VEE LINE

NUMBER 92 MAY 1972

DIRECTOR'S CORNER

Open Letter To Members of Car Classification Committee and Competition Board:

In the past there have been some differences of opinion between SCCA officials and Vee owners on the desireability of some of the rule changes we have proposed. In many cases we have found later that part of the trouble was due simply to lack of communication. We who have been involved in Formula Vee tend to take it for granted that others share our language when actually not too many people do speak "Volkswagen".

If there is anything in our rules proposals which you don't understand, or which you understand but disagree with, your comments are invited, too, along with those of our members. We want our final draft to be acceptable to our members, of course, but if they're not acceptable to you, too, our efforts will have been in vain. Any help you can give us now, *before* you make a final decision, will be more than welcome!

OBSOLETE?

The 1200 VW hasn't been sold in this country since 1965, but it's very much alive in many other parts of the world, in almost identical configuration with the ancestor of your Vee. It has been subject to continued "improvement" of course, but most of the vital parts are still interchangeable and available.

One major exception is the crankcase and associated parts. A couple of years ago VW switched to a "universal" case which could be used on all current engines, from 1200cc to 1600cc. The bore for the cylinder was enlarged to take the largest size, and cylinders for the smaller engines were redesigned so that all have the same outside diameter at the case end. The oil system has been changed, with larger galleries and a second relief valve at the flywheel end. The original valve is no longer a relief valve, but functions only to control the amount of oil diverted through the cooler.

In order to use this case, new cylinders, studs, and several other parts must be changed too, but the crank, cam, rods, pistons, etc., will still fit.

Since the "F" case is listed by VW as superseding the "C" case we've all been using, it will have to be considered legal for Formula Vee. The "C" case is no longer being furnished from the factory and there probably aren't very many left in the pipeline. Other parts for the "C" cased engine are still available, however.

The VEE LINE of FORMULA VEE INTERNATIONAL

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

MEMBER'S SOAPBOX

"Dear Don—I object to you using VeeLine to suggest rule changes without a full explanation of the consequences of those rules. For instance, would the membership have known that your proposed suspension rule makes the D-13, the Shadow-tax, and other similarly suspended cars illegal if a D-13 owner hadn't complained that you were about to do him in? If Bill Hoyer hadn't written, would you have volunteered that your proposed firewall rule would make the Lynx illegal? How about your proposed fuel tank rule requiring the tank to be located inside the perimeter of the frame? Although you have not mentioned it in VeeLine you must certainly know that the Zink, with its saddle tanks, cannot meet this proposed requirement. Before I can vote intelligently on rule changes, I want to know what impact they will have on makes of Vees, including mine. I think you have an obligation to clearly spell this out, particularly to the members whose cars are directly affected.

I don't think you should propose that any rule be changed without clearly demonstrated cause, especially when it would affect the legality of currently owned cars. Your rear suspension concern is sheer speculation ... the experience I've had following D-13's and similarly sprung Vees through turns indicates absolutely no suspension advantage over a well set-up conventionally sprung car. The firewall and body cross section of the Lynx is not the real issue, so why require their owners to go through a costly re-work exercise? Your proposal for stock tension on the fan belt makes the question of cylinder head ducting and cooling rather academic. What actual experience can you cite that indicates an unsafe condition which needs

(Continued on page 2)

HOW A PRO DOES IT

Here's that article on head preparation you've all been breathlessly waiting for! It's a considerably condensed version of an article written for a magazine by Pat Peters. Jim Wilde worked for Neal Williams during the development of this procedure, and took over the business when it reached the business stage and Neal moved on to something new. (He's reportedly making movies in Tahiti or Tangiers or Timbuktu now.)

As you're probably aware, the last ounce of improvement in head preparation can be obtained only with the use of flow measuring equipment, so that the effect of minute changes can be observed, and a stopping point can be determined. However, this article should enable you to get somewhere near to Jim Wild's minimum standard. (He discards about one head out of five—anything which isn't better than the average do-it-yourself job.)

You'll probably be somewhat disappointed by the simplicity of this projcet. We've all accepted the "fact" that a truly great head must have some kind of spectacular modification not known to ordinary mortals.

Probably you'll also be disappointed in the amount of improvement your work will accomplish in terms of speed and acceleration. Bear in mind that air flow into the cylinder is restricted not only by the port passages, but by the manifold and the carburetor as well. A 25% improvement in the flow characteristics of the head, with no change elsewhere, may result in only a third of that amount in overall flow efficiency. And due to the fact that the overall "volumetric efficiency" (the ability to suck in a complete cylinder-full of mixture on each intake stroke) isn't spectacular in a VW engine anyhow, an eight percent improvement isn't going to give you eight percent more horsepower. However, it will help—and in Formula Vee, every little bit counts.

Please consider the following to be in quotes:

Most of the changes the average racer makes with his rotary file hurt the air-flow because he takes out too much. Some of the changes do help, but the result of the average porting job is only a minor gain because the bad changes largely offset the good ones.

"The most important thing I've learned about porting, after ruining many heads, is what *not* to do," says Jim. " All my in-

(Continued on page 3)

MEMBERS' SOAPBOX

(Continued from page 1)

a costly correction by your fuel tank rule? In 5 years of Vee racing I've only seen one Vee ignite after impact, and that car had its fuel tank mounted inside the frame. I've been belted in the side of my Zink and the only thing that didn't collapse was the fuel tank.

Your proposed rule which deals with air passage openings in the firewall would require me to change the air inlet openings on my Zink which feed the carburetor. Why should I have to do this?

Don, I don't like making changes to my car when there is no good reason, and I don't want others to either. I've been this route with my '68 formerly-stressed-skin and 1¼-inch-longer Zink, and it has cost me many dollars and a lot of work. Therefore, when the membership casts their ballot on rule changes I think they ought to know precisely how those rules affect existing cars. I certainly don't want to add frame members around new and smaller gas tanks, nor construct air ducts in my engine cover to feed the carburetor.

Larry Wilson, Sacramento, Calf."

Larry, I can understand your feelings, and I suppose a good many owners will agree with you. It may be that we have allowed Formula Vee to stray too far from the INTENT *of the rules already. However, I hope you will believe that, with a couple of exceptions, the sole purpose of this proposed revision is to reword present rules which are being violated (in spirit, at least) or to forestall developments (like direct cooling) which were not even considered when the original rules were written. Pinning down the meaning of the rule so that it* HAS *to be observed, may, as you and some others say, "make a car illegal". If it does, it will not be because the rule was "changed", but because compliance with the* INTENT *of the rule is being required.*

Running through this entire proposal, I can find only three items which I would consider "changes". (You are entitled to your own interpretation, of course.) First is the "weight with driver", and that is actually in furtherance of the original concept of all Vees being equal—"emphasizing driver ability". Second is the gas tank relocation (in some cars) which we'll come back to in a moment. Third, if you read the fine print, is the elimination of the "B" cam. There has been a lot of complaint, from those who can't find one, that it gives an unfair advantage to those who can. Professional builders claim that the "D" cam is better, anyhow, but then they go to extreme (and in some cases illegal) lengths to attain the maximum valve lift which a "B" cam provides. (That is the only difference!) It would seem, then, that this complaint is valid, and that the "B" cam is NOT *within the* SPIRIT *of the rule. (Lest anyone think this is proposed from the standpoint of "sour grapes", Petunia is wearing one now and we have two more on the shelf.)*

Many of the so-called "changes" evolved simply from a study of the present rules, looking at them from the standpoint of, "Now what could I do within those limits? How could I argue that it's legal to do that, even though the rule implies that it's not legal?" In other words, I just looked for loopholes, and then tried my best to close them. (I have a somewhat devious mind, myself!)

Many more "changes" came from studying things we are doing now which everyone agrees SHOULD *be legal, but actually aren't, like rotating the clutch arm on the the shaft, free caster and camber angles, oil filters, hub-cap clip removal, etc. You'll find a lot more new "cans" than "can'ts" in these proposals.*

A few of those "changes" were, to be sure, prompted by observed or reported violations of the SPIRIT *of the rule by some builder or builders. As to pinpointing the specific cars which might be affected, I wouldn't mention any specific make by name, even if I were aware of all the makes which may have subverted the body width rule, or which have vulnerable gas tanks, or which have non-fireproof firewalls. In plugging for more adequate roll bars, a couple of years ago, I didn't think it necessary to mention any particular make which had weak ones. I don't intend ever to point out the bad features—or the good ones—of any particular make of car. I think the rules should apply equally to all of them, and that's as far as I go.*

Although I wrote the wording for the suspension rule in that spirit, it WAS *prompted by the D-13, but the intent was more to prevent further excursions in that direction than to correct that one. Several reports indicate, as you say, that it is not all that significant. However, the point is that it was intended to be. It has been touted as a great advance in Vee technology (as was the super-stiff Zink monocoque design) and claims are made that it makes the D-13 faster than cars with conventional suspension. If it actually does* NOT *improve performance, that certainly wasn't the intent of the builder!*

Even if this particular design has been over-rated, what is next? Should we wait until someone comes up with something else which IS *really significant, and then start trying to shoot it down, or should we lock the door now?*

Now let's go over that bit once more about "rule changes which make my car illegal". In nearly every instance this charge is made in regard to a proposed revision which spells out more clearly the INTENT *of the rule, without in any way changing that intent. Let's take the body width and firewall, for instance.*

The rule says, "Body width at firewall, minimum, 34 inches." Can there be any doubt as to the meaning of that? The INTENDED *meaning, that is? The only reason for that dimension being included in the rules at all was to "emphasize driver ability rather than design and preparation of the car" by requiring all Vees to maintain a minimum frontal area. But look at what has happened! We have cars with an actual body width of around 18 inches (*INCLUDING *the firewall) with see-through scoops, or fins, or perhaps only sheet metal tabs on the rear section—the only point where the "body" comes anywhere near to being 34 inches wide. (Note that the proposed revision requires only that the firewall be at least as wide as the engine—not 34 inches. This "change" could actually make some presently illegal cars legal!)*

This is a compromise between the original rule and present practice. It would no doubt, as you say, require covering that open scoop on a Lynx and probably on some other makes, and eliminate any possibility of using it for direct cooling to the cylinders.

I didn't even think of the carburetor intakes beside the driver's head in the Zink when that was written, but now that you mention it—Sec. 1.5.19 of the GCR, Appendix A, ("Automobiles, General Regulations") says, "Fire wall and floor shall prevent the passage of flame and debris to the driver's compartment." If you were to park your Zink at the end of the straight upside down, and ignite the gas pouring out of the carburetor into that ducting, you wouldn't need a shave for a month! I'm surprised, really, that it hasn't been outlawed as a safety hazard long before this.

While we're on that subject, let's consider gas tanks. To me, the only thing your experience indicates is that you were darned lucky, but let's grant that it proves that the Zink gas tanks are invulnerable. Would you say that cars with fiberglass tanks, protected only by the fiberglass body shell, are equally safe? (Need I list them all by name?)

To put it bluntly and callously, I'm not particularly concerned about your cremation, if that's the way you want to go. However, the first time some Vee gets rammed in the side, squashes the tank, squirts five gallons of gas on the driver, and busts out into fireworks, every Vee owner (including those with Zinks) is going to have to spring for a couple of hundred dollars worth of custom-made fuel cell, and then find some place to put it. We've been on the ragged edge of this for several years, and that's all it would take. As you say, it hasn't happened—yet. Should we wait until we can "cite an actual experience" before taking steps to prevent it? This, to be sure, is one rule CHANGE *which* WOULD *make some cars illegal, just as the new roll bar rule did, but by the same line of reasoning, I believe it's justified. It will be on the ballot, of course.*

As to the need for prohibiting direct

ducting to the cylinders and heads if a tight fan belt is required, obviously you're not a cheater type. If you were, it would have occurred to you that with adequate ducting you could block off the fan inlet completely, and that with no air to pump the fan would just set there and spin, drawing practically no power from the engine.

Finally, let's consider the plight of those poor D-13 and Lynx owners who may be "forced to junk their cars if these rules are adopted." I've seen only one D-13 undressed, but if I remember correctly, I could convert it to "conventional" suspension in about five minutes, using only an arc welder. With a couple of turnbuckles and a couple of hours work, I'm sure I could replace that tie-rod between the arms with the turnbuckles, anchored to the frame at one end, and have an easily adjustable "conventional" rear suspension, permitted under this proposal.

As for firewalls, as I said, this wasn't dreamed up with any particular make of car in mind, so I can't describe just what it would take to make the correction for any of them, but the expense for a new sheet of aluminum shouldn't be prohibitive. It probably would take several hours of labor, since it might even be necessary to remove the engine in order to get in there and drill new holes for sheet metal screws. However, it certainly wouldn't cost as much, or take as much time, as it would to remodel the rear section for the installation of direct ducting, if Formula Vee is allowed to drift into that.

Thanks for taking the trouble to express your opinions, Larry, and now please go a bit farther. If you agree that SOME *of these "changes" are justified—like some gas tanks need more protection even if Zinks don't, or suspension development should stop with the D-13, write up an alternate proposal to be put on the ballot. That's what the next couple of months are for.*

HOW A PRO DOES IT

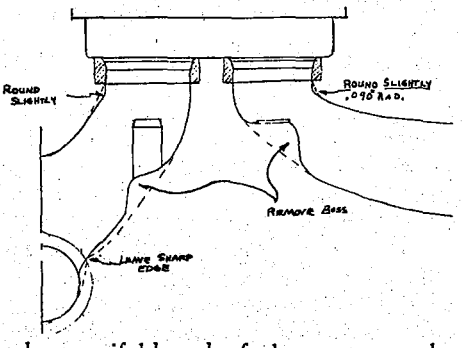
(Continued from page 1)

tuitions about removing sharp edges and smoothing out abrupt changes and polishing the surfaces have been proven wrong. Now I never even touch two-thirds of the port area with a piece of emery paper. For the most part, the VW engineers seem to know a lot more about air-flow than the average Vee racer. Those little bumps and ridges and sharp edges are not all just the result of sloppy manufacturing processes!"

Jim begins his porting by driving the valve guide partially out of the head until the end is flush with the aluminum surface inside the port. (If the guide is removed completely the grinding tool will snag on the edges of the hole, rounding the edges.) Thread the rocker arm end of the guide about ¾" deep with a 3/8"-16 (coarse thread) tap, screw a bolt into it full depth of the thread (but don't tighten enough to swell the guide) and use a punch (or an old valve) and hammer from the port end. This has the effect of "pulling" on the guide, stretching it and loosening it in the hole. Driving directly on the end tends to swell it and tighten it.

A ½" diameter eliptical rotary burr is used for the porting. In the intake port, smooth in the side farthest from the exhaust port. This is only ground down for the first ¾" below the steel seat insert. The lower edge of the insert may be tapered on that side, also. *Under no circumstances should the inserts be ground on the inside at any other location in either exhaust or intake ports!*

The intake port may be widened and deepened in the area just above the guide boss, and the boss itself may be rounded slightly, or completely removed. The intake manifold end of the port may be opened up to 28.5 mm (1.122"). Note the sharp edge where the port starts to divide, rather than the smooth transition into the "Y" which you might expect. This apparently has the effect of a nozzle, making a single "stream" of the incoming air which can be diverted to either port, rather than an equal division between them. Remember that both valves are *not* open at the same time! Any other enlarging, port matching, smoothing or polishing is unlikely to show any improvement, and will probably reduce the total flow.



The most important thing you can do do the exhaust port is to *not* remove that terrible sharp edge below the valve seat on the side farthest from the intake port. This edge forces the air to flow straight down toward the bottom part of the port before it makes a turn toward the outlet. If this edge is removed, as every beginner and most "experts" do, the flow will drop off 10% at .200" valve lift and 5% at .300". Just grind a .09" radius on the edge. (That's the radius of a #15 drill bit, which is halfway between 11/64 and 3/16".)

Jim says, "I do recommend that the exhaust guide boss be completely removed, but the passage should not be deepened or widened. Just follow the contour of the passage wall which is on either side of the boss. I don't touch *any* of the rest of the port."

Next, Jim smooths up the areas he has ground, first using a ½" diameter sanding drum, and then with a ¾" Cratex disk. The final smoothing is done primarily for appearance sake and does not cause any measurable improvement in air flow.

When the porting is completed the remaining guides are removed and new guides are installed. Then the final valve seat grinding can be done.

Jim has found that the shape of the valve seat, rather than that of the port, is the most important part of making a good head. In fact, he says, a set of heads with the proper valve seats, but with completely stock valves and ports, will out-perform 80% of the heads being used on Formula Vee engines today.

Speaking of valves, "When it comes to the valves, many people do themselves a great dis-service by grinding down the valve, or putting smoothing cuts on the back side, Jim points out. "I've tried a dozen different racy-looking valve contours and none of them were as good as the stock valves. That little lip on the underside of the intake valve actually improves the air flow, yet most racers grind it off. Use stock, untouched VW valves!"

Using a hard-seat grinder, Jim first grinds the intake seat with a 15 deg. stone until the cut reaches the OD of the steel valve seat insert. A 15 deg. cut is made on the exhaust seat the same way.

Next, the 45 deg. valve seating surface is ground until the cut reaches the OD of the valve diameter. Jim reports, "It is very important that the OD of the 45 deg. grind be exactly the same as the OD of the valve. I measure this to plus-or-minus .002". Then I check each seat for run-out with a dial indicator. If run-out is greater than .001", the seat must be reground and the top 15 deg. cut may have to be redone also."

Finally, a 70 deg. stone is used to grind out the inside of the valve seat insert and reduce the intake seat width to .050" and the exhaust to .060". Again Jim warns, "Measure the seat width very carefully. An error of .005" is too great."

After the valves are lapped in and installed, the head is flow tested. With all the careful measuring and testing, you might think that every head Jim does would be a great one. "Not so," he says. "About one in five just doesn't make it. In spite of anything I can do, one of the intake ports will still be weak so the head ends up in the scrap heap. Without flow testing I still can never tell if I've done a good head or a bad one."

Jim explains that he thinks the most probable cause for a weak port is that the intake port core was offset from the rest of the mold when the casting was made. This manufacturing error (typically .060" or less) if excessive, causes the flow centerline to be offset from the valves, so that one port will be good and the other is unusually bad. He has never been able to cure a bad one, so he discards the head. Unfortunately, this deficiency can not be

(Continued on page 4)

HOW A PRO DOES IT

(Continued from page 3)

spotted until after the job is completed, and then only on the flow bench.

Many thanks to Jim Wild (whose address just happens to be 482 O'Connor, Bldg. A, Menlo Park Cal. 94025) for sharing his "secrets" with us!

THAT OTHER ORGANIZATION

It's been some time since the "other" racing organization in this area was mentioned— the International Conference of Sports Car Clubs, or "Conference". It covers the same geographical area as the Northwest Region, with the addition of British Columbia, is about the same size, numerically, and has a very similar racing program. (Between the two organizations, we could race nearly every weekend from March to October if we could stand the pace!)

"Conference" is about 20 years behind the times, really. It was founded originally strictly for racing stock sports cars, and that's still the basic class. (Drive it to the track, strip off the top, bumpers, wind shield and muffler, race it, put it back together again, and drive it home.) All the other classes are included too, of course— even to an "improved production" class for SCCA "production" cars—but they still have some old fashioned ideas.

For instance, the race stewards take rule enforcement very seriously. If they notice a visible infraction, or if one is called to their attention, they take steps to have it corrected, voluntarily. Protests are considered as part of the game, and are almost welcomed, on the ground that they keep everyone honest. All of which leads up to the point that I was asked to preside at two Vee teardowns a couple of weeks ago, at Vancouver.

One engine had been in a car bought last Fall from an Eastern driver, supposedly with a professionally built engine in it. It had been protested and torn down a couple of weeks previously, and was found to have an offset key, which changed the cam timing, and illegal deck height in the cylinders. It had been rebuilt after the protest at the VW shop by which it was sponsored. The other engine was fresh from an Eastern builder.

Using the "Schultheis" technique, the propared engine was found to have illegal rocker arms, and the deck height varied from .039" in one cylinder down to .031" in the worst one. The engine rebuilt in the VW shop had the throttle shaft filed down, and the deck height varied from .039" in one cylinder down to .032" in two of them.

The illegal rocker arms and the faired throttle shaft were, of course, deliberate attempts to improve performance by the respective builders, but the illegal deck height, in both cases, had to be simply the result of carelessness. (What builder would carefully CC heads and then allow that much variation in deck height on purpose?)

It's natural to assume that anything that's strictly stock in a Vee engine *has* to be legal but it ain't necessarily so! Deck height is one very good example. On Petunia's original case we had to use three gaskets under one of the cylinders in order to get the legal measurement.

Next time you tear your engine down, after you get the heads off, slip a handful of washers or oversize nuts on two opposite head studs (for spacers) and then, using the regular nuts, tighten the cylinders back down moderately to where they are completely seated again. Get the piston up to top dead center, lay a straight-edge across the cylinder, and check your headspace with a feeler guage. You may be surprised!

If you find a variation in deck height, lay the straight-edge across the tops of both cylinders at once, and you'll no doubt find an equal variation in the height. When you consider that the one-piece head has to fit down snugly on the tops of both cylinders, it's pretty obvious that shimming them to the same height may be equally as important from a mechanical standpoint as it is from that of legality.

If you mike the old gasket you'll find that it's around .003" thick, while a new one is around .007". If you're .004" short, a new gasket won't do it, because it, too, will compress. Probably two gaskets won't do it, because they'll compress to .003" each, which is still not enough.

One of the mechanics mumbled something like "what difference could a couple of thousandths make?"- You can bet, though, that when he puts that engine back together again it won't have seven thousandths too *much* headspace!

UNCLASSYFIED ADS

WANTED: Set of rear Continentals, 6.25x15, new, or used in good condition. (Even one will help!) Stan Moore, 63 Bergen St., Westwood, N.J. 07675 (201) 666-2148.

FOR SALE: Lynx, with Zink engine still in crate, many extras. Professionally prepared and maintained. Reasonable— really want to sell. Jon Clemens, Hilltop Road, Rt. 1, Coopersburg, Pa. 18036 (215) 282-3856.

FOR SALE: Sardini Vee, frame and running gear in good condition. Stock 40 H.P. engine, recently rebuilt, trans in excellent condition. $800 with engine, $500 without. A. H. Ager, 618 Leslie Drive, #B, Salinas, Cal. 93901 (408) 424-1035.

FOR SALE: Zink Vee. Chassis squared and balanced, latest suspension, long and short Goodyears, minimum weight. Zink's best engine with latest intake and exhaust. Zink trailer (with brakes) spares, special tools and all pertinent data. Flawlessly prepared, better than new! Ralph Tremaine, 1305 Laven-Del Lane, Kirkwood, Mo. 63122 (314) 822-3202 (home) 739-0100 (work).

FOR SALE: Crusader Wedge, going to Atlanta if you don't buy it first. Ready to race, $1895, or in kit form plus front end, wheels, and tires, $1100. Kirk McDowell, 2611 Mulberry St., Riverside, Cal. 92506 (714) 683-8464 (res.) 885-3445 (Bus.)

FOR SALE: Vee built to McKnight plans. Balanced engine, light flywheel, heads ported and cc'd 4 to 1 exhaust. All aluminum body. 6 Goodyears, mounted. Asking $1200. Jay Schneider, Clymer Rd. & Holly Ln., Hatfield, Pa. 19440 (215) 822-2065.

Formula Vee International
1347 FAIRMONT AVE.
EAST WENATCHEE
WASH. 98801

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UNITED STATES 8c

Warren A. Roberts A
5927 E. 127th St.
Grandview, Mo. 64030 7

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