VEE LINE

NUMBER 43 APRIL 1968

1500, ANYONE?

At Freeport last December, the lack of really spectacular advantage for the 1500's over the 1200's was attributed to the short straights, but it was predicted that at Sebring, with several long straight sections, they would paralyze the Formula Vees.

No comparative times were available for the race itself, although Hugh Kleinpeter in a 1500 won it at an average speed of 86.943 mph. Glen Harcus won the Formula Vee class, but no speeds were given.

In practice, the fastest lap for a 1500 was 88.14 mph, by Pedro Rodriguez (!), and for the Vees it was 82.39 mph (a whole 5.75 mph slower!) for Richard Kimsey.

It's a good thing the "Crise rules" allow the "Formula Fives" to modify to 9.25:1 compression ratio. In stock condition they'd be run over by the Formula Vees.

ANOTHER ONE!

Riviera Motors (Portland, Ore.), the VW distributor for the Pacific Northwest, has joined the two California distributors in offering prize money for Formula Vee races. For each of the four Nationals in the Northwest, they are posting $200 for first, $100 for second, and $50 for third place. If a Washington or Oregon driver wins the championship in the North Pacific Division, an additional $250 will be given; and if he wins the National Championship, there is an added bonus of $500. This puts the entire Pacific Coast under VW support. How are the rest of you people doing?

FROM EUROPE

Formula Vee Europe publishes on a bi-monthly basis a very fine newspaper. Originally it started merely as race reporting, but has lately started including technical articles. Its most unusual feature is that each article, including most of the picture captions, is presented in German, French, and English.

Here's a worthwhile tip, called to my attention by Lawrence Perry who is stationed in Germany with the Army: "Drivers are advised to safeguard the gear shift rod which is immediately on the rear end of the transmission with a simple type bracket or guard. It often occurs that during slipstream driving the gear shift rod of the vehicle in front is unintentionally touched, causing the 4th gear to spring out, which then results in engine defects."

DIRECTOR'S CORNER

I really hated to write the article on modifying the heads. As anyone who has been with this organization very long should know, I abhor rule-breaking, or even bending, and my conscience isn't entirely clear on the subject of "cc-ing" heads, even though I've just completed doing the job on Petunia. I can rationalize that it's legal, inasmuch as it entails only the attainment of a specified measurement in the rules (which isn't a standard VW spec, so it can't be called "blueprinting"), and even that it's moral, on the grounds that it has an equalizing effect on the Class. If everyone accepts it as one more of the things which have to be done to make a car competitive, it will remove some of the advantage, and the myths, now attributed to "professionally prepared" engines.

On the other hand, it's not a modification which is "specifically authorized," and it does increase the cost of Vee racing to some extent, regardless of how you go about doing it. Ignoring these two considerations is striking at the heart of the Vee ideals. Nevertheless, "everybody's doing it," so to maintain as nearly as possible the equality of the cars (which is also in the best tradition of Formula Vee) if you're really competing seriously, you'd better get with it. If it's legal, you'll be in a lot of good company!

FOR A LITTLE MORE GO

Most of the things you can do to a Vee engine are straightforward mechanical changes which can be done by almost anyone, but just the thought of "cc-ing" leads to doubts. It's the sort of thing done by professional speed shops, and is generally considered to be on a par with dynamically balancing a crankshaft. Actually, it's not that difficult – the toughest part is deciding to do it. Next is deciding how to go about it, and perhaps this will help.

If you can afford it, the simplest way is to send your heads to some speed shop and tell them what you want, of course. And if you can afford it, you've probably had it done already. At the other end of the scale, you can do the job yourself, though you'll still have to spend a few dollars for equipment unless you're in good scrounging territory.

The in-between route – doing the measuring, etc., yourself, but getting the machine work done at a local shop – will probably be the most difficult, and expensive. The expense isn't due to the actual machining – if you could tell them exactly how much to take out, and if they had the proper equipment, it probably wouldn't cost much more than the equipment you'll need. But by the time you cut a little, and measure, and cut a little more, and measure, and repeat the process for four chambers, you'll have a good many dollars worth of hours built up. Most shops will charge for the entire period that their machine, and machinist, are tied up, whether or not they're actually in action.

So why not do it yourself? If you can replace the bearings in your engine, you can do this job, too.

Before you start tearing down your engine, get your equipment assembled. This may take longer than the job itself. First, you'll have to have something with which to measure the cc's. If you can borrow from a lab (or from your old high-school chemistry teacher), you're in luck. Ask for a "50 milliliter (cc) burette." This is a long glass tube with a shutoff valve on the bottom end, graduated into tenths of a cc. You could, with extreme care, use a 50cc "graduate cylinder," but it is graduated in full cc's, and is therefore much harder to read accurately. If you have to buy, look in the Yellow Pages of your phone book under "School Laboratory Supplies" or ask the operator to find it for you if your local phone book doesn't list it. A burette will cost in the neighborhood of $10, a graduate cylinder about $2.

Next you'll need a clear plastic disc, 3½" in diameter, to enable you to determine when your combustion chamber is actually full of liquid. It should be at least 1/8" thick, and 1/4" is better. Drill 5 holes in it, located so as to outline the combustion chamber, with one in the center. These are to prevent trapping air bubbles under the plastic. Due to the surface tension of the liquid, and the tendency to "creep" beyond its actual level, it is difficult to tell when you've just filled the combustion chamber level full; but the disc will show the actual top level of the chamber. And by filling to the tops of the four holes, it is easy to tell when they are level full. The volume of the holes is, of course, to be added to the 43cc you're shooting for as a final measurement. In a 1/4" disc, the volume of five 23/64" holes will equal an additional 2cc. For a disc 1/8" thick, it will be 1cc of course, and for any other thickness, you're on your own.

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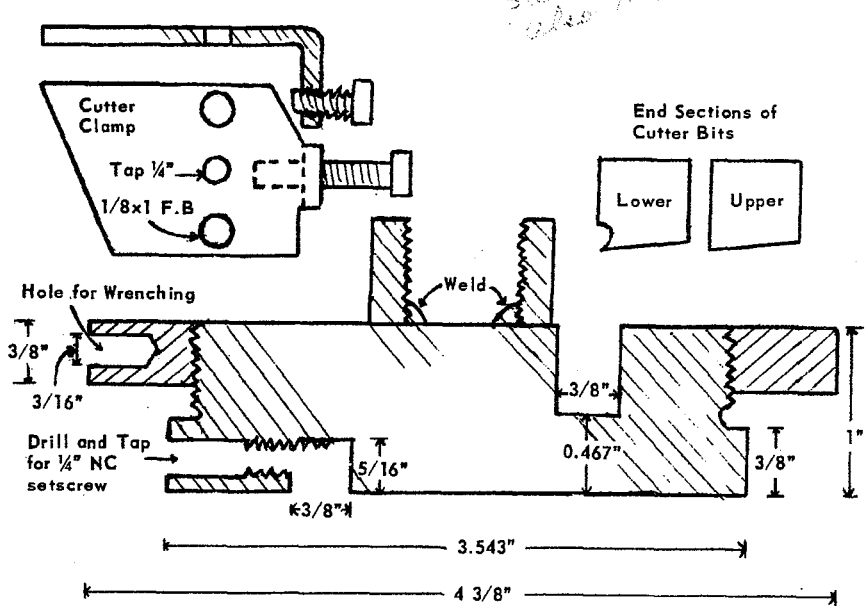
Oh, yes – you'll need something to do the cutting with, too. EMPI sells such a tool, hand operated, for around $75, or you can make (or have made) the one described here for much less (depending on your connections). Your VW shop may still have a hand-operated cutter for reseating the cylinder bearing surface in a head (it's no longer done); but if this is suggested to you, shun it. It only cuts a groove around the circumferance, leaving the center untouched. This would be great for all-out modifying, but illegal in FV. The center part would protrude into the headspace above the piston, further reducing the volume in that area, too.



The cutter shown here is pretty unsophisticated, but it works. It will not only deepen the combustion chamber, but will also take a corresponding amount from the gasket groove – and also from the area surrounding it – so that the head will still seat against the gasket and the rim of the cylinder, and not on the shoulder of the cylinder below the gasket. You'll need: a disc of steel place 3¾" diameter and 1" thick, a ring of 3/8" plate about 4½" OD and 3" ID (all torch-cut dimensions, to allow for machining), a hex nut (3/4" or 7/8"), 3 screws ¼" x 1", a couple of inches of 1/8 x 1" flat bar, a 1/4" socket-head setscrew and a couple of pieces of 3/8" lathe bit, an inch to an inch and a half long.

Only the dimensions shown in decimals are critical. Those shown in fractions can be approximated, or even varied, to suit. To prevent breaking taps and drills, the hole for the setscrew should be drilled and tapped before the keyway is cut for the bottom cutter. The clamp for the upper cutter bit doubles as a lock for the adjusting ring while the lower cutter is in use. All care should be taken to get the threaded portion true with the rest of the block – turn and thread at the same set-up if possible. (On a small lathe this can be done with the hex nut clamped in a three-jaw chuck. On a larger lathe, it might be better to weld the nut on the outside, and screw it onto an arbor in the lathe chuck to allow room for threading.) Use of a fine thread (20 per inch) makes adjusting the depth of cut easier.

That's all the special equipment you'll need for cc-ing; but while you're at it, if you haven't opened up the ports, you'd better prepare for that, too. You'll need a "3/8 inch eliptical rotary file" (which you can use in a ¼" electric drill if you don't have a regular high-speed hand grinder) and a new set of valve guides (unless you're gambler enough to try to reuse the old ones, or to risk disqualification for cutting them off).

OK, all ready? Got plenty of time for the job – like a week-end and several nights – before the next race? You'd probably better start by taking the heads off the engine. Do it carefully, without disturbing the cylinders if possible. You could be in for a surprise here – we were. (Pacific Northwest Members please skip to the next paragraph.) Scrape the carbon from your piston heads; and with a depth micrometer or a straight-edge and feeler guages, check your "top of cylinder to top of piston" measurement, which should be at least .039". We found ours to be .038, .038, .034, and .028! With a standard gasket under each cylinder yet! The shortest one was a late model cylinder we installed a couple of years ago when we melted a hole in a piston and scored the old one. Knowing that it is common practice to omit the gaskets, we assumed we were well over the minimum when they were used. Evidently the cylinders tend to "crush" into the softer metal

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MEMBERS' SOAPBOX**

"Dear Don: Action is immediately necessary to save our economical racing class. Goodyear's new Vee tire indicate a gross increase in cost for racing. . shocking demonstration of its superiority was the April 7 Marlboro Nationals where the first six qualifiers, all using Goodyears, were under last year's lap record by up to two seconds. The consensus was that the tires reduced times by about 3 seconds per 1.7 mile lap. However, this increase in speed comes at a very high price – the tires last only two, or maybe, if one stretches it, three races. This means that the average competitor will have to spend $450 to $600 per season for tires if he intends to be competitive!

"I believe this year is the critical period for FV, and unless we band together (FVI) to counteract the ominous direction thar FV is heading in, I am sure that very soon the class will be left in its raped form to such "professionals" as Joe Herman (VeeLine 42).

"I have a proposal for consideration. Like Formula Ford, I suggest that FV be restricted to commercially available high performance radial tires. SCCA has published a list of acceptable tires which would serve as a guide for a rule change for next year. Since radials would last two years, tire cost would be reduced to $75 a year instead of the $450 which it appears will now be required. This is certainly in keeping with the original Formula Vee philosophy. Now if we cou revive the "claiming-price" rule, too, F might return to its original concept.

"I hope that the VeeLine will allow space (perhaps a ** Members Soapbox column) to present this idea to the membership. I hope if there is sufficient support that this proposal will be included in this year's voting on rule changes."

Bill Maisey, Yorktown, Va.

That was a low blow, Bill, coming just when we'd agreed that our racing budget doesn't include a new set of tires at this time! We've been using two-season tires ever since we started, but had hoped to get a new set again this year, even though last year's are still good. Even a new set every year is bad enough, but for each two or three races!!! That's ridiculous! It's hard to reverse progress – if that's progress – but I agree with you that Formula Vee can't stand that kind of racing expense.

How about restricting Vees to tires approved for highway use at 100 mph? (Do they have to be radials?) And no recaps? (Recaps could bring us right back to exotic high-traction short-life high-price compounds again.) Let's have some comments!

In Australia and South Africa rac tires were banned in the beginning, though in Australia they are now having some second thoughts on the subject. When they get wind of this development, they may take a third look.

WATCH THIS KID!

A couple of months ago I speculated about the possibility of a good Vee driver graduating to a larger faster Formula. Well, we now have a candidate in this Division. Neil Hansen, who has been one of our closest competitors for the past two years, is driving a Brabham Formula C this year. In his first race at Las Vegas, where he drove a Junior for the first time in the practice session, he came in third. In his next race he was first. He has a good car, it's true, but he's driving it like a race cat should be driven – like he drove his Vee.

We've all been giving him a bad time for being a turncoat, but we're really proud of him – we even let his continue to join the Vee bull sessions and belong to FVI!

Watch for him at Riverside.

BOBSY VEGA

I don't make a practice of endorsing any particular make of car (except Formcar) for a number of obvious reasons, including the fact that I don't have the opportunity to test them. However the Bobsy Vega *has* to be good – Jerry Mong is the only manufacturer, to my knowledge, to show his "FVI" emblem on the car in his publicity photos. I hope it helps.

FROM FIRESTONE

"We have referred your specific questions to our Race Tire Development Department, and are pleased to advise you that the new molds are due during March. However, tires would not be readily available before the end of March or early April. These new tires have been designed specifically with Formula Vees in mind, but will find application on the smaller production cars as well, as they will have an all-purpose design. We expect the wear factor to be good; but due to the design, it will not last as long as the current Super Sports Indy Tire. These tires will be basically equivalent to the 450/650-15 fronts and 500/730 rears currently produced in the Indy design. Air pressure is dependent on the driver's preference, but the general range would be from 23 to 28 psi cold.

"A smaller tire on the front minimizes the frontal area of the car, which aids in maintaining directional stability under braking and increases front end adhesion through the turns. This has been substantiated by lap times and comer speeds related to driver comments."

By this time some of them should be in use. "Driver comments" will be appreciated.

The VEE LINE of
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in the crankcase as time goes on, which might explain why they used to fall out, but now have to be removed forcibly.

Cylinder gaskets are about .010 thick when new, but crush to about .007 in use. When replacing them, then, we glued a couple of new gaskets to a sheet of onion-skin typing paper (.002) with rubber cement to add a couple of mils to the .038 cylinders and cut away the excess paper when it dried. We used an extra gasket under the .034 one, and put *three* gaskets under the .028 one for an additional .014. So now we should be legal after two years of cheating. Sorry about that!

OK– back to the heads. You'll no doubt want to grind the valves; and if you're going to clean out the ports, now is the time. To remove the guides, you can play it safe and make a puller from a 5/16" high grade (very!) bolt. Grind the head to a diameter slightly smaller than the guide and saw a screwdriver slot in it. Use a piece of pipe or tubing for a spacer under the nut on the outer end of the guide, and pull. If, as ours did, the bolt breaks before moving the guide, carefully drill the guide to take a 3/8" bolt and try again. Reducing the wall thickness of the guide will make it easier to break loose, and judicious use of a hammer when you get to the point where you think the bolt may fail will help. The most direct, and successful, approach is to skip the pulling and start with the hammer in the first place, provided you've resigned yourself to buying new heads if something breaks. (Ours are "A" heads, which we'd just as soon replace with the "65's" anyhow, so of course nothing broke.) Use a ground-down bolt in the guides to drive against, or you'll find the guides swelled to where they won't go either way.

It's been mentioned before on these pages – some engine builders cut off the guides along with the excess material in the ports. However a protest against Bill Denison a couple of years ago was denied by the Appeals Court mainly because he had replaced the guides with new standard ones after this "porting" procedure. Valve guides are replaceable parts – not an integral part of the head – and Sec. 4.10 says they must be "normal replacement parts." Further – as a practical matter – being of brass, they have an appreciable effect on conducting heat from the valve stems, especially when the surrounding aluminum is cut away. Cut them off at your own risk, then, but my advice is to replace them. When driving the new ones in, use STP liberally – it's miraculous for assembling press fits.

You can mike the ports and work out the last thousandth with the rotary cutter if you wish, but it's probably not worth the effort. The intake port is already the largest section between the carburetor and the cylinder, and the exhaust port is much larger. However, the bosses around the valve guides do offer some restriction, especially the exhaust. In the intake port, it's not really restrictive, but could cause turbulence which would interfere with the gas flow. So use the rotary cutter to "fair" the ports to smooth, even contours. Actual *polishing* of the surface is generally considered to be of no benefir, but try to get the humps and hollows leveled out so that you can't feel them with your finger.

After replacing the guides, reseat the valves in the normal manner. Get the valves refaced at any garage, and the seats done with a seat grinder. Don't try to actually grind them in – you'll get a groove around the valve head. Don't bother with the secondary angles on the seats either at this time. You may have to do some additional grinding later, but more of that when we come to it. Right now, let's start cc-ing.

If you have a steel work bench top you can drill holes in, it will make the job a lot easier, but it's not essential. If you do, drill a couple of holes through which you can stick the rocker arm studs, use three nuts and appropriate shims between the head and the bench-top to level the head, upside down; and use the rocker arm nuts, under the bench, to draw it down tight. (The three nuts are used to leave a space between the head and bench so you can reach under to push the valves up.) Make some kind of support for the burette, if you didn't borrow one, and check your present volumes, just for practice and for the satisfaction of knowing how much you're accomplishing.

Drop the valves in place, sealing them with a bit of grease; lightly grease the plastic disc around its edge and press it firmly into the head. Set up the burette over one of the holes in the disc and fill it to the top mark with slightly soapy water. Fill the combustion chamber *and* the holes in the disc until all four holes are level full. Subtract the volume of the holes, and you'll have your present combustion chamber volume. Remove the water with a sponge, and repeat for the other cylinder. Then you'll have another decision to make.

It's very unlikely that the chambers are exactly equal. You can't equalize them by cutting them to different depths, or you'll distort the head when you tighten it in place. Therefore, you'll have to work either to the smaller one, cutting it to 43cc and leaving the other slightly larger, or to the larger one, cutting it to 43cc and enlarging the smaller one to match. This is where the extra valve grinding comes in. You can't change the *shape* of the combustion chamber, but you can grind the valves a few thousandths deeper and increase the volume correspondingly. If you're really gung-ho, and can borrow tools for grinding the seats, and have plenty of time, you'll probably want to do it the hard way. On the other hand, it's unlikely that a couple of tenths of a cc really make enough difference to warrant the extra work; but that's up to you.

So let's start cutting. Be sure the cutter bit is set to cut *exactly* the same diameter

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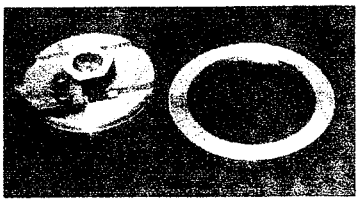
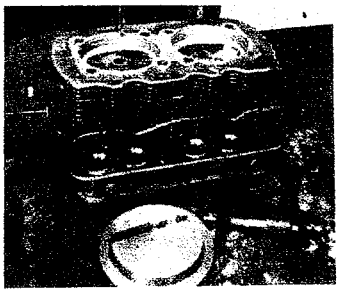
as the original hole, or you'll have trouble later in using the tool to cut the gasket groove. For that job, the tool must rest on the bottom of the recess and turn freely, so any shoulder left in the recess will have to be scraped out by hand. Set the depth ring so the cutter doesn't contact; bear down hard on the tool and turn it with a ratchet wrench while someone holds the ring stationary so that the tool is fed downward. As soon as you feel resistance, tighten the ring lock and make a couple of turns with the tool, always bearing down heavily on it.

From here on, it's cut-and-try. Turn the adjusting ring not more than an inch at a time, and take each cut until you can feel no resistance before readjusting the ring. At first, the cutter will tend to cut deeper at the ends of the recess than at the sides, so each cut must be made until the entire circumferance is cut to the same depth. Stop and recheck the volume frequently. Your total cut will probably be in the neighborhood of .020", so don't overdo it – it's rather difficult to replace material once it's been cut out. Be sure to cut both recesses before readjusting so that you'll end up with both the same depth. A little oil or grease on the cutter will make the chips stick, but it will also make it a lot easier to turn.

Complete the valve grinding with the head still clamped level, and complete both heads to this point before converting the tool to a gasket seat cutter. For this operation, remove the adjusting ring and clamp the upper tool bit in place firmly but not tightly, as you'll be moving it with the adjusting screw. The depth of the groove is already built into the tool, so all you do is feed the tool gradually outward until the original diameter is attained, taking a turn or two with the tool between each adjustment.

With the gasket grooves deepened, set the tool again to cut a clearance for the shoulder on the cylinder. Remove the cutter bit and place about .070 worth of shims under it (tin, paper – it's not critical) and clamp it in place again. Again repeat the gasket groove process, feeding the tool outward an additional 1/8". And that does it! Now you're an expert head cc-er.





NOTA BENE

"Dear Don: I recently purchased a (Brand X) in kit form. After reading your articles in the VeeLine, we replaced the original bar (1"x1/16") with a new one (1¼" x 1/8") even though I didn't realize how poor it actually was. After the original bar was removed, a friend broke the forward brace from it with his bare hands!. . .I do think SCCA should tighten requirements for "factory" roll bars. Some of the bars I've seen by other companies are just as bad. Needless to say, I am very thankful we replaced it. Keep up the good work."

Jason Anderson, Pittsburgh, Pa.

Thanks, Jason! It's good to know that this "campaign" has accomplished something, even though it's only on an individual basis, so far. More letters like yours, and those previously published, and we might even do some good on a national scale.

UNCLASSYFIED ADS

FOR SALE: Formcar, excellent '67 record. Guaranteed legal. One hour on completely rebuilt and balanced engine. Sprung trailer with spectator deck and compartment for tools and spares. Complete with spares, $1450. Henry G. Bennett, 407 Back Bay Blvd., Wichita, Kan. 67203 (316) AM 2-8064.

FOR SALE: Formcar, new race-ready engine, Konis, choice of Pirellis or Goodyears. Never bent. Without engine $900, with engine $1100. With engine and trailer $1250. Jay Sanderson, Box 4221, Whittier, Cal. 90607 (213) OX 3-9832.

FOR SALE: Autodynamics, new, raced twice and never damaged. $1400, or will take VW or sports car in trade. Lyle Witmer, c/o RCA AUTEC, 3105 Belvedere Road, West Palm Beach, Fla. (305) 683-8482.

FOR SALE: Factory built Autodynamics, never raced. Demonstrator in VW showroom, driven on street a couple of times. First $1200 takes it. Thomas I. Curtis IV, 10716 Dalton Ave., Tampa, Fla. 33615 (813) 855-1730.

ON FIREPROOF TANKS

In addition to Firestone and Goodyear, another tank fireproofing process is said to be under consideration by SCCA. If approved, it will be cheaper, at least, and probably lighter than either of the other processes.

It involves coating the inside of the tank with a rubber-like compound, and covering the outside with pre-cured sheets of the same material. It is said to be self sealing against small punctures and almost impervious to bursting, even though the metal tank itself may be ruptured. If it proves to be all its promotors claim it to be, watch for the "PyroGuard" tank treatment to be approved by SCCA.

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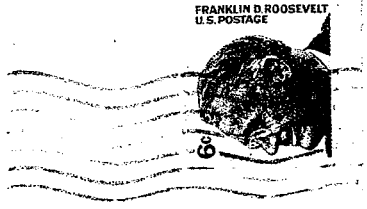

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