



VEE LINE

NUMBER 80

MAY, 1971

DIRECTOR'S CORNER

I sincerely hope that all this talk about etching manifolds, porting and cc'ing heads, and all the other things like that which we discuss here, won't discourage newcomers, or dissuade any prospective participants from becoming active ones. These are the ultimate points in fine-tuning a Vee — the things you do when you know for sure that you could get into the front ranks if you could just cut your lap times by even a second. And that's just about what each of these items *may* do, if you're driver enough to take advantage of it.

After it's all done, the engines are still stock, for all practical purposes. The combustion chamber is reduced in volume by less than 2cc's, the ID of the manifold is increased by perhaps .030", and it all *might* result in an increase of 2 to 3% in horsepower. For those drivers who are already in the front spots, this can make the difference between third and second, or even between fourth and first, in a tight race, but it won't move you up into win, place or show, if you're not yet able to take full advantage of what you have.

So if you're just starting, or are trying to decide whether or not to start, don't let this sort of thing scare you out. There's just as much racing going on farther back as there is up front, if it's fun you're after. Don't worry about getting a championship car until you become a champion driver.

MEMBER'S SOAPBOX

"Dear Don — just a short note to say that I got a buyer for my Vee through the "Unclassified Ads". I'm presently in the process of building a new one from the frame up. Thanks for running the ad and for the many helpful hints I've been able to glean from the VeeLine.

Gerald Ewig, Toledo, Ohio"

Thank YOU — for the kind words. Often wonder how many of the VeeLine ads are effective. We don't get many requests for seconds.

"Dear Don — I have used the rubber/emery cloth tool for polishing aluminum and iron ports. It works fine, but the addition of a piece of adhesive tape, wound sticky side out around the rubber before tightening the bolt/shaft (so that the bolt squeezes the rubber out thus holding the tape in place) makes the job easier and neater. Using coarse emery is sometimes better than using the rotary file, as you don't have to be quite as careful.

Mike Carroll, Tucson, Ariz."

"Dear Don — I am looking around for a used Vee, for around \$1500. I would very much like to know if there are items which should be looked for in a Vee to get the most for the money.

Dwight Phillips, Saugus, Cal."

Well, this is somewhat simpler than checking out a normal car, probably, although some of the same principles apply. For that amount of money the Vee should be in good condition, externally, at least, and although age isn't too important from a performance standpoint, it has a bearing on the price you could get for it if you wanted to resell, so it should be of fairly recent vintage.

Fiberglass is easy to repair if it's only cracked, but replacing a broken section is somewhat of a job—or if an entire piece is

needed, somewhat expensive. (Check, in this case, to see that the manufacturer is still in business—many aren't.)

Frame damage is pretty obvious, usually, but a carpenter's level, laid across the frame, front and rear, might detect a twist that wasn't otherwise noticeable. (A SLIGHT twist can be compensated by suspension adjustments.)

Front brake drums should be wider than the rears. (Up to early '58 VW's had them the same width, MIGHT still be found on a Vee.) If the rears have five radial ribs on the hub, they're probably newer than the rest of the VW components.

The transmission can only be judged properly by driving the car. If it has a "split-case" it will have synchro only on the top three gears; if the "tunnel case", on all four—and they must be working to be legal. The split case has only one possible set of gears, but the tunnel case CAN have several combinations. For a beginner, at least, the best is probably "sedan ring and pinion, with transporter third". (And unless you have a degree wheel and the VeeLine in which the checkout was described, you'll have to take the seller's word for this.) With the engine in gear, and the clutch pedal depressed jack up one rear wheel and rotate it. Grunching noises or tight spots are grounds for at least a hundred dollar discount.

The engine is probably the hardest part to evaluate. Its present CONDITION isn't too important, really—it will need periodic rebuilds anyhow, and unless it's obviously in great shape, and the owner can give you some proof that it's in virgin (or nearly) condition, you'd better figure on an early teardown, anyhow. However, there ARE some vital points to check for. The cylinders, for instance, should have 18 cooling

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LET'S ETCH SOME MANIFOLDS

After etching one manifold, my first inclination is to just say, "Forget it!" and drop the subject. However, it is a rather fascinating and challenging process, and well worth further exploration, so we'll get into it even deeper, later on.

It's been mentioned here before that some of the professional engine builders claim they can, by the process of elimination, find stock manifolds better than the ones they can create from run-of-the mill items. I've never doubted their words, of course, but now that I've done a little research of my own, I'm ready to confirm their statements. The point is, of course, that not many of us can order a dozen manifolds (or borrow them) in order to pick out the best, and if we could, there's always the probability that there is an even better one in the next dozen. On the basis of only three specimens, I can state positively that they certainly do vary.

This research started as a head modifying project, with the manifold scheduled as an extra, if time permitted before the Rose Cup Race, but we'll skip as many of the head details as possible for now, since manifolds are presently the hot item in Formula Vee news.

Primarily for the head work, a "flow tester" was cobbled up. It's very simple—a 2 x 6 plank, 4 lengths of 1/4" Redi-bolt, ten feet of transparent plastic tubing, a six-foot steel tape, and a shop vacuum cleaner. (You could no doubt use your wife's household cleaner if you could persuade her to let you have it for a day or so.) A hole to fit the hose was cut in the plank and an old cylinder was set over it. Matching holes were drilled for the Redi-bolts and a head was

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SOMETHING DIFFERENT

On Sept. 11 and 12 the International Racing Association will sanction professional races for FV and FF on the Wisconsin International Raceways in Kaukauna, Wisc. This is a "circle burner" 1/2-mile banked oval—something different for the majority of formula cars. The Vees and Fords will practice, qualify, and run separately. Races will be 150 laps.

There's a \$7500 (!) purse, and entry fees are only \$50. If you're interested, write immediately to: International Racing Assn., 12650 Bluemound Rd., Suite 311, Elm Grove, Wisc. 53122. Include type of car, type of license, and your racing experience.

The VEE LINE of FORMULA VEE INTERNATIONAL

DON CHEESMAN, Director
1347 Fairmont Ave.
East Wenatchee, Wash. 98801

C 1971 Formula Vee International

MEMBER'S SOAPBOX

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pins, not only for best performance, but as a guarantee that they're reasonably new and not badly worn. The heads (with the valve covers removed) should show (in the valve chamber) a VW insignia and a part number ending in the letter "C", "D", or "F" (the latest one) or with the last three digits "353", without any letter (a good one). Heads with the letters "A" or "B" have smaller ports, and poorer cooling fin arrangement. The manifold may be just a simple "T" shape or it may still have the aluminum casting surrounding the junction of the "T". If that is still there, the part number should end in the letter "D". If it doesn't have the casting but the heads are OK, it can be assumed that the manifold is too, probably.

For that price, a car should have some kind of "tuned" exhaust-system. If it doesn't, a set of pipes from the manufacturer will cost you about a hundred dollars, or you can build one for around \$25.00. Either way, it's a good haggling point.

The steering system should be tight, but without any binding anywhere. The slightest turn of the steering wheel should be transmitted to the wheels without any obvious play. If there is slack in the box itself, it could be simply a matter of adjustment, or it could be due to worn parts which would have to be replaced. If it has the "roller-type" steering, and has been in any kind of shunt, it is possible that the roller has been forced against the sector gear hard enough to make a dent which can be very annoying if the adjustment is correct (but not notice-

able if it's loose). Loose king-pins can be detected by shaking the front wheels vertically. Not expensive to repair, but necessary if you intend to get past the tech inspectors. Brake lining can be inspected through the brake adjusting hole (sometimes) but is expendable, at best, so count that as a recurring expense, like tires. Which, again, aren't too important on a used Vee, as you'll have to replace them fairly regularly, anyhow.

Now—this is the touchy part. If the car has a winning history, and has been driven by a good driver who is selling in order to get a later or different make of Vee, PROBABLY the car is legal. If it is being sold by someone who used it for only one season, had a history of finishing in the back of the pack, has a lot of wild theories about "every-one cheating" and has a reputation as a poor driver, watch out! This is the car which is surprisingly often found by the new owner to have a racing cam, oversize cylinders, undersize combustion chamber and anything else you can think of whereby the owner tried to compensate for his lack of skill, often without the slightest suspicion from other drivers due to lack of success. For an expenditure of this amount it might be wise to have your lawyer draw up some kind of "certificate of legality" if you have any doubt. And whether you have, or not, be sure to check these items at your first rebuild! Tech inspectors are totally unmoved by the tearful plea, "But this is the way it was when I bought it!"

"Dear Sir—Our newly formed club—American Independent Racing Association—would like to know how many Formula Vee Drivers would be interested in racing

in our area. Please send inquiries to AIRA, c/o Douglas M. Friedman, 3322 S. 114 E. Ave., Tulsa, Okla. 74135.

D. M. Friedman"

If you could extend your operation into Southern California, you'd get a lot of them! After their race was cancelled in order to give the pros more time, at the Continental 5000 Championship race at Riverside, they were ready to walk out of SCCA, en masse!

LET'S ETCH SOME MANIFOLDS

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clamped down on top of the cylinder. A clamp was made which could be hooked over the rim around the valve chamber, with a T-handle screw lining up with the valve stems (a 1/4"-20 thread gives 0.050" of valve travel for each full turn, which makes for neat records and graphs). That took care of the business end.

At the laboratory end a tube fitting was installed in the lid of the vacuum cleaner, with the plastic tubing leading from it, up over a nail in the wall, and down into the Mason jar full of water with a little food coloring added for esthetic effect. The finishing touch was the steel tape, Scotch-taped to the wall alongside the tubing, with the lower end at the level of the water in the jar. The filter bag was removed from the cleaner in order to get the maximum flow, and after all the joints were sealed up it would lift water 48" in the manometer tubing.

The results aren't comparable to those obtainable in a space laboratory—they indicate resistance (friction) rather than the actual volume of air flow—but for comparison between two heads (or manifolds) or to check the progress of your port polishing, that's all you need, anyhow.

The first test of a manifold was made by bolting it to a head which was installed on the cylinder, and it was downright disappointing! After working several days on a pair of "C" heads, and getting *much* less resistance (on the manometer) than with the old "A" heads, I had visions of Petunia at the ARRC, but after comparing them with manifolds installed I gave up that dream. There was some improvement, all right, but not enough to be exciting. It seemed pretty

— UNCLASSIFIED ADS —

FOR SALE: Autodynamics MK III. Excellent shape, 0 hours on engine rebuild. Goodyears, Konis, Z-bar and camber compensator, 2 sway bars, many spare engine and suspension parts. With tow-bar, lights and tires, \$750 or best offer. W. L. Griffith, 130 Sedgewick Lane Danville, Va. 24541 (703) 797-3239.

FOR SALE: Crusader, raced one year. Konis, EMPI camber compensator, good trailer. \$1000. Mike Farmer, 4400 N.E. Sunset, #3-D, Renton, Wash. 98055, (206) 255-8309.

FOR SALE: Formcar, Indys, many spares. \$750. Trailer available. Sylvan Cornblatt, 4300 Seminole Ave., Baltimore, Md. 21229, (301) 945-5600.

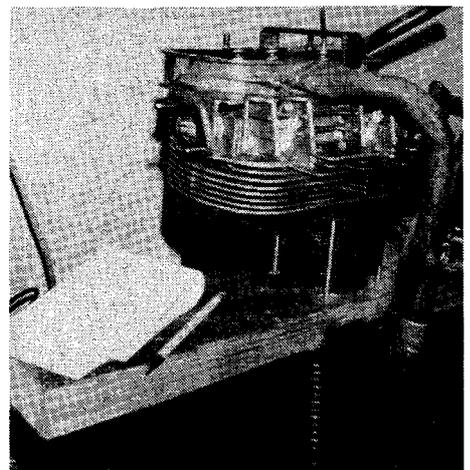
FOR SALE: Two Autodynamics Vees: Number One—my Autodynamics Nassau model. Engine dyno'd at 50.4 hp, '71 generator and manifold mods, Konis and latest Goodyears all around. Rebuilt gearbox, new clutch, all new wiring, 5 gal. seat tank, custom wide-angle mirrors, solid motor mounts, Brabham shift linkage, new brake linings, Z-bar, 2 sets rear springs, sump extension. Remodeled to fit 6'4" driver. Immaculate! Available after July 4. \$1750. Number Two—Cheryl's "Hot Pink" AD. Legal Boyd engine, dyno'd at 48.2. '71 generator and manifold mods, new rear Konis, rebuilt

brakes and transmission, new clutch, wiring, 3.3 gal. aluminum tank, wide-angle mirrors, solid motor mounts, Z-bar, sump extension. Firestone Indy's (80%) and Firestone 122 rain tires (75%). Adaptable to driver of any height. Available after Aug. 18. \$1450. Buy both for only \$3150 and will throw in custom double deck trailer, all spares, and secrets. Will deliver up to 300 miles. Dunsmore, 12131 N.E. San Rafael, Portland Ore. 97220, (503) 253-1649.

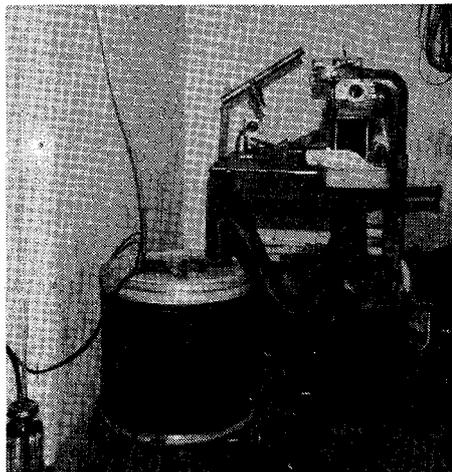
FOR SALE: '67 Viper, good condition. With trailer, asking \$950. Dan Harman, 13423 3rd Ave. S., Seattle, Wash. 98168, (206) 248-1832.

FOR SALE: '71 "Zingre" Vee. Latest Goodyears, Konis, minimum weight and frontal area, roll cage, built for large driver. Two spare engines (one fresh), spare trans-axle, front end, chassis, 4 Firestone rain tires mounted, '70 formula car trailer. Complete package \$3580. Send \$1.00 for action photo. Dick Zingre, 9723 Whitestone Terrace, Rock Hill, Mo. 63119, (314) 961-8746.

FOR SALE: All components for a Vee except body and chassis kit. Also AD trailer and Nomex. Everything cheap, available separately. Ralph LoCurcio, 201 St. Clare Terrace, Tonawanda, N.Y. 14150, (716) 692-7862.



Close-up of the business end of the flow tester. More on this next time.



Pore-boy flow tester. The gadget on the back of the bench is a valve spring compressor.

obvious that the manifold is of more importance than it's been given credit for.

So then an adaptor was made for testing manifolds alone—just a wooden plug for the hose socket on the vacuum cleaner, with a hole in it to fit snugly around the base of the manifold flanges. With one side in the socket and a hand held over the flange on the other end, it was easy to read the resistance of either side on the manometer.

Our manifold drew 17½ inches of water on one side, and 18 on the other, in stock condition. The vertical downtube is furnace-brazed to the horizontal tube, and since Walter Striedieck (in the January issue) cautioned against the inclusion of any copper in the etching process, it seemed a good idea to melt that joint apart, clean off all traces of the brazing metal and then gas-weld it back together again. At the same time, it also seemed a good idea to enlarge the hole in the horizontal tube and bevel the edges in order to insure a smooth transition after the etching process. The brass was removed with the rotary file used for porting, the joint was welded back together, and the manifold was tested again. This time—both sides tested the same, at 17¼ inches. There was no clue as to why the "bad" side was improved more than the good one, but it definitely was.

Are you still hanging in there, hoping for something on the actual etching process? Well here we go! Just to hold your interest, let's mix up a batch of "arn", first.

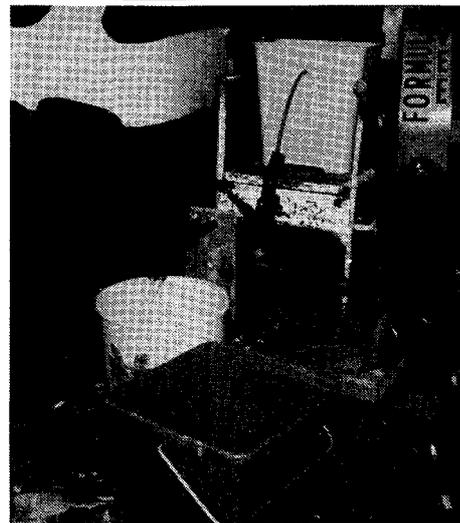
The "Technical Grade" stuff we got is a brown powder which looks like what you might get if you scraped a very rusty piece of steel. It seems somewhat damp and lumpy. Using Walt Striedieck's recommendation for a "42-degree Baume" solution, and a highschool chemist's report that 6-2/3 lb. of the stuff, with enough water to total two gallons, would result in that strength, I proceeded along that line. I swiped a plastic bucket and wastebasket from the Asst. Dir. (it didn't seem like a good idea to use her galvanized mop bucket for this job), measured two gallons of water into it to establish the full mark, and dumped it out. Then I weighed in the

Ferric Chloride, using the postal scales, and added the water. Walt said the solution works better hot, so I took it from the hot water faucet—and got my first surprise. The stuff practically exploded when the water hit it, giving off steam and a chlorine odor and nasty sizzling sounds. Nothing worse happened, so I hit it again—and again, until finally it quieted down. It then occurred to me that on top of the heat of the water, considerable heat had been generated by the mixing process, itself, and I was worried for some time that the plastic containers might cease containing. They got pretty soggy, and bulged a lot, but they held. (Note: Although the stuff is not classified as an acid, it may be safer to remember your high-school chemistry and "add the acid to the water"—or was it the other way around? If you do, it takes about 1½ gallons of water, and more about that "about" later.) It looked very similar to hot chocolate after it was all stirred up and the bubbling ceased, but didn't smell nearly as good.

OK, I got the cart ahead of the horse there, mixing up the brew before telling you what we were going to do with it, but I was afraid you'd get tired of waiting for it and go away. So now, let's backtrack a bit.

You may have noticed in Autoweek's classified columns that you can save all this trouble by getting a ready-treated manifold from Sportelli Engineering, in Seattle. Domenic Sportelli is one of our members, with whom I frequently pass the time at races discussing wierd ideas like this, so at the Rose Cup Race last weekend I asked him about his attack on the problem. We'll get into more of it farther on, but for now—he has set up a plastic pumping plant which circulates the solution through the manifold at controlled speeds. On the other hand, Walt said to just plug the ends with rubber stoppers and fill it up. I compromised by setting up a siphon system. I don't believe it was worth while, really, but if you want to try it—

Holes were cut in the previously mentioned multi-purpose plank to fit the manifold and rubber tire valve stems (with the brass valve mechanism drilled out) were used as gaskets, with the stems protruding down through the holes. A length of plastic tubing was slipped over each one and was led up through holes drilled in a board which held the ends somewhat higher than the carburetor flange on the manifold. (The manifold was bolted to the board in the normal position, using carriage bolts.) The neck of an old manifold was cut to about four inches long and was bolted to the carburetor flange to act as an extension, so the fluid could be carried at a level high enough to submerge the entire inner surface. A hole was drilled in the side of a waste basket, about three inches below the top, of a size to fit snugly around the plastic tube used as the siphon. When the container is filled above that level the siphon is self-starting. (You wouldn't want to suck on it to start *that* stuff!) An outlet in the bottom would



This is the Manifold Etching Division. Petunia on her trailer in the background.

serve just as well, except that a leak would be somewhat embarrassing. The system was tested with plain water first, then with a strong lye solution which was left to soak overnight after I got tired of playing with it.

OK—with the components all in place the stuff was dumped into the upper container and right on cue the self-starting siphon started to siphon and the manifold started filling up—and up, and up, until it overflowed. I grabbed the siphon tube and elevated it, and the manifold gave a big burp and belched nasty goulash all over the floor, and then the two drain tubes started to flow nicely. So I stuck the siphon back in the hole and watched the etching process begin. (Note: Whether or not you try the flow method, be sure to get the bubbles out of the manifold before it's completely full!)

I had to swipe another waste-basket at this time—as the lower container filled I rapidly slipped an empty one in its place and dumped it into the upper one to keep the siphon flowing.

A few random comments while we wait for the etching to take place: This stuff, as was mentioned, is not classified as an acid, and yet it has an acid rating of "1" (which is as "high" as it goes) on the PH scale for only a 5% solution, yet! The salesman, who claimed to be a chemist, said he couldn't imagine why it would react with iron, being an iron compound already, unless it forms hydrochloric acid when combined with water. It's harmless to hands (thank goodness!) but does give a rather Oriental effect to them for several days. It stains everything it comes in contact with, for that matter, so use it on your concrete patio at your own risk. It bubbles and boils on contact with concrete, just as acid does, but doesn't seem to penetrate very deep. It doesn't seem to bubble off any gas in the manifold, as an acid would normally do, but it does create heat while it's doing its job.

After about six hours of alternating between working on the heads and exchanging the containers in order to keep the siphon flowing I couldn't wait any longer. Besides,

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LET'S ETCH SOME MANIFOLDS

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Walt said the stuff worked faster when it was hot, so I thought it *might* be approaching the final stages. Hah! After dumping the contents of the manifold into the bucket (and onto the floor) I flushed it out for several minutes with a garden hose, and miked it. About .005" was all I'd gained! So the next night, repeat, and another .005", measured at the carburetor flange. The next morning I filled the manifold and let it set all day, figuring that even though the solution "gets tired after half an hour or so," I could gain a little while I was at work by letting it soak. Since the solution had already been in use about ten hours, and I'd had to add water to make up for the quantity I'd spilled, in order to get that siphon to flow, I wondered if it would do anything at all. By now it looked more like coffee than chocolate, but I did note that the manifold warmed up appreciably when the solution was allowed to just stand there doing nothing but etch.

So that evening, after work, I went out to the shop to check the progress. When I picked the thing up to dump it a small stream of solution started squirting out of one of the bends, and when I flushed it with the hose, another one started! And the mike showed that it had enlarged about twice as much as it did during the previous periods. (Note: It appears possible, at least, that a more dilute solution may act faster than the concentrated one.)

A very delicate brazing job—just flowing a very thin layer over the area cured that, so I started the ball-stretching process. Ugh!

I had previously made a hydraulic "pump" for forcing the ball through the tube—a 1/2" x 4" pipe nipple, reamed out to 5/8", screwed into a 1/2" x 1" bushing. The bushing was turned on the lathe to fit into the taper on the manifold flanges, making a tight fit when the assembly was slipped into place, with the nipple sticking through the hole in the plank and the flange drawn down tightly over it.

So I inserted the ball, which took a little persuasion going through the flange (just

right!) filled the inverted assembly with water, inserted the piston (a length of 5/8" shafting) and whapped it with a hammer.

Surprise! Instant lawn sprinkler! Ten more holes showed up! So back to the brazing torch and then try it again. Another half inch for the ball and another dozen holes. After about ten repeats, I gave up! No doubt about it, that manifold had been over-etched. Although the normal wall thickness is .040", it couldn't have been more than .015" on the outside of the bends. (Note: Although the manifold was flushed for several minutes, the chlorine odor remained and the black film on the inside remained wet for some time. It's possible that some etching continued after it was presumed stopped. It might be a good idea to run the lye solution through again, to neutralize the solution and clean off the coating.)

Cutting the ruined manifold into sections brought more surprises. The T-joint was somewhat bumpy (possibly due, in part, to the weld bulging into the inside of the tubing) but the joint itself was invisible. The straight length of the tubing was still too small to take the ball without splitting, though it *should* have been a trifle oversize if it had etched as much as the points which could be miked. And strangest of all—in one section of the horizontal tube a puddle of pure copper had formed, a couple of inches long, about 3/8" wide, and possibly .015" thick in the center. Not only that, it had evidently eaten a hole through the tube, in the beginning, because there was a "pimple" of copper on the *outside* of the tube, between the steel and the paint! Either some copper was missed when the T-joint was cleaned up, some brazing is done on the ends where the flanges are attached, or the "arn" wasn't as copper-free as I had been led to believe.

Saturday afternoon, and no manifold! I finally located one at a little gyppo foreign car shop, and was glad to pay \$4.00 for it. Until I put it to the flow test, that is. This one Ed Zink would definitely discard! One side wasn't too bad—about 18 1/2" inches of resistance—but the other had some internal

feature which created a constant variation, between 19 1/2 and 21 inches. The turbulence could be felt on the palm of the hand closing off the other end, similar to the effect of riding in some cars with the window down. Redoing the T-joint didn't make any noticeable difference, either!

As a last resort, I took the manifold off the Ghia. It didn't test out quite as good as the first one, but it was nice and steady, and even on both sides, at 18 1/4 inches of resistance. Not bad—if I hadn't already found that VW had built a better one, which I had ruined.

So that's where we stand, as of now. The Ghia has a racing manifold, Petunia has a pretty fair stock one, but I know there are still better ones somewhere, even in stock condition. Am I going to etch another one? Probably—but not until I have a spare one on hand, and then it will be the second-best one that I'll work on. I don't often waste time wishing I had or hadn't done something, but I'd certainly like to have that first manifold back in its original shape!

SUPER VEE

As was predicted here last December, a pro series for Super Vee has been established by VWoA. There will be eight 100-kilometer (62.14 mile) races, with at least a \$7000 purse for each, scheduled as follows:

- July 3 — Daytona, Fla.
- July 11 — Road Atlanta, Ga.
- Aug. 22 — Talladega, Ala.
- Aug. 29 — TBA
- Sept. 6 — Lime Rock, Conn.
- Sept. 11 — Bridgehampton, N.Y.
- Oct. 3 — Riverside, Cal.
- Oct. 17 — Laguna Seca, Cal.

For details on entries, etc., write: Josef Hoppen, Volkswagen of America, Englewood Cliffs, N.J. 07632.

The Northwest saw its first live Super Vees at the Rose Cup Race at Portland, Ore., on June 12. Pierre Phillips, well-known Northwest driver, has the dealership for the British "Hawk" Super Vee. He and Todd Webb, his first customer, made an impressive showing in the combined Formula A-B-C race.



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