VEE LINE

NUMBER 78 MARCH 1971

DIRECTOR'S CORNER

Due to lack of space, there will be no Director's Corner this time. Besides, I didn't have anything profound to say, anyhow.

IMSA

The International Motor Sports Association, by their own admission, didn't exactly meet their expectations last year, but it certainly didn't discourage them! They're off toward bigger and better things this year.

Their Formula Ford orientation last year has been expanded to include not only Super Vee, but also formula cars based on Renault 16 engines(?). Actually, they don't use the common names—they're all lumped into the "International 100" Class. Generally they follow the SCCA rules, except that the Fords, for instance, can have alloy wheels and the "VW-1600" cars can use only two single-throat Solex carburetors.

They are establishing their own Sedan classes, too, which will include almost any small sedan. Modification is more limited than in SCCA's rules, with emphasis on keeping everything looking stock. Stock wheels must be used, and tires (get this!) must be premium grade street tires, as sold to the general public! Like they say, so you can't corner as fast so you can't overstrain the wheels and suspension, so the stock stuff will do the job.

No, they don't even mention Formula Vee this year.

MEMBER'S SOAPBOX

"Dear Sir—(1) What type of cutters and polishing stones are best for porting aluminum heads?

Having punched out the three larger oil gallery plugs, I'd like to pass on the following info: The plugs are shaped like inverted cups, nearly as deep as their diameter. They are available from VW and are replaced as you would a frost plug, using a sealant. If you remove the larger ones you will find it necessary to tap larger than ¼" pipe, which means over ½" in actual size.

I found it best to drill and tap the plug itself, leaving it in place. You must drill dead center, starting with a small bit and working up to 11/32". Then use a 1/8" pipe tap. Don't run the tap in too far, at first, or the plug will go right on through the hole. I used brass plugs with screwdriver slots. Use particular caution on the plug at the bottom of the pressure relief valve, as any damage to the bore could cause the valve to stick.

John Paget, Vancouver, B.C."

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BREAKING TRADITION

Here's another innovation started by Vee drivers—not a secret, exactly, but obviously not known by everyone yet. The classic racing way of getting into a corner is to slow down first, of course, which is done by a tricky maneuver called "heel-and-toeing". You put your toe on the brake pedal and your heel on the throttle (or vice versa, depending on the location of the pedals and the joints in your right leg). You press on the brake, and (watching the tach) when you slow enough to shift down a gear you jump on the clutch, shift gears and simultaneously blip the throttle with your heel (or toe) to bring the engine speed up, and release the clutch. If you're shifting down two gears, you repeat the process as soon as your engine speed drops enough. All the while, of course, you keep your toe (heel) firmly on the brake pedal, braking right to the limit of adhesion. You also watch the shut-off markers, the start of the turn, and your mirrors. If you know your shift points, and watch your tach carefully, you won't overrev the engine. In theory, this process utilizes the engine compression to help slow you down.

Aside from the obvious difficulty of doing all this perfectly, so as to avoid damage to the hardware, there's one other drawback to this method of slowing down. You can't slow down as quickly as you're actually able to. Assuming that you have a balance bar on your dual master cylinders, and that you have juuuuust a little more braking power on the front wheels than on the rear while you're slowing down in fourth gear, you're able to decelerate at probably the maximum possible rate, but what happens when you get down into third gear? You get more braking power from the engine, of course, than you do in fourth, but it's all on the rear wheels. With the same pedal pressure, then, you slide the *rear wheels* (which isn't good) so you reduce the pressure somewhat, which also reduces the braking effect on the front wheels. In other words, you can retain maximum braking power on the rear wheels only by reducing it on the fronts. In second gear, of course, the effect is magnified even further.

What to do? Well, first, set your brake bias so that you will slide the front wheels slightly before the rears, with the clutch *disengaged.* Second, drive that way. When approaching a turn hit the brake and the clutch at the same time, casually reach for the shift lever and place it in the gear you intend to use in the corner (*either* second or third), and when you've braked sufficiently, get off the brake, dump the clutch and tromp on the throttle simultaneously, and GO!

Your braking will always be predictable, you can decelerate faster because you can always get the maximum effect from all four wheels, and it's easier on the machinery—assuming that your synchromesh is "operating on at least three gears", like the book says.

ANOTHER RACING ASSOCIATION

Next time you're racing in the rain, give a thought to the National Volkswagen Racing Association—for VW sedans, of course. By some strange coincidence the address is the same as EMPI's—Box 1120, Riverside, Cal.

PART II ON "THE NEW LOOK"

I hope this isn't boring those few of you who don't have Formcars to remodel. We'll try to throw in a few items of general interest from time to time, which will apply to any car, just to held your interest. We broke off at a rather awkward spot last month, due to the limits of space, and I see I got the cart before the horse, somewhat, as you really should make the steering shaft extension before the modified Pitman arm, so you'll have something to locate it by. Anyhow, to resume where we left off—

Now, with the box tightened in place and a ball-joint bolted to the arm, measure the *vertical* distance between the center of the axle tube and the center of the joint. Do the same on the spindle steering arm, measuring the *vertical* distance between the center of the link-pin and the ball joint. The difference is the height of the spacer you should install under the joint on the spindle arm in order to establish steering geometry which won't change toe-in under loading (braking) or rebound. If you aren't following this remodeling procedure, you might want to check this out on your car, anyhow. In this case, you may be able to establish the height, at least, just by rotating the box on the crosstube.

Don't make this spacer out of any old piece of tubing or pipe which will accept the bolt. Make it heavy enough so that when it is welded to the steering arm it—rather than the bolt—will take the stresses. Like a piece of ¾" dia. shafting, drilled to the bolt size, for instance. Bevel the upper end so that it will not foul the outer part of the joint as it rotates due to the up-and-down motion of the car. Run a bolt through it and weld it in place on the arm with a "low-hydrogen" electrode. Then, before it has a chance to cool, heat it and the entire end of

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MEMBER'S SOAPBOX

(Continued from Page 1)

First, thanks a lot for the dope on the plugs, John. We haven't done this yet—with this info, perhaps we will.

I don't know of any stone which will grind much aluminum without loading up. If there is, I hope someone will come up with a letter on that. For what work we've done on Petunia's heads we used a 3/8" rotary file, "eliptical" shape, with no trouble. We used it in a quarter-inch drill, for lack of one those flexible shafts or high-speed hand grinder. It worked fine, except that the front bushing on the drill is now pretty loose—it wasn't built for side loading.

It's pretty well accepted that actual polishing, to a mirror finish, is wasted effort. No matter how fine the finish, the air molecules next to the surface dig in between the exposed molecules of the metal and remain stationary. Those next to them move, but very sluggishly. From there on out to the center of the stream, movement is progressively faster. The "boundary layer" thickness doesn't seem to be affected much by the surface to which it is anchored—polished, or scratched. Humps and bumps large enough to change the actual direction of the air flow are something else, of course. We never went beyond the rotary file stage, which does leave a slightly irregular surface no matter how carefully you use it. It could perhaps be improved slightly by "polishing".

If I ever do it, I'll try to find a chunk of rubber about an inch each way, run a stove bolt through it, with washer and nut, for an arbor, clamp it in the drill chuck, and with the drill turning, hold it against the wheel of a bench grinder to "turn" it to a round "wheel". A knife cut, across the face, should take the end of a strip of emery cloth (obtainable in various widths and grades at most auto parts houses) which would then be wound around the wheel for several turns. The end could be torn off several times as the cloth lost its effectiveness. If it works, let me know?

PART II ON "THE NEW LOOK"

(Continued from Page 1)

the arm to a dull red and allow it to cool slowly, in order to reduce any tendency toward cracks or brittleness.

The tie-rods are made from 5/8" OD, 3/8" ID Shelby tubing, which is just right for taking a 7/16" tap. The ball joints are "Spherco" brand, which cost about 25% as much as some of those advertised by "racing specialty" houses. They have 7/16" holes and shanks of the same size. All are right hand thread, which means one end will have to be disconnected for adjustment, which can only be made in half-thread increments. They can be obtained in left-hand threads, too, if you have a left-hand tap, or want to buy one. And incidentally, on the West Coast, at least, spherical bearings must be installed with a washer large enough to retain the outside of the joint in case the inside comes unravelled—which has been known to happen. By either "dishing" the washer, or installing a spacer under it, provide room so the joint won't be in a bind at either the upper or lower limits of travel of the suspension.

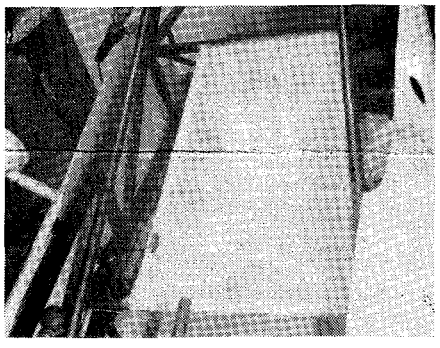
Treat your car to the very best when it comes to bolts for the tie-rods. You can get Grade-8 bolts in practically any size at any Caterpillar tractor dealership, I found. That's all they use on Cats! If they don't have your size, they can get them for you in a surprisingly short time. Thin "jamnuts" for locking the threaded shanks on the ball-joints, too.

The steering shaft extension is made from 5" of ½" standard pipe. First, weld a 1" square of ¼" material on one side of the pipe for the clamp. Fill the gaps flush to the edge with weld metal, then grind to the width of the pipe. Drill the hole for a 5/16" cross bolt next. This is a bit tricky because if you just start drilling, the drill will catch, run off sideways, and ruin everything as soon as it breaks through into the inside of the pipe. So—run a 5/8" reamer (or drill) into the pipe a couple of inches, insert a piece of 5/8" diameter rod, and then drill the cross hole. With solid metal to work on, all the way, the drill will go straight through with no trouble. Now, on a lathe, or with an expanding reamer, run the hole on out to 0.635", which is about .004" smaller than the shaft. Using plenty of STP, drive the pipe onto the shaft the full length of the fine splines. If you have the gearbox disassembled, you'll have no problem. If not, don't drive too hard, or you'll force the ball bearings into the races, forming dents that you'll feel every time you turn the steering wheel. In this case you might make the hole slightly larger, and when driving becomes harder stop, lay the whole works on an anvil and tap on the pipe all around, as far as the shaft has been introduced, so as to "cut" matching splines in the pipe. Do this in any case when the pipe is fully on the shaft, until it can be easily pried off again with a screwdriver. Then hacksaw a split in the clamp so that it can be tightened.

The U-joint is a high grade socket-wrench type. It could probably be used in its original state, except that it was somewhat loose and would have permitted some slack in the steering. The pins were ¼", but the holes were slightly larger and the ears on the end pieces fit the center block quite loosely. The holes were drilled out to 17/64" and new pins were made which were a tight fit in the holes. They were riveted in place, pulling the ears in against the block, and reinforcing them against spreading at the same time. The end of the pipe was cleaned out with a rattail file and the outside was ground to a bevel. With a bit of taper ground on the square shank of the U-joint it was easy to drive it into the pipe. Then a weld of "low hydrogen" rod completed the job. The steering shaft will be filed square to fit the female end of the joint and a 3/16" hole will be drilled through both in order to secure them. (Yes, you can drill through one of these joints—they're tough, but not all that hard.)

The arch supporting the cowl and steering shaft is far enough forward so that John's knees are behind it. Not ideal from the standpoint of the steering shaft bearing, certainly, but every inch counts. With a new 10" wheel (for better vision over the top of and more leg room underneath of) with a five-inch dish (for mounting the tach in the center of, because there's nowhere else) that was the only possible location.

The seat was somewhat of an adventure, for John, especially. (A lot of exercise, too.) The support tubes were located with him sitting on a board C-clamped to the bottom of the frame rails. Then fiberglass cloth was laid over them, hammock-like,



Formfitting seat. The front cross support is welded to the diagonal frame member—not the roll-bar brace. The upper end is wrapped around the frame cross-member.

and with John in place again the slack was pulled up at all points, wrapped over the tubes, and pinned in place with six-penny nails, as close together as possible. When the board was removed the threads in the cloth pulled somewhat, letting his derrier drop below the belly-pan line, so when he got out about half an inch of additional slack was taken out. This time the height was OK, so he got out again and a strip of fiberglass resin about half an inch wide was painted all around, on the top side of the tubing. When it hardened the nails were removed and the pulled threads in the cloth were urged back into place. Then the entire hammock was painted with resin, up to the tubes (taking care that no resin got on the outer fringe of cloth, since it would be fitted later).

Then the fun started! We used "epoxy" type resin, since we were told that it adhered to metal better, as well as to old fiberglass. We weren't told that it took forever to set up, although we began to suspect it when we had to use a heat lamp to speed up the process on the first line around the tubing. Anyhow, we painted the entire hammock and set a large radiant heater below it, and in an hour or so it started to stiffen. We lined it with Saranwrap (which isn't affected by fiberglass) and then, with an old Army blanket folded to four thicknesses (for shimming, so the seat wouldn't be *too* formfitting) John got in once more. This time he had to remain motionless for an hour and a half before the resin set up stiff enough to hold its shape when he got out. He hadn't started to smoke yet, but I've seen rare steaks that weren't any hotter!

There were a few wrinkles and humps and hollows which will be improved with fiberglass putty, but generally speaking it was an unqualified success. It fits perfectly, of course, even to a groove for John's belt. (It doesn't do much for me, though—we're both about the same height and weight, but we're certainly assembled differently!)

Another layer of cloth was laid down in resin and allowed to set up (adding a few more wrinkles and bubbles) and then the car was turned over and the outer edges of the cloth were glued to the seat itself. With strips of wood and angle iron covered with Saranwrap and held in place with C-clamps the cloth was held to the bottom of the tubes and against the tub. When the raw edges are trimmed off and the low spots are filled in with putty the whole thing will be sprayed with Krylon spray enamel.

Did I ever mention that stuff? It's the only brand I've ever found that does what it says it will on the can. It dries to the touch in about five minutes, hard in about ten, covers better than anything else, even without primer, and lasts like a professional paint job. On large areas like body panels there is some tendency for the overspray at the overlaps to dull the finish somewhat, but this could be rubbed out if you're fussy.

Oh—and I'd recommend the "polyester" type of fiberglass, too, if you have a race date coming up in the near future. It's much faster. In fact, if you get too many drops of the hardener in it, it will set up before you can use it, so don't overdo it. (There'll be some more fiberglass work, like filling in the old holes and the notches for the front suspension tubes, before you're done.)

Note that all the stuff above should be done in somewhat of a combined operation, the seat and front arch, especially. With the front suspension now "higher" you'll have to be sure you can see over it, with the nose and cowl in place. You have to have room for your knees under (or behind) the arch, and room for your thighs under the wheel. The roll-bar should be done last, so you can determine its height requirement accurately.

We got the frame pretty well taken care of last month, except for the roll bar, which is what started all this in the first place. The actual bending of the bar was covered about this time a year ago, when we were compelled to make a one-piece bar for Petunia. We might add a couple of thoughts to that, including a repetition of the advice to get it done by a shop with a bender if you possibly can. If you have to do it yourself, you'll find that it takes a very large torch to heat the new larger tubing to a bending heat, especially when it is filled with sand. This time we took an old barrel, installed a grate of old gravel crusher screen (from the local junkyard), cut a hole below it for the hose from the momma's vacuum cleaner (connected to the "blow" end, of course) and a couple of holes on opposite sides about three inches above the grate, large enough to take the tubing. A couple of large sacks of charcoal briquettes, and we had an effective forge. Get a pretty fair bed of coals started before you insert the tubing, then continue to add briquettes to keep it covered with fire. Watch closely to prevent it getting too hot in spots, like where the draft comes in alongside the tube where it passes through the holes. You'll probably have to shift it back and forth a few times. Turn off the blower when it starts to get red and let it soak until the sand, too, is up to heat. If you take it out too soon the sand will cool it rapidly. If you don't get a perfect bend around your form the first time, insert the spot you want to correct into the coals and reheat, bending it sharper here and straightening it somewhat there until you can draw a chalk outline on the floor and flip the bar over and still have it fit the same outline. The one on Petunia started out to be a true arc, (bent around one of Petunia's spare wheels held down by parking the Merc on it) but the above dope on getting an even well-soaked heat was learned the hard way. So was the bending and straightening part. It worked out fine, and we're glad it is wider than we planned as it gives some extra room alongside John's helmet.

The braces look rather odd, at this stage, but there are a couple of reasons for their location which may not apply to any other car. First, the gas tank (about three inches thick) will set alongside the seat on the left, where it would interfere with a brace running to the former location at the top of the center vertical frame member junction. Second, even if it didn't, we expect the body shell to come inboard past that point, which would require notching or slotting it. You might very well take this route, however.

Getting the original fiberglass to conform to the new shape takes some gentle persuasion, like additional mounts here and there to which it is bolted. The side panels are at the original height, but the frame is narrower. The nose is lower, but of the original width. Therefore, for one thing, the side panels will deviate away from the frame at the bottom as they go forward. If your Formcar was assembled by the book this may not present too much of a problem, but Petunia's panels were pulled in close to the frame at the bottom to start with, and a couple of inches of extra material was cut off the lower edge after it was screwed in place on the frame rails. Now we wish we had it back. Anyhow—

When you fill in the original notches for the cross-tubes on both the nose and side panels, add a couple of extra inches of material all along that edge. Most of it will be trimmed off later, but you'll need some of it. The cowl is going to be practically horizontal, so if the curve of the profile is to be maintained the nose will have to be tipped up a bit. With the cowl latched to it and laying on the arch, slip the nose on as far as it will go, at the appropriate angle, and mark the spots where it hits the cross tubes. Measure foward from each tube a distance somewhat less than the distance to the old notches, using the same distance for all four tubes. Now, using a ¼" drill, drill a string of holes close together along the lines which will be the new notches and break out the center. Clean out the notches, but don't overdo it—it's hard to make them smaller if you get them too large. A one-inch rotary file in an electric drill is great for this. Put the nose back in place and mark the spots where you'll have to grind more and repeat —and repeat—and repeat—until you get the nose into its final position.

One thing to watch here—with the exhaust megaphone extending the minimum one-inch behind the body Petunia was right at the 127" maximum overall length, so the new position of the nose must be accomplished without adding any length. If you have started following in our footsteps without waiting to see where they lead (you wouldn't, would you?) you'll have to do some measuring and figuring to determine where the rear end is going to terminate. Drop a plumb-line to the floor, measure 127" ahead of that point and mark the location of the front end, and then drop a plumb from the tip of the nose from time to time to check your progress. If you haven't started yet, simply measure from the inside of the nose back to the cross tubes

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UNCLASSIFIED ADS

FOR SALE: Crusader Vee. Original aluminum body shell, adjustable Koni steering damper, adjustable shocks (Koni front, Spax rear). Engine in good condition. Trailer with ramps, and some spares. $900 or make offer. Also, '63 V8 Chev ½ ton pickup tow car. Body fair, mechanicals good. Michelin tires and Spax adjustable shocks. Make offer. Wilkie Talbert, 38148 Smith Court, Fremont, Cal. 94536. 792-3396 or 843-6836.

FOR SALE: '67 Beach. Zink engine, konis, Z-bar, trailer. Bent in drivers school. As is, $900 or best offer. Wayne Onaka, 3433 Kenneth, Palo Alto, Cal. 98303 (415) 327-1163.

FOR SALE: '65 Ford F-100 Pickup, set up for Vee or SV. Ramps, tool boxes, 6-ply tires, ¾ ton springs, 100 mph top speed. $700, or with an almost complete Lynx kit, $1600. Jim Herlinger, 431 Adobe Place, Palo Alto, Cal. 94306. (415) 328-4982.

FOR SALE: Much modified Formcar. New shocks, many spares. Richard Neville, 700 Ruby, Apt. 113, Waco, Tex. (813) 772-1272.

FOR SALE: Zink, like new. '71 roll bar, one hour on engine, new tires, too many spares to list. With excellent trailer, $1995. Gordon Webster, 3553 Clayphil Ave., Memphis, Tenn. 38111. (901) 324-2946.

FOR SALE: Autodynamics MK5B. With trailer, $1250, or will sell less engine. Ralph Locurcio, 201 St. Clare Terrace, Tonawanda, N.Y. 14150. (716) 692-7862.

PART II ON "THE NEW LOOK"

(Continued from Page 3)

before you start and write it down somewhere.

With the nose in its final resting place, fasten it to the lower cross-member with a couple of sheet metal screws, run a temporary brace back from the arch to the top to maintain that distance, measure the inside height (it has been sprung some, in order to get it in place, no doubt) so you can insert a stick of kindling wood in it to restore that measurement, remove the nose and front-end assembly, and replace the nose. Now fit the side panels in place, screwing them to the frame in the original position toward the back, but leaving the front part loose. Here you'll have to use your own methods. You'll find you'll need supporting brackets, bolts through the side panels and nose to take out gaps, and you may even have to remodel the fiberglass in this area to some extent in order to get a smooth transition. There will be some gapping between the panels and the lower frame rails, but most of this should be covered when the belly pan is replaced—it will be trimmed to frame width at the rear, of course, but will be tapered outward to match the panels at the front. Also, you will need an additional floor panel under the pedal area, since the nose won't come back to where the cross-member used to be, and it isn't there any longer to fasten the belly-pan to, anyhow. This should be fairly heavy aluminum, like at least .040", and long enough to extend on out to the side panels for additional support.

This hasn't been a very comprehensive blueprint for remodeling a Formcar, but out of consideration for those unfortunate enough not to own one, it has been kept as brief as possible. If anyone has read it, and tries to follow it, and has any trouble, we'll be glad to go into more detail. Picture of the final result in the next issue.

MANIFOLDS

Do you have your manifold eaten out (or up!) yet? Neither do we. Besides being too busy on Petunia's rejuvenation, we couldn't find any Ferric Chloride. At several photo-engraving shops they laughed when we asked. All said about the same thing—"That stuff hasn't been used this side of Chicago for twenty years!" Seems that in the West, copper engraving plates have been replaced by magnesium, which takes a different process.

Discussing the situation with our President, Don Reich, opened up a new line of approach. He had found that Ferric Chloride *powder* can be obtained easily, and with the help of a chemistry teacher friend, he had learned how to use it. And by phoning a Seattle chemical supply house I found out just what to ask for and where and how to get it.

First, of course, you have to get your Ferric Chloride. This isn't the only source, by any means, but it's a sure one, and there's a warehouse somewhere in your part of the country. The name varies in different areas, but it's all part of the "Van Waters and Rogers" system. In the West, in your nearest major city, ask the Operator for "VWR Scientific". In the East it's presently known as "Will Scientific" but the name is to be changed to "VWR Scientific" in the near future. If you can't find either, ask simply for "Van Waters and Rogers", and tell them your troubles. These branches are suppliers of scientific lab-type chemicals, as compared to the parent company, which is more closely related to industrial chemicals.

OK, you've got them on the phone, so you ask for "Anhydrous Ferric Chloride, Technical Grade". There's also a "reagent" grade, which is certified pure for laboratory analysis procedures, but it's much more expensive. "Technical" grade is also called "photographic" grade, so is presumably pretty good stuff.

Packaging will vary somewhat, at the different locations, but at the Seattle outlet, for example, it comes in 1 lb. ($1.35), 5 lbs. ($3.55) and 25 lbs. ($10.90) packages and 100 lbs. ($30.80) drums. It is in dry form, and can be sent by Parcel Post or United Parcel Service. They sell to anyone (you don't have to be a dealer or commercial account) and this establishment, at least, will ship COD. It might be smart, just to simplify things, if you made arrangements with your local druggist to order it on his account, in case the company in your area is reluctant, though.

When you get the stuff, make a solution of 6-2/3 lbs. of powder in enough water to total two gallons of solution. This should have a specific gravity of 1.41, which is the equivalent of the "42 degrees Baume'" specified in Walter Striedieck's January article. I doubt that the exact proportion is all that critical—you may have noticed that 6¼ lbs. would make four batches from a 25 lbs. order, and probably a 5 and a 1 lb. package, with a little less water would do the job, too, if you wanted to gamble on getting it right the first time.

There! You're on your own—unless you want to wait until we try it first, so you won't have to go through our mistakes. There may very well be some "don'ts" that we'll learn the hard way.

Oh—we still have about 20 of those steel balls. Read that paragraph in the January issue again, though—they're 15/16", *not* 61/64, as some have read it.

OTHER REGIONS PLEASE NOTE!

". . . The FV class designation sticker which FVI distributes *is* acceptable in the San Francisco Region. I wasn't aware that any of my crew was being *that* strict! . . . Keep using your present size—I'll correct my crew's overenforcement."

Frank Schultheis, Chief Scrutineer
San Francisco Region"

Our sticker is also accepted by the International Council of Sports Car Clubs, and has never been questioned in the Northwest Region. Any difficulties anywhere else?

Will have some more from Frank on Atlanta and scrutineering in general in the next issue.

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