Our thanks to Jim for the great photos of the Roundup. Also for his untiring efforts in helping members in his area with technical problems, and publishing the Regional newsletter. Jim's area is a widely spread out one, covering several states, so local meetings are pretty rare, but his enthusiasm is much appreciated.

Region V, Southern States

Our new Regional Director, Melvin Ayers and his son are two of the enthusiastic members of the Cosworth Vega owners group. This is another spread-out region covering several states. Melvin and his family never miss a Roundup, even though it means a two or three day drive!

Region VI, Florida

Hello to Ham and Diana Harper, and to our former Regional Director from Tennessee, Jim and Pam Crane. Thanks for the letter, and we hope to see you all at the next Roundup. P.S.. — Jim and Pam, its time to get another Cosworth!

Region VII, Great Lakes Region

Another example of a dedicated Regional Director is Mark Rock. Along with his fast growing law practice, he manages to bring together the Ohio group for meetings and bull sessions about twice a year. We look forward to another good year with Mark at the helm.

Region VIII, Detroit and Michigan

John and "Special K" Kathy Cowall have already demonstrated what can be expected in the year to come from this enthusiastic Detroit group.

Very active in Detroit area sports car activities, John and Kathy have already held two regional meetings and have begun what promises to be a dynamic program in the year to come. Our thanks to the Detroit group for their hospitality over the Labor Day weekend, and especially to Paul and Stephanie Wicker who worked so hard to provide us all with a great program for Roundup '81.

Region IX, Chicago

Pete and Debbie Dirisamer are hard at work to build the Chicago region. In cooperation with Mark Grimm, they are planning an assault on Road American this summer. Pete is active in the Chicago Region SCCA, and we look forward to great things from Chicago.

Region X, Indiana

Phil "Rusty" Rust gave the word "helpful" new meaning to those members in his region. Phil tells us that he has either helped in or has personally overhauled three Cosworth motors in his garage at home in the past year. Phil is a great guy, and has been a strong supporter of the association from its inception. If you need help with your car, call Rusty. He is ready and willing to help. Although we did not select Indianapolis for Roundup '82 . . . what about '83?

Region XI, Mid-West States

This will be the home of Roundup'82! Morton, Illinois is located about six miles southwest of Peoria, IL and is the site of the next C.V.O.A. National Roundup. Mark is hard at work enlisting the aid of city fathers and local businessmen to make us all welcome. There is even talk of the first "Grand Prix du Morton" to be run in the streets! Mark says that bicycle motorcross' have been held on the street, so maybe there is a chance, although a slim one! We ask all of you in the region to get behind Mark and volunteer to help on the various committees that are forming to get the job done for '82. Finally, a special thanks to Mark, his father, and his uncle at Grimm Chevrolet for their help in babysitting #2150 this winter. The editor has been accused of having the Roundup in Morton because that's where his car is . . . no more excuses in '82, right Bob?

Region XII, Cowboy Country

The honor of "DIRECTOR OF THE YEAR" went to the tireless Clark Kirby of Arlington, TX. Mark has developed his region into the single most active and viable in the entire country. With meetings, newsletters, rallys and other events held in the Dallas-Ft. Worth area, Clark and his new wife, Jean, are some of the most valuable assets this organization has. Our special thanks to Clark and Jean for flying to Detroit at the last minute to accept the award. You deserved it, and then some!

Region XIII, Rocky Mountain States

Paul and Kaye Cornell are two very special people to this club. The Cornell family drove over and spent Thanksgiving dinner with the Maloys and the Maloys drove over and spent New Year's eve with the Cornells. Always a source of good company and conversation, and in spite of one of the most geographically spread out areas of the country, running from Canada to Mexico, Paul and Kaye have had many meetings in their Scottsdale home, and have provided the members in the region with sound advice on their cars. Meetings about twice a year have proved to be well attended. The last meeting focused on valve adjustment techniques with Ken Berry, an Indy car mechanic and a cosworth Vega owner, leading the discussion.

Region XV, San Francisco

Mike Schmidt, formerly the Regional Director for the New York - New Jersey Region has moved to foggy San Francisco, and will be giving Doug Elmer a needed break in the organization of local events. In addition, Carl Rumberger of Performance Dynamics in Sacramento has volunteered to assist as the technical brains for the region. Carl has lots of experience working on Cosworths, and operates his own repair facility in Sacramento.

(cont. on page 29)

LETTERS TO THE EDITOR

DEAR C.V.O.A.

Now that I'm a student here at the University of Wisconsin I can really get to enjoy my Cosworth. My car is stored in Sun Prarie, about ten miles from my apartment, and it's in winter storage right now.

Ron Mass (our former Regional Director in Atlanta, now living in Alburquerque - Ed.) did one heck of a job on the motor overhaul. I now have about 12,500 miles on the rebuild, and it just gets stronger and stronger! The University of Wisconsin has Sunday morning gymkanahas so I'm looking forward to making some serious suspension mods come spring. My Kleber V12 tires are giving me good service, and I've only had to get one front end alignment in 15,000 miles. Finally, concerning '76 paint jobs, mine is metallic mahogany and it's a factory paint job. Do you know of any others? All the research I've done says that this is the only one.
Ken Benson, CV #3004

Answer: Ken, thanks for your letter. Atlanta has lost a fine guy in Ron Mass. He's just finished up at Georgia Tech and returned to Albuquerque with his family. On the color, sorry to burst your bubble, but I have seen at least seven or eight others that color. I agree that it is a rare one though.

Dear C.V.O.A.

I have just purchased a 1976 Cosworth Vega and would like to ask your advice on improving the performance. What would you recommend?
Jim Fischer

Answer: Jim, you've asked the second most talked about subject in all of cosworthdom. There are so many improvements that can be made, limited only by your pocketbook and your imagination. Now that we have completed the suspension series, we are going to start with a series on performance improvements and maintenance in the next issue. Not everyone will agree with our ideas, but we encourage correspondence from our readers with new and different approaches to the problems Cosworth owners face in the care and maintenance of their cars.

Gentlemen:

Enclosed is a copy of a page from *Air Refiner's Air Filter Master Catalog,* No. 801 issued December 1980. Note that they list a "1975 Vega Cosworth W/RC 206 Rotary," as well as the regular "Cosworth W/122 Cu. In. Eng." I didn't know the rotary was ever planned for the Cosworth, but for the Monza. Did *Air Refiner* know something nobody else did? Of course, they also list "1977 Vegas V8-305"!
Sincerely, Les Briggs

1977 Vega		
V8-305		ARP-92
1976	Monza V-8 262 (2 Bbl.)	ARP-92
1976	Chevelle L6 250 (1 Bbl.)	ARP-132
1976-77	Chevelle V-8 305 (2 Bbl.)	ARP-348
1976	Chevelle V-8 350 (2 Bbl.)	ARP-348
1976-77	Chevelle V-8 350 (4 Bbl.)	ARP-348
1976	Chevelle V-8 400 (4 Bbl.)	ARP-348
1976	Impala, Caprice V-8 350 (2 & 4 Bbl.)	ARP-348
1976	Impala, Caprice V-8 400 (4 Bbl.)	ARP-348
1976	Impala, Caprice V-8 454 (4 Bbl.)	ARP-348
1976-77	Camaro V-8 305 (2 Bbl.)	ARP-92
1976-77	Camaro V-8 350 (4 Bbl.)	ARP-348
1976-77	Nova L6 250 (1 Bbl.)	ARP-132
1976-77	Nova V-8 305 (2 Bbl.)	ARP-92
1976-77	Nova V-8 350 (4 Bbl.)	ARP-348
1976-77	Corvette V-8 350 (4 Bbl.)	ARP-348
1964-69	Corvair (2 or 4-1 Bbl.) Single silencer	ARP-67
1961-65	Corvair (2-1 Bbl. dual silencers)	ARP-120*
1960	Corvair	ARP-99C
1975	Vega Cosworth W/122 Cu. In. Eng.	ARP-29
1975	Vega Cosworth W/RC 206 Rotary	ARP-67
1962-75	Chevy II, Nova 4 & 6 Cyl.	ARP-132
1969-75	Chevy II, Nova V-8 307 & 327 (2 Bbl.)	ARP-132
1969-75	Chevy II, Nova V-8 350 (2 Bbl.)	ARP-92
1969-75	Chevy II, Nova V-8 350 (4-Bbl.)	ARP-92
1969-70	Chevy II, Nova V-8 396 (4 Bbl.)	ARP-212
1968	Chevy II, V-8 (2 Bbl.)	ARP-1[illegible]
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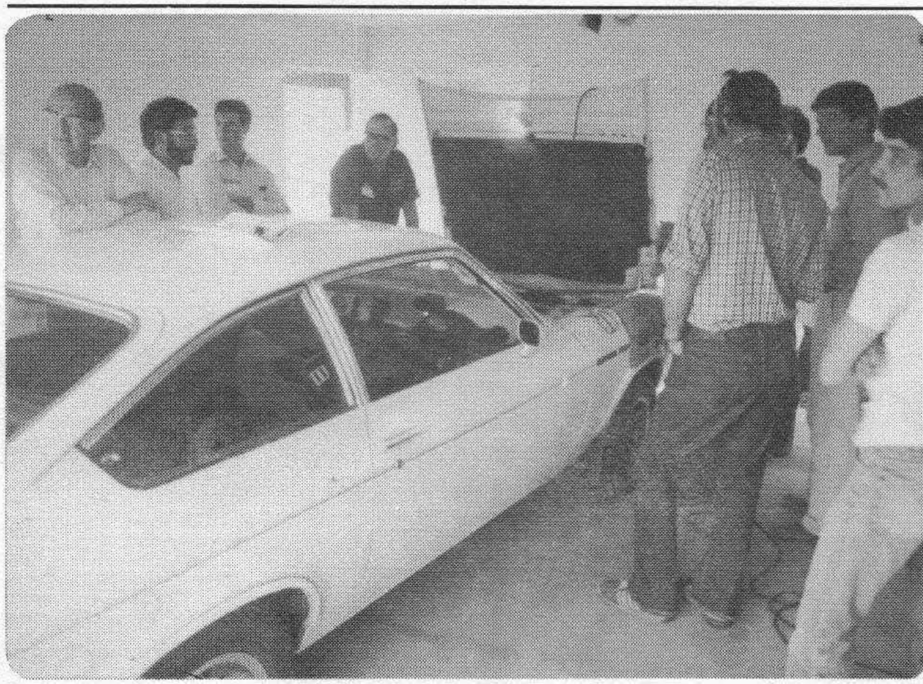
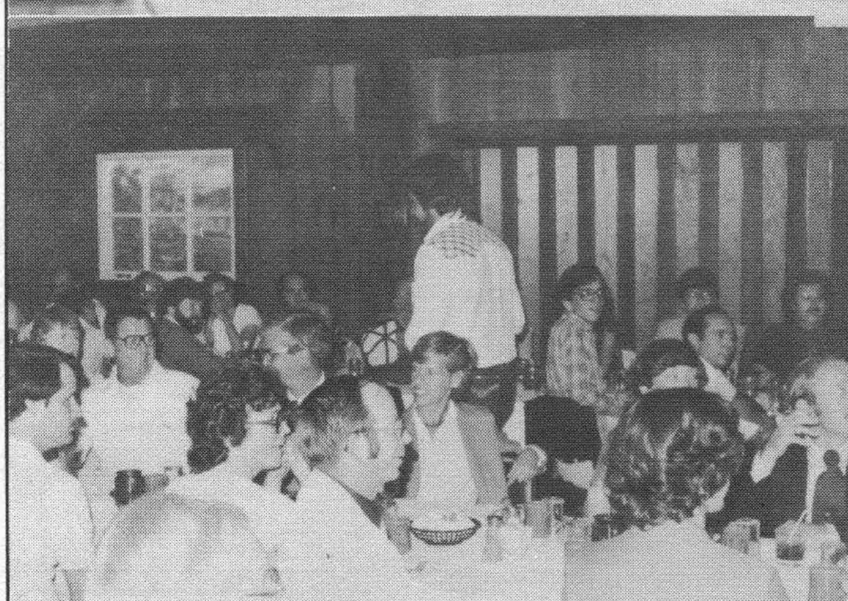


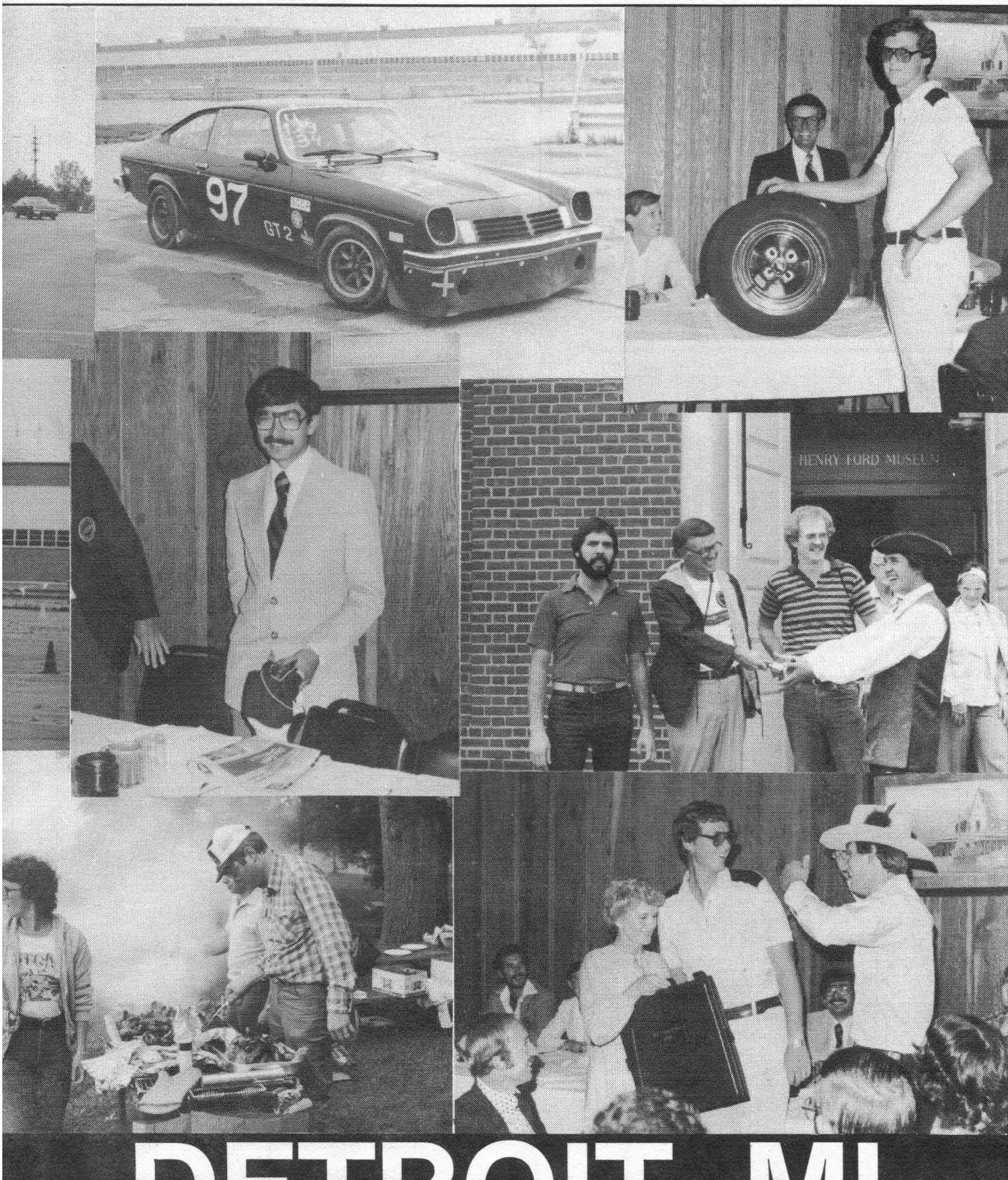
REGION XIII MAINTENANCE CONDUCTED
BY PAUL CORNELL AND KEN BERRY








ROUNDUP '81



DETROIT, MI

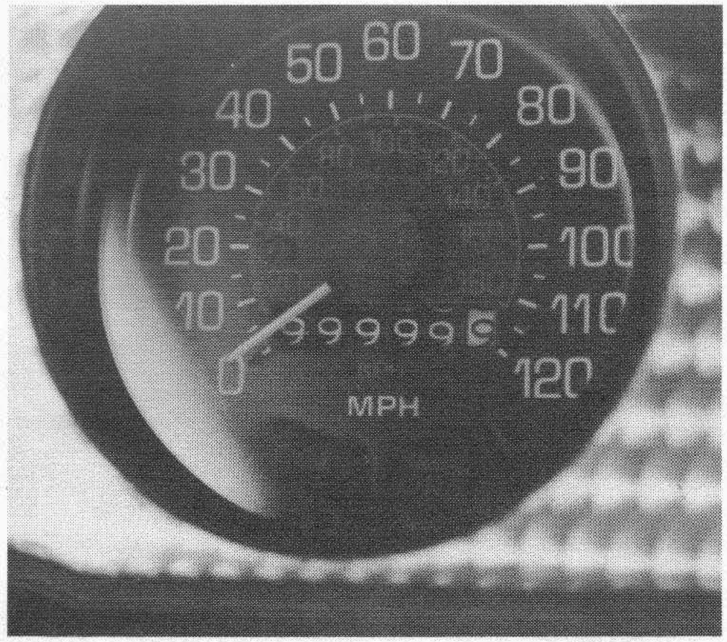
LICENSE PLATE CONTEST ANNOUNCED

Here is a chance to win a one year renewal of your Cosworth Vega News subscription. If you have a personalized license plate, we would like to run a photo of it in the next newsletter. The most interesting plate will be awarded a one year renewal worth $25.00! The second through tenth place entries will receive a free new design jacket patch worth five dollars.

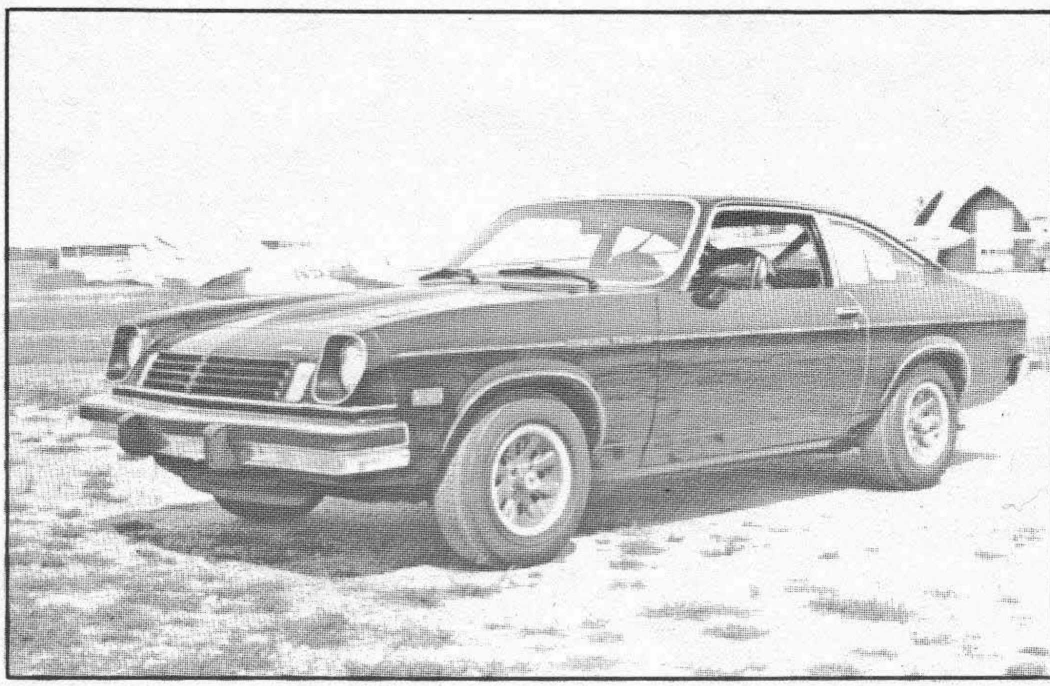
To enter, just take a photo of your plate showing the rear of the car with the "Cosworth Twin Cam" decal showing, and send it in to Cosworth Vega News not later than February 28, 1982.

All entries will be published, no matter how gross! So here's a chance to have your car be a star! Be sure to give us the dash number on your car, and your current address so we can send out your prizes.

RPO-Z09 WAS THE ORDER CODE FOR THE COSWORTH-VEGA



THEY SAID IT COULDN'T BE DONE. THIS IS AN ACTUAL UNRETOUCHED PHOTO OF MARK ROCK'S COSWORTH TURNING ITS FIRST 100,000 MILES. THIS DEMONSTRATES WHAT MINIMAL CARE CAN DO!



MEMBERSHIP RENEWALS DUE

As a special incentive to renew your newsletter subscription, you will receive AT NO COST a new design jacket patched valued at $5.00 if you renew before March 1, 1982. These are really beautiful new jacket patches that you can sew on your blazer pocket or on your windbreaker. It's a round design, with gold lettering on a black background, very similar to the Regional Director's patch.

Benn, Bob	7/1/81
Copadis, Nicholas	7/1/81
Conner, Paul	7/1/81
Eroskey, Clifford	7/1/81
Fabel, Raymond	7/1/81
Grey, Kris	7/1/81
Hacker, Dennis	7/1/81
Hock, Dick	7/1/81
Jones, David	7/1/81
McCarthy, P.	7/1/81
Moquin, David	7/1/81
Potchatek, Walter	7/1/81
Smith, Russell	7/1/81
Von Gunten, Gene	7/1/81
Walker, MMyles	7/1/81
Adee, Bret	8/1/81
Bast, Jim	8/1/81
Benson, Kenneth	8/1/81
Evans, Sidney	8/1/81
Giorgi, Oliver	8/1/81
Guthrie, Anthony	8/1/81
Hood, Donald	8/1/81
Laguardia, Jim	8/1/81
Martin, Jerry	8/1/81
McRae, David	8/1/81
Ortez, David	8/1/81
Perry, Lou	8/1/81
Schechfer, Maurice	8/1/81
Wall, Phillip	8/1/81
Westrope, Lee	8/1/81
Wicker, Paul	8/1/81
Wilson, Bruce	8/1/81
Braune, Chester	9/1/81
Buchenauer, Charles	9/1/81
Childress, Fred	9/1/81
Elrod, Martin	9/1/81
Fure, Johannes	9/1/81
Garland, M.	9/1/81
Hessevick, Terry	9/1/81
Johnson, Harry	9/1/81
Paulos, James	9/1/81
Pettiford, Michael	9/1/81
Pierce, J.	9/1/81
Sullivan, Tom	9/1/81
Turner, Eric	9/1/81
Warren, Craig	9/1/81
Asato, Earl	10/1/81
Bezanson, Edwin	10/1/81
Elliott, Stephen	10/1/81
Foote, Frank	10/1/81
Herbert, Larry	10/1/81
Hoeschen, Paul	10/1/81
Kramer, Bob	10/1/81
Laird, Odis	10/1/81
Sousa, Gary	10/1/81
Strnad, Dennis	10/1/81
Sung, Harold	10/1/81
Tang, II, Anthony	10/1/81
Thrums, Dave	10/1/81
Tuggle, Thomas	10/1/81
Whitehair, Donald	10/1/81
Abraham, E	11/1/81
Alvino, Lou	11/1/81
Barbour, Jim	11/1/81
Coon, George	11/1/81
Doran, Charles	11/1/81
Dodge, Floyd	11/1/81
Forehand, Doug	11/1/81
Jendruczak, Thomas	11/1/81
Kornely, Michael	11/1/81
Meszaro, Andrew	11/1/81
Pitts, Trent	11/1/81
Pittinger, Jerry	11/1/81
Polder, Jerry	11/1/81
Quattrone, Carmen	11/1/81
Rigg, Jim	11/1/81
Syrus, Robert	11/1/81
Wike, James	11/1/81
Younglove, Ted	11/1/81
Pokorny, Joseph	12/1/81
Weinkam, Joseph	12/1/81
Allen, Douglas	12/1/81
Arnold, Gerald	12/1/81
Barger, David	12/1/81
Birch, Bob	12/1/81
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Chastain, Philip	12/1/81
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Crow, Kenneth	12/1/81
Dean, James	12/1/81
Dean, John	12/1/81
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Harvey, Ralph	12/1/81
Hesler, John	12/1/81
Hixson, Jim	12/1/81
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Koenig, Phillip	12/1/81
Kramer, R.	12/1/81
Lambert, Charles	12/1/81
Lang, Richard	12/1/81
Labowitz, Sam	12/1/81
Lampe, Dan	12/1/81
Leh, J.	12/1/81
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Soares, Arnold	12/1/81
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Spoolstra, Greg	12/1/81
White, Jeffery	12/1/81
Bailey, Chuck	12/31/81
Giammona, Marc	12/31/81
Hawk, Mike	12/31/81
Kelley, Ray	12/31/81
Maslen, Patrick	12/31/81
Washburn, Jeff	12/31/81
Brazeal, Jerry	1/31/82
Cunningham, Jeffrey	1/31/82
Duncan, Bob	1/31/82
Felder, John	1/31/82
Gilmore, Ollie	1/31/82
Marr, Louis	1/31/82
Mansfield, William	1/31/82
Owens, Karl	1/31/82
Porter, Allan	1/31/82
Hatfield, Mark	2/10/82
Figel, George	2/15/82
Black, Pat	2/28/82
Cash, Victor	2/28/82
Clapp, Ronnie	2/28/82
Copans, Don	2/28/82
Cross, Emil	2/28/82
Edwardsen, Edwin	2/28/82
Gantt, Valerie	2/28/82
Ruther, Mark	2/28/82
Schroeder, David	2/28/82
Seman, Timothy	2/28/82
Shea, James	2/28/82
Sherrod, Derek	2/28/82
Trumbull, John	2/28/82
Osika, James	3/1/82
Chester, Chris	3/10/82
Wiggins, Dale	3/10/82
Cash, Kerry	3/13/82
Bradshaw, Robert	3/15/82
Conner, Steven	3/15/82
Federoff, Howard	3/15/82
Grime, John	3/15/82

Renewals Due

(cont. from page 19)

Hoffmeier, John	1/30/82
Bartuska, Jim	1/31/82
Bloor, Paul	1/31/82
Bowen, Robert	1/31/82
Borland, Ray	1/31/82
Briggs, Leslie	1/31/82
Brown, James	1/31/82
Burton, Greg	1/31/82
Calciana, Joe	1/31/82
Cowall, John	1/31/82
Cornell, Paul	1/31/82
Dunnom, Rob	1/31/82
Edge, Willard	1/31/82
Gilley, Ollie	1/31/82
Griffin, H.	1/31/82
Humphreys, Jeffrey	1/31/82
Kirby, Clark	1/31/82
Kondratovich, Michael	1/31/82
Kosora, Noboru	1/31/82
Kugler, John	1/31/82
Martin, Douglas	1/31/82
Micek, Dennis	1/31/82
Nauseef, John	1/31/82
Neveu, Mark	1/31/82
Parker, Bill	1/31/82
Rahner, John	1/31/82
Rust, Philip	1/31/82
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Schneider, Harley	1/31/82
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Stone, Trevor	1/31/82
Stonitsch, Joseph	1/31/82
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Altobelli, Donald	2/28/82
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Dick, Richard	2/28/82
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Hume, Ritchey	2/28/82
Infante, Suzanne	2/28/82
Kawamoto, Robert	2/28/82
Lakso, James	2/28/82
Mirich, Thomas	2/28/82
Ryno, Jay	2/28/82
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Bohler, Albert	3/17/82
Bates, Lawrence	3/20/82
Ginther, Bert	3/20/82
Biklasevics, George	3/25/82
Cook, Gary	3/25/82
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O'Leary, John	3/31/82
Dillingham, Jerry	4/3/82
Britt, Joe	4/5/82
Petters, Stanley	4/5/82
Van Acker, Charles	4/5/82
Watson, Charles	4/5/82
Albrecht, Robert	4/9/82
McCarty, Robert	12/5/82

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Tod Buenger	Niles, IL
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CUT OUT AND MAIL

MEMBERSHIP RENEWAL

COSWORTH VEGA

NAME ______

ADDRESS ______

CITY ______ STATE ______ ZIP ______

PHONE (____) ______

MEMBERSHIP: ☐ ONE YEAR $25 ☐ THREE YEARS $60

ABOUT YOUR COSWORTH

YEAR ______ BODY COLOR ______

ENGINE # ______ UPHOLSTERY COLOR & TYPE ______

V.I.N. # ______

DASH # ______

MODS. ______

AMEX ☐ M/C OR VISA ☐ CARD NO. ______

EXP. DATE ______ SIGNATURE ______

OFFICE USE ______ DATE RECEIVED ______ EXPIRATION DATE: ______

ENGINE REBUILDING AND CYLINDER HEAD WORK

Our policy is to perform only first class work using the best parts available. We can build or overhaul any engine to stock or performance specifications.
We use only TRW, Chevrolet, FEL-PRO and other proven materials. All cylinder head polishing and porting is done by myself, personally, not farmed out. All of the installation of Cosworth of England valves is performed by me.
Our best references are our customers. We will be happy to provide names to you if you would like to check us out.

AVERAGE PRICES

Polish and port C-V head, cc chambers, includes bronze valve guides and teflon valve stem seals	$395.00
High performance 3 angle valve grind	275.00
Seal engine oil leaks (head, cam carrier gaskets, and adjust valves)	250.00
Overhaul to stock specifications includes valve grind and engine balance	425.00

ALL ABOVE FOR LABOR ONLY PARTS AND FREIGHT EXTRA

COSWORTH VEGA SUSPENSION

30 day money back guarantee

Suspension Kits

These springs and sway bars have been specially fabricated for us, for use on the Cosworth - Vega taking into account weight distribution and other factors.

Stage I	Front and rear springs special calibration lower ride height by 1¼"	$225.00
Stage II	As above: Plus: 1.125 Front Bar Includes bushings for sway bar	375.00
Stage III	As above: (Lower ride height 1½") 1.125 Front Bar .09375 Rear Bar Includes bushings for bars	460.00
Stage IV	Full competition rate springs and bars plus teflon suspension bushings, upper and lower control arms and rear control arms (Lowers ride height 2.5 inches). (Not recommended for street use).	850.00
Stage V	Full NASCAR type adjustable suspension quotation on request - installed by DTR only.	

Prices subject to change

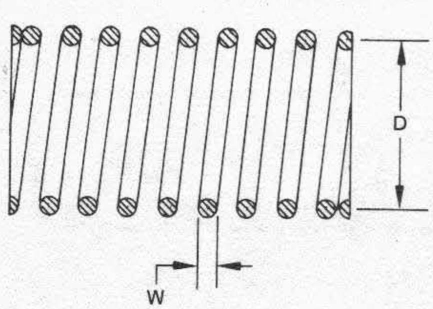
Down the Road Enterprises
1182 North Grove
Anaheim, CA 92802
Ren Reugebrink
(714) 630-7360

Installation extra on request

We recommend the use of gas pressure shocks such as Bilstein, or Koni Coil Over types with the above modifications. Be sure to obtain shocks that are for HIGH PERFORMANCE USE, not street calibration.

quite sensitive to coil diameter–a larger coil results in a softer spring. Note the direct relationship between the number of active coils and the stiffness. If you cut off half the active coils, spring stiffness is doubled. Cutting off active coils or heating and collapsing the end coils solid is the way to change the stiffness of a coil spring. All you can do is make it stiffer, never softer. Buy a new spring if you require a softer one.

If you are checking in junk yards for different springs, bring your measuring tools and electronic calculator to figure stiffness. Don't go by the looks of the spring or you will be fooled. Remember a tiny difference in wire diameter makes a huge difference in stiffness, so measure



If you measure the diameter of the coil and the wire diameter as shown, you can calculate the spring stiffness using the formula in the text. The coil diameter "D" is measured to the center of the wire. An easy way to find the diameter "D" is to measure the outside diameter of the coil and subtract the wire diameter "W". Use very accurate measurements of both "D" and "W", as a small error in measuring will result in a large error in the calculated spring stiffness.

it with a micrometer. The number of active coils is the number of free coils plus one half coil. The free coils are the ones free to move, usually all but the two end coils.

In addition to stiffness you must also consider the inside diameter, end treatment and direction the coils are wound. The inside diameter should be at least as big, end treatments should be the same and the coils should be wound in the same direction as the springs being replaced to ensure proper seating. To prevent sagging occurring as a result of overstressing, wire size in the new springs should be at least as big as those replaced.

There are four types of end treatments you are likely to encounter–open, squared, square and ground and pig-tailed. It is not a good practice to use the wrong type of end because the spring may become unseated and disaster would likely result. Determining the direction a coil spring is wound: Look at the end of the spring and follow the wire around in a clockwise direction. If the wire goes away from you it is a right-hand wind and vice-versa.

You can measure spring stiffness with a bathroom scale and a steel tape. Measure the free length of the spring resting on the bathroom scale and note the scale reading. Now push the spring and measure its deflection while reading the increase in weight on the scale. The spring stiffness is the increase in scale reading divided by the spring compression. If you are strong enough to deflect it one full inch the arithmetic is simple.

If your car requires stiffer springs, one way to do this is to bolt on helper springs. There are a large number of helper springs on the market, both coil and leaf types. Some bolt on in addition to the existing springs, and some come with heavy-duty shocks as a single unit. All of these increase the suspension vertical stiffness, and thus increase the natural frequency. You won't get a huge increase in stiffness with any of these springs, so the car will still be reasonably comfortable.

Stiffness of a small coil spring can be measured with a ruler and a bathroom scale. Just lean on the spring and measure the increase in scale reading and the deflection of the spring. Spring stiffness is the scale reading increase divided by spring deflection.

One type of helper spring has adjustable stiffness. These are the air helper springs such as those marketed by the Air Lift Company. The more the air pressure the greater the stiffness. Thus you can tune the stiffness to get the ride you want. Air Lifts also change the ride height of the vehicle when the pressure is changed, so once the right spring stiffness is obtained you will have to adjust the ride height to the desired value.

The relationship of spring load and spring deflection is shown in Figure A for Air Lifts at 40 PSI pressure. Spring stiffness increases with increasing spring deflection. This is a *rising rate* suspension system, which increases suspension vertical stiffness with suspension movement toward full bump. Rising-rate suspension is highly desirable, giving a soft ride at the ride-height position, but increasing stiffness when approaching the bump stops. This allows more severe bumps to be taken without hitting the stops, but does not sacrifice ride comfort. Rising-rate suspension is particularly valuable on racing cars, which have limited suspension travel because of low ride height.

On cars meant for street use, stiff springs usually are *not* one of the most useful modifications. You can get more handling improvement with stiffer anti-roll bars and the ride will not suffer nearly as much as modifying the springs. You may consider lowering the car with the springs, but this modification is best done by using smaller-diameter tires. This way you still have full suspension travel. On a road car a softer ride is more desir-

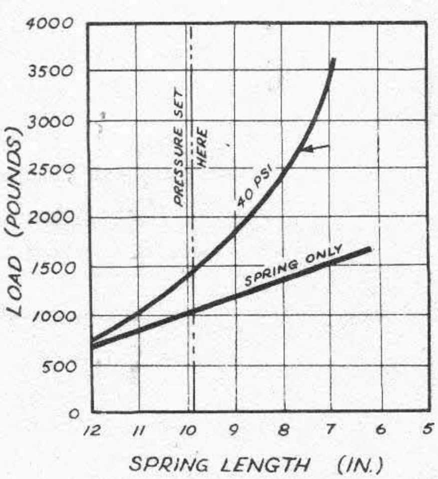


Figure A /This shows the relationship be-between spring load and spring deflection for a suspension with and without Air Lifts. For a leaf or coil spring only, the curve is a straight line. This indicates the spring stiffness remains constant. The Air Lifts, however, have an increasing spring stiffness as the spring is compressed. Note the increasing steepness of the curve. This gives a *rising-rate* suspension.

able than on a racing car, and the lower road-speeds mean aerodynamic forces are very small. All in all, modified springs are not very helpful except in highly-modified cars. A word to the wise: Don't change the springs unless you have a really good reason.

SHOCK ABSORBERS

Many sedans and sports cars can be helped by better-quality shock absorbers. On most production cars, the manufacturer uses the softest and cheapest shocks to lower manufacturing cost and to get the softest ride under non-spirited driving conditions. For hard driving, most original equipment shocks simply will not do the job.

Without shocks a car would bounce uncontrollably on the springs. The car would hit the bump and droop stops often, and the ride would be a constant series of bounces. The tires would have little adhesion on turns because they would be bouncing up and down on the road surface. Shocks are used on all automotive suspensions to damp out these wild oscillations. The shocks do not hold up the car, but they do absorb much of the energy when the wheels hit a bump in the road. All a shock does is convert the energy into heat, thus resisting unwanted motion.

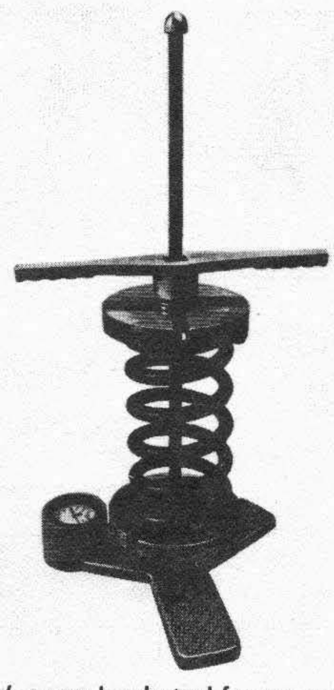
If the suspension tries to move rapidly, the shock resists this with a high force, caused internally by the shock piston trying to ram oil through a tiny valve. Adjustable shocks change the size of this valve by an external knob or adjuster.

The heat generated inside a shock warms up the oil that it contains. As the oil gets hot, it thins out just as the oil does in your engine. Thin oil offers less resistance to being pushed through a small hole, so the shock loses its damping force. This is *shock fade,* and it can be a real problem under certain conditions. To combat fade, the shock must be larger and contain more oil. On some cars, dual shocks are used for this purpose. In any event, a good-quality shock will be bigger and heavier than a cheap light-duty shock.

Another problem with shocks is cavitation or foaming of the oil. Gas bubbles are formed inside the shock and it offers little resistance to movement of the suspension. High-quality shocks are designed to have less tendency toward foaming, both by their design and by the fact that they tend to run cooler.

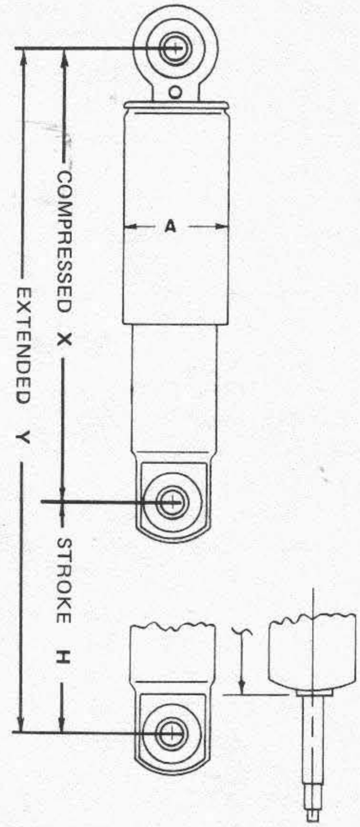
Of course the brute strength of the shock is important if you are planning to do hard driving. Heavy-duty shocks have larger-diameter rods and bigger parts on the ends for increased strength. Also the design of the seals is better on the more expensive shocks. Leakage of fluid past the seals is one source of shock failure.

The amount of force a shock develops for a given speed of compression or expansion of the shock is its *damping* or *stiffness.* When people talk about stiff shocks they are referring to shocks that offer a great amount of resistance to motion. At very slow speeds there is only the friction of the moving parts inside the shock, as the oil offers almost no resistance. The force increases roughly four times for each doubling of shock-absorber speed of movement.



Here's a very handy tool for measuring stiffness of big springs. This Wacho portable coil-spring checker allows quick and accurate measuring of coil spring stiffness. This expensive tool is a must for a serious racer, particularly if experimenting with a variety of coil springs. (Photo courtesy of Wacho Products Co.)

For street use the force is much less on the bump stroke than on the rebound stroke. When the wheel rises on a bump it encounters a rather small resistance. A large force on the upward motion of the wheel would jar the car and cause a poor ride. The major part of the resistance to motion is when the wheel is being pushed back toward the road by the spring.



The important dimensions of a shock are extended length, compressed length, stroke, and body diameter. The length is measured center to center on the eyes as shown. On shocks with studs, measure to the shoulder at the base of the stud. For special shock applications be sure to have all the above dimensions handy.

The stiffness of a shock must be matched to the stiffness of the springs. Because springs are normally dependent on weight of the car, heavier cars require stiffer shocks. Thus shocks for a Buick will be much too stiff for a VW, assuming they are mounted in a similar manner on the suspension.

Shock manufacturers seldom supply any engineering data about their products. You would like to know the relationship of force to motion when designing the suspension on a special car. Figure C shows the sort of information you would like if you could get it. Since you usually can't, you must resort to trial and error or use of adjustable shocks on special cars.

For production cars shock manufacturers have designed proper shocks, and all you have to do is install them. There are a number of quality brands, all more expensive than the minimum price you could pay. Stay away from the cheapest ones, and stick with heavy-duty or high-quality shocks. Monroe, Gabriel, Koni, Armstrong, and Bilstein are all well-known companies with a large product line. Some of these companies also build racing units and can help you select the proper shocks for your car.

Unlike racing wheels and tires, racing shocks can be used on the street. However, there are several disadvantages, the major one being cost. The best racing shocks such as the aluminum Konis used on road-racing and drag cars cost over $200.00 each. Racing shocks usually do not have rubber end bushings, but instead use spherical bearings with metal races. This gives better shock action on small bumps, but the metal fittings do transmit more road noise and vibration from the suspension. Also many racing shocks have closer to a 50-50 damping force ratio between the bump and rebound stroke. This will make the car ride stiffer. In addition, some racing shocks do not have dust covers and thus don't have as much protection against damage to the precision-ground shaft. If the shaft of the shock is nicked or corroded, the seal will leak oil and the shock will soon be useless.

An advantage of many racing shocks is that they are externally adjustable. Some such as the racing Konis have separate adjustments for the bump and rebound stroke. On racing cars, the shocks can be tuned to give the maximum adhesion on whatever course you are running. Because the temperature of the shock may vary with the course and the temperature of the day, adjustable shocks are desirable for the ultimate in suspension tuning.

Adjustment of the shock is largely a trial-and-error process that you do at the track as described previously. A rough adjustment can be done in your garage by bouncing the suspension. Start with the shock set on full soft and see how many times the car bounces up and down before it comes to a stop. It usually will be more than one complete up-and-down cycle. Then increase the shock stiffness until the car only goes down and back to rest. Additional stiffness will probably not be necessary, but tests should always be made at the track to confirm the proper setting.

Bilstein shocks are used on some racing cars such as Porsche. They are designed for the particular racing car and are not externally adjustable. Bilstein shocks are rather unique in their design and deserve special mention. They have a pressurized gas chamber inside which acts against the oil at all times. The result of this is a resistance to foaming of the oil, because gas bubbles do not form as readily when liquid is under pressure. This is the same theory behind the pressurized cooling system in your car. The boiling point is raised by pressure. The gas pressure shock also runs cooler because the working cylinder is exposed to the air and not insulated as is the reserve chamber on a conventional shock absorber.

Bilstein shocks have special seals to withstand the high pressure of the oil. Thus they will not leak and will work perfectly well if mounted upside down. On most cars this saves unsprung weight, because the heavier oil-filled body of the shock is stationary and the lighter rod and piston move with the suspension. If you try this with any conventional shock it will not work. Air will be in a portion of the shock normally filled with oil.

The gas pressure of 25 atmospheres inside the Bilstein tends to push the shock into the open position at all times. Thus it is always fully extended when not mounted on the car. According to Bilstein, this force is approximately 40 pounds, and it remains nearly constant through the travel of the shock. This extra force acts in addition to that of the springs and may make a small difference in ride height on a light car.

Bilsteins have had remarkable success in off-road racing, apparently because of their resistance to fade and foaming. Some models are made specially for racing. The importer is happy to assist a race car owner select proper shocks for his car. Contact Bilstein of America for engineering assistance if you need it. Be sure to include all information on your car such as weight, type of suspension, and the use of the car. Also the mechanical dimensions of the shock must be specified. Measure a shock from eye to eye extended and collapsed, and give the dimensions of the mounting bolts. It pays to get expert help on special applications.

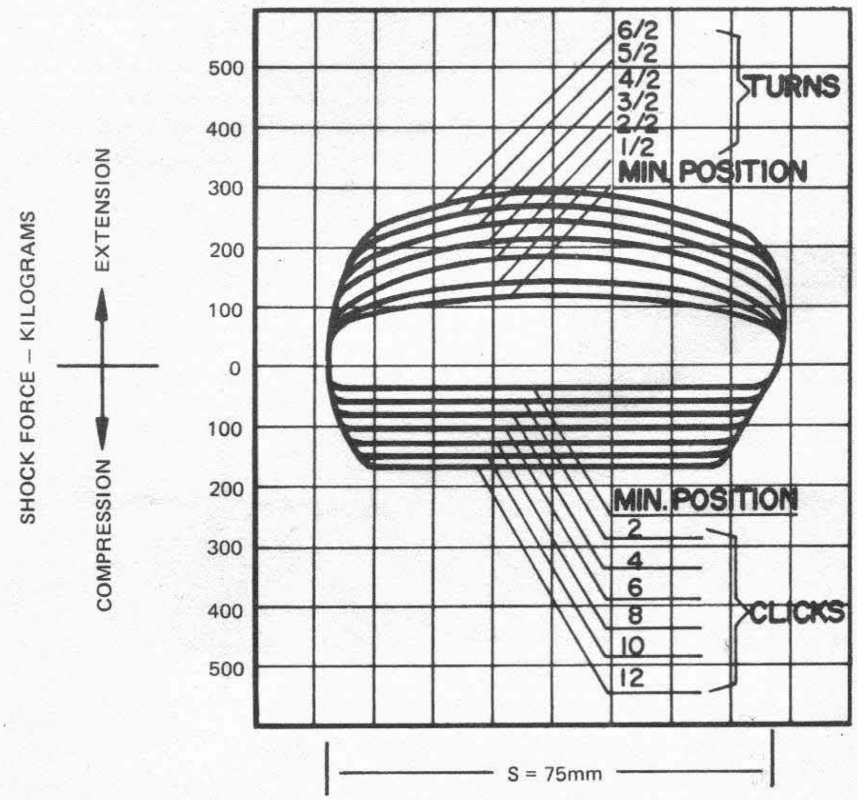
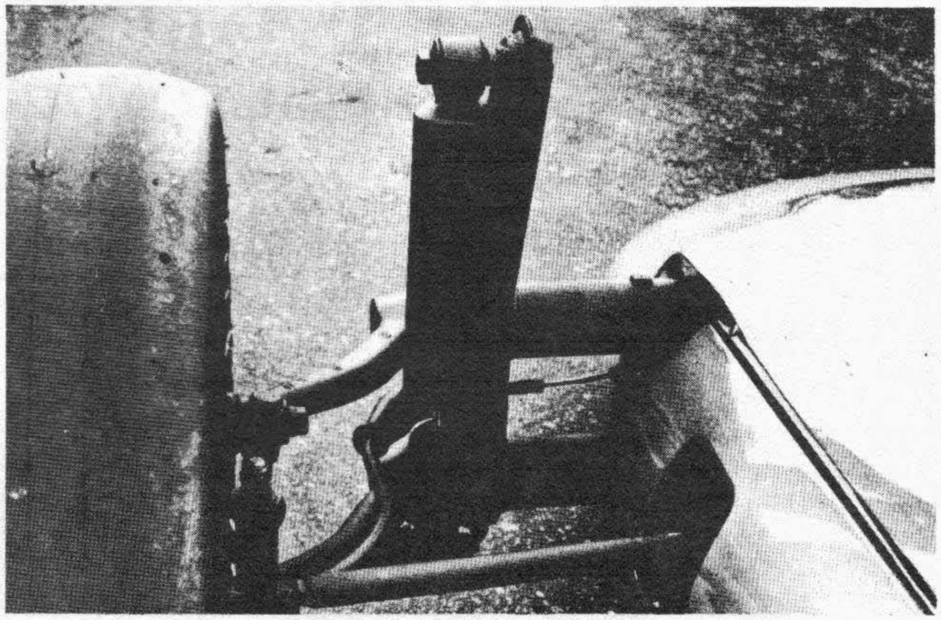


Figure C /This graph shows the relationship between force and stroke for a double-adjustable Koni shock. The various curves show how the shock adjustments vary the force separately in the extension and compression strokes. This test is run at a particular shock velocity. If the shock were tested at a higher velocity all forces would be higher. (Courtesy Kensington Products Corp.)

There are some shocks that serve a dual purpose: to damp the suspension and also to change the spring stiffness. These are called overload shocks, and they increase the stiffness of the suspension. There are two types, those using coil springs mounted on the shock and those using air pressure in the shock. The air type can be adjusted for ride height with an air valve outside the car. The main purpose of these shocks is to raise the ride height and provide stiffer springs for a car or truck that has to carry extra weight. However, because they also stiffen the springs and are good heavy-duty shocks, they can also improve the handling of some cars. If you install these shocks you will increase the ride height and the spring stiffness at the same time, so be sure this is what you need before you buy them.

Just because a Monroe Load Leveler or a Gabriel Load Carrier looks like a racing coil-shock unit, don't assume it will work as the only suspension spring on a special racing car. These overload shocks use a shock that is much too stiff for the spring that is on it, because it is meant to go on a car that already has springs. The spring will have to be much stiffer if it is to be the only spring on the suspension. Overload springs generally are about 60 pounds per inch spring stiffness, and this is only satisfactory on a very light car. On such a car the shocks would be too stiff, so they just won't work for that purpose.



One advantage of the Bilstein shock is that it mounts upside down. Thus the unsprung portion of the shock is the relatively light piston and rod. This saves a small amount of unsprung weight over a shock which mounts the other way.

IN SUMMARY

OK, so now that you have all of the formulas and hot engineering information, what should you buy? Well, here are our fearless recommendations:

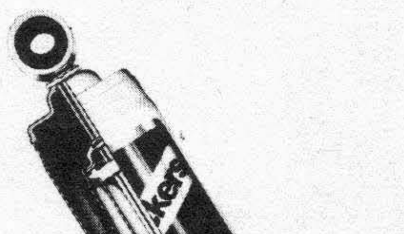
FOR THE STREET:

Tires
Goodyear European NCT's 195 x 13's
Wheels
Gotti, two piece modular, 7 inch wide rims, with 3½ inch backspacing.
Springs
Front, 375 pound rating, shorten 2 inches. Rear, left side, 175 pounds, shorten 2 inches, right rear, 175 pounds, shorten 1¾ inches;
WHY? To compensate for axle windup on hard acceleration.
Sway Bars
Down The Road, 1⅛ front, stock rear bar.

FOR THE AUTOCROSS/SLOLOM/ RACE CAR CROWD:

Autocross Tires
Phoenix 3011 195 x 13.
Racing Tires
Pirelli P-7, 15 x 205-50, 225-50 rear.
Autocross Wheels
Same as street Recommendation.
Racing Wheels
Plus Two configuration. Gotti three piece modular 8 inch in front, 9 inch in rear.
Springs
Same as Street Recommendation. **Sway Bars**
DTR, 1¼" front, 1 15/16" rear.

This Monroe *Load-Leveler* is both a heavy-duty shock absorber and an auxiliary coil spring which adds to the suspension stiffness. Although it has both a spring and a shock, these units are not intended to serve as the entire suspension. (Photo courtesy Monroe Auto Equipment Company)



Air-adjustable shock absorbers are pressurized air in a cavity inside the shock to add stiffness to the suspension—just as an added coil spring does. This cross-section of a Gabriel *Hi-Jacker* shows the air valve and a flexible diaphragm which converts the top portion of the shock body into an air chamber. (Photo courtesy Maremont Corporation)

COSWORTH VEGA MODULAR WHEELS

SPECIAL LIMITED QUANTITY

5.5 x 13	3-3/4″ Backspacing	$110 ea.
6.0 x 13	4-1/4″ Backspacing	$115 ea.
7.0 x 13	4-1/2″ Backspacing	$125 ea.

(All prices plus U.P.S. freight charges and 6% sales tax in California.)

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Cosworth Vega Owner's Association
22032 Trailway Lane, El Toro, California 92630 (714) 770-1305

Technical Bulletin

DATE: 12-15-81

SUBJECT: Alternator Failure Due to Heat Build-up

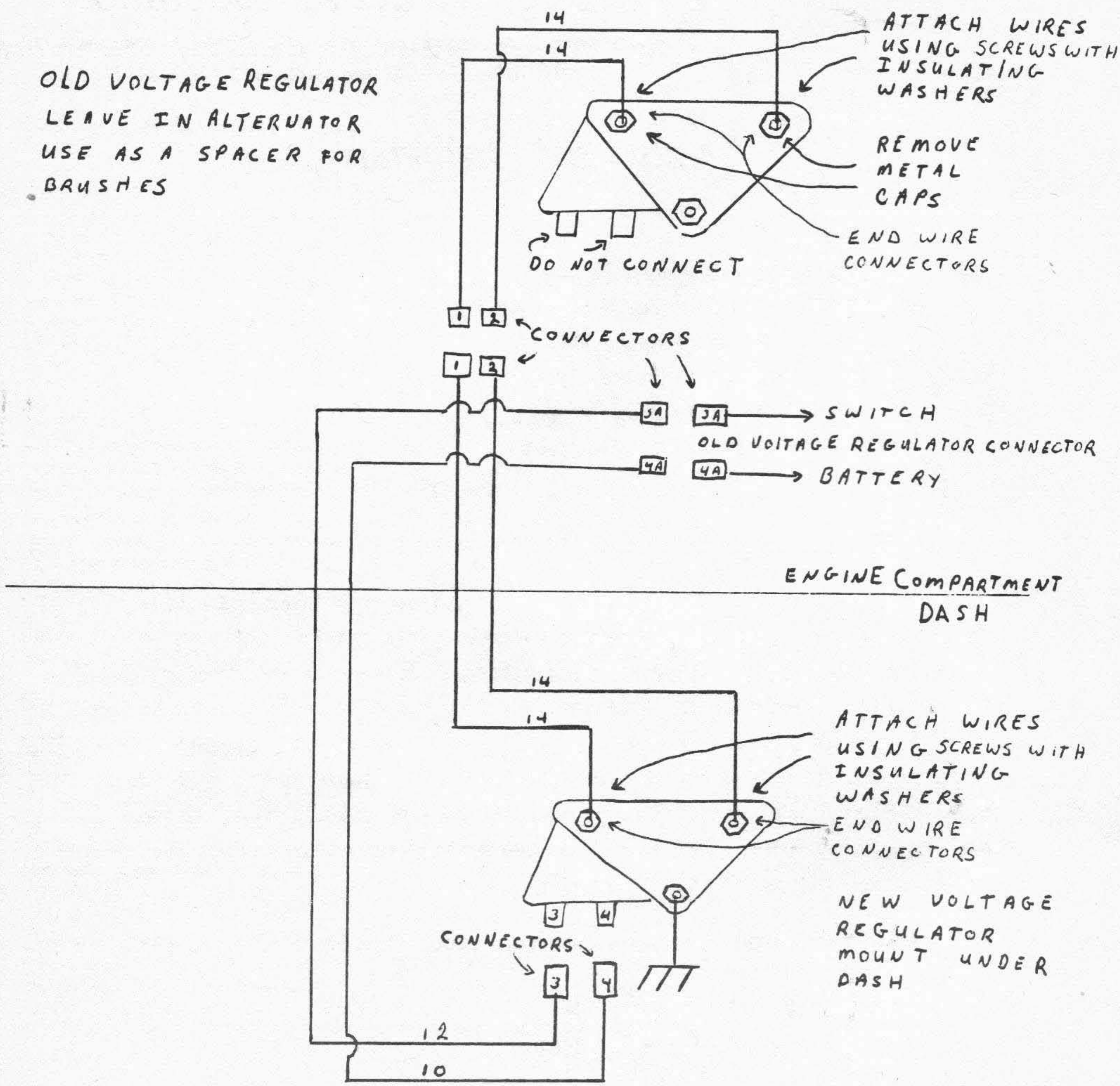
PART(S) REQUIRED:
- 1 new stock voltage regulator
- 8' of 14 gauge wire
- 4' of 12 gauge wire
- 4' of 10 gauge wire
- 4 pairs of connectors
- 1 pair of attaching screws with insulating washers (GM Part # 1846900)
- 2 pairs of end wire connectors

Excessive heat destroys the resistors in the voltage regulator and causes the alternator to generate too high a voltage. This can lead to the destruction of both the alternator and battery. To correct the problem, the voltage regulator needs to be isolated from the heat source. This is accomplished by mounting the voltage regulator inside the car under the dash. The instructions for accomplishing this are illustrated on page 28. NOTE THAT THE SCREWS WITH INSULATING WASHERS MUST BE USED IN MOUNTING the new voltage regulator. These are the same type screws used to mount the voltage regulator inside the alternator.

This repair takes about two hours and costs about $15.00.

Any questions? Call: Reed W. Cearly
10202 Forum Park Dr. #237
Houston, TX 77036
(713) 270-7042

(See Page 28)



REQUIRED PARTS

1) NEW 'STOCK' VOLTAGE REGULATOR
2) 8' of 14 GAUGE WIRE
3) 4' of 12 GAUGE WIRE
4) 4' of 10 GAUGE WIRE
5) 4 PAIRS of CONNECTORS
6) 1 PAIR of ATTACHING SCREWS WITH INSULATING WASHERS (GM PART # 1846900)
7) 2 PAIRS of END WIRE CONNECTORS

Regional News

(cont. from page 14)

ROCKY MOUNTAIN REGION

DETROIT GET TOGETHER

Region XVI, Los Angeles, and Southern California

Our new Regional Director is Kris Gebracht. Kris has been a long standing member of the association, and has already proven to be an invaluable help with some of the statistical analysis relating to the membership list.

Kris started off his new job with a great "Mountain Madness" get together that took sixteen cars from the ocean to an elevation of over 5,000 feet high atop Big Bear mountain, a two and one-half hour drive through twisting mountain roads and passes to a delightful picnic get-together where several donated door prizes were awarded.

The final piece of information is the date for **"DRIVE YOUR BRAINS OUT, III"** to be held at **WILLOW SPRINGS RACEWAY** the weekend of **May 15th and 16th.**

This event will be held again in conjunction with the Southern California COBRA CLUB. The event will be a two day opportunity for all members of the Cosworth Club to drive your car on a real road racing course, as fast as you want to go, as long as you can take it!

The first event, held about a year ago, brought out 87 cars, and everyone who attended agreed that it was a blast. Although this isn't a "race," it will give you an opportunity to drive your car under race course conditions. The requirements are that your car pass a technical inspection, and that you have a helmet. Driving instruction will be available, free of charge, to anyone requesting it.

You will be able to drive from 8:00 a.m. to 5 p.m. Saturday and Sunday, as much track time as you wish for only $55.00 for both days, or $30.00 for one day. Following the Saturday driving, an informal get-together is held at a local motel, giving everyone an opportunity to lie about why their car won't get more than 6500 rpm on the backstraight. To register call Lynn Park, (213) 746-1210 (b) or (213) 248-4942 (r). See you at Willow Springs!

Cosworth's Law

Whatever part you order, you will receive something totally unrelated to your order That's why the parts man wants a 100% non-refundable deposit

Cosworth Vega Owner's Association

Technical Bulletin

DATE: 12-1-81

SUBJECT: Parts Availability

We have been informed that the following parts are no longer available from Chevrolet:

PART NUMBER	DESCRIPTION	QTY. REQUIRED
348615	Camshaft Cover	1
334020	Connecting Rod	4
366215	Piston - 12.5:1 comp. (Std.)	4
366217	Piston - 12.5:1,.010. oversize	4
334024	Oil Pump Assy., with bypass spring and valve	1
360151	Engine Assembly, complete	1
326215	Crankshaft, Forged Steel	1
334068	Keeper, Valve, split lock	32
348613	Camshaft Housing (Carrier)	1

These parts may be in dealer inventories, or in limited supply, but no longer will be supplied by Chevrolet when current supplies run out.

Classified Advertisements

FOR SALE: Recaro Seats from Scirocco-S. Newly covered in black corduroy. Will require some fabrication to mount to Cosworth seat rails, but not much! Got to get these out of the garage or wife will commit great bodily harm. First $200.00 takes. F.O.B. El Toro, CA. Call Bob Maloy (714) 770-1305.

FOR SALE: BIG BORE COSWORTH MOTOR. Want to amaze your friends with a 200+ horsepower street Cosworth? No expense spared in preparing this monster for the street. Either modified fuel injection or carburetion included (not both), high performance cams specially ground to specification, long stroke crank, heavy duty rods, custom forged pistons, polished and ported head. 10.5:1 compression. Goes like stink. See 140 MPH, for real, Destroy the ego of your neighborhood Porsche drivers. All this for only $3,900. FIRM. Installation can be arranged. Call Bob Maloy, (714) 770-1305.

FOR SALE: Special Grind Cams for the street with modified computer with adjustable from-the-car enrichment settings. These camshafts came from the GM Tech Center, and have no part numbers, just the best hi-pro grind for the street.The computer must be used with these cams, as a stock box cannot read the low vacuum condition at idle. Full adjustment for street or track with fully adjustable computer from the drivers seat. Now you can see 9000 RPM from the comfort of your car! All this for only $950.00 FIRM. Call Bob Maloy, (714) 770-1305.

FOR SALE: 75 CV #2060, Black, Black Vinyl. 42,000 mi. Motor just rebuilt. All options, including AM-FM Delco radio and rear window defroster. New shocks. Gotti 15" modular wheels with P-7's mounted, or stock wheels and tires. New clutch. $6,000 with P-7's or $5,000 with stock wheels and tires. Call Ken at (714) 838-7021 (B) or (714) 552-8005 (R) Southern California.

FOR SALE: 75 CV #1101. Black, Black Cloth. Box Stock. Spare never on ground. Perfect condition. $5,000. Joe Lally, Baltimore, MD. (301) 838-4792. Delivery arranged.

FOR SALE: 75 CW #0543, Black, Black. 27,000 mi. IECO soiler and console with gauges. New clutch, flywheel, pressure plate. CIBE' lights. Excellent mechanical, one loving owner. Lack of storage space forces sale. $4,100 O.B.O., Mike Schmidt, San Francisco, CA (415) 474-8215.

FOR SALE: 75 CV #2127 Black, White. 5 speed, 8060 miles. All original and in mint condition. Never in rain or snow. $5,400 O.B.O. Louis Sabo, Tonawanda, NY (716) 691-7423.

FOR SALE: 76 CV #2078, Black, Check CLOTH interior. Box stock. 6,000 careful one-owner miles. 5 Speed Transmission. As new. $7,000 O.B.O. Kurt Melander, Rosemont, MN (612) 432-0207.

FOR SALE: 75 CV #1358, Black, White Vinyl, 24,000 pampered miles. 4 Speed, rustproofed, perfect condition. Box Stock. $3,600 O.B.O. Mike Espamer, St. Paul, MN. (612) 698-0158.

FOR SALE: 75 CV #0863. WRECKED. No front sheet metal. 23,000 miles on runing gear. 5 good wheels and tires. Suspension O.K. Dash O.K. No interior. All harness and computer included $1,000, firm. Dave Mahaffee, Riverside, CA (714) 688-0221 after 5 p.m.

FOR SALE: 76 CV #2816. Firethorne, Red Vinyl interior. 23,400 miles. Clean, excellent original example. $4,000 O.B.O. Paul Iversen, Chicago, IL (312) 763-4865 after 6 p.m.

FOR SALE: 75 CV, #0045. Black, Black Cloth interior. 27,000 miles. Completely original and perfect throughout. Document service records. All manuals, factory window sticker. $4,200 O.B.O. Call Phil Koenig, Berkeley, CA (415) 540-7340.

FOR SALE: 75 CV, #0045. Black, Black Cloth interior. 27,000 miles. Ziebart Rustproofed. Very Good Condition. $3,900. Karl Owens, Claymont, DE (302) 798-0774 anytime.

FOR SALE: 76 CV #2501. White, Black interior. 23,000 miles. 4 Speed, AM-FM Cassette. All service records. MUST SELL AT ONCE FOR BEST OFFER. Susan Harrison, Norwell, MA (617) 659-4934.

FOR SALE: 75 CV. Black, Black. ONLY 247 miles, $6,200. 65, CV, Black, Black Vinyl, 10,000 miles. $5,500. 76 CV. White, White Vinyl. 5 speed, 17,000 miles, $5,200 O.B.O. All stored indoors and in perfect condition. Lost storage, must sell at once. Will sell or trade for late model Corvette. Call Mike, Lansing, MI (517) 482-2848.

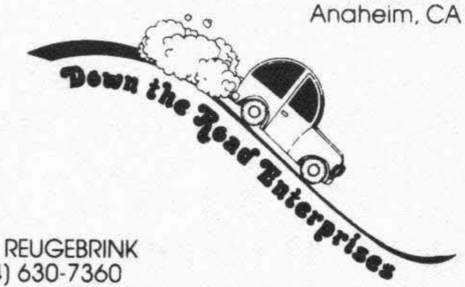
FOR SALE: 75 CV #2025. Black, Black. 45,000 miles. New radials. AM-FM radio. $4,300. Call Dominick Sorino, Garden Grove, CA (714) 636-9029.

COSWORTH VEGA

Service Facilities Listings

Telephone HOTLINE Service

1182 No. Grove
Anaheim, CA 92802



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ESTATE SALE

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1975 #1471. Black, Black Yinyl interior. 45,250 miles on chassis. NO EXPENSE SPARED in preparing the ultimate street Cosworth. New, zero miles. 2.4 Litre motor prepared by Hutton Motor Engineering. Black. H.D. Custom Moldex Billet Crank. Carillo rods, Cosworth of England forged overbore pistols at 13:1 compression ratio. ZPorted head, seven quart sump. Intermediate road cams, 45 DCOE Weber Carbs, all engine parts polished or chrome plated. Includes radar detector, Pioneer AM-FM radio, Blaupunkt speakers. Pirelli CN 36 tires, Hurst Shifter Koni shocks. Near flawless condition. Over $20,000 invested. Offers considered around $10,000.

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