

The Mo-Hud

Knockoff



NEWSLETTER OF THE MOHAWK-HUDSON REGION SPORTS CAR CLUB OF AMERICA (Mo-Hud)

October 2016

The REport

Falling into Autumn- I believe that by the time you read this, it will officially be fall. For those of us that choose to remain in the northeast that means the 2016 racing season is coming to a close. While not wishing away the next few years I have to say Trish and I are incredibly jealous of those MoHud members who are retired (yes, this means you Thom and Pete and Jack) and spend time in the Florida sunshine racing while we're stuck here in the snow and cold of winter. Mine and Trish's racing adventures have been well documented in the pages of this newsletter this past season...from Rockledge, Florida to Alton, Virginia to Loudon, New Hampshire, Watkins Glen, and Pittsburgh, Pennsylvania, it has been a heck of a season.

But don't think that the MoHud season is over yet. We still have an autocross event or two to be run, the John Stim race at Thompson, CT on Oct 7-8 and a Tire Rack Street Survival event at the Saratoga Auto Museum on November 6. And let's not forget our end-of-year awards banquet and annual meeting on Saturday, December 3 (more details to follow).

National championships- MoHud had several drivers competing for championships at the Solo Nationals and Runoffs. Andy Furlong, Ken Hurd, Arn Beebe and Jim Garry went to the Solo Nationals. Jared Lendrum, Charlie Campbell and George Kline were at the Runoffs. Whether you finished first, last, or somewhere in between I applaud your commitment of time, talent, and resource and your sense of adventure and competition. Congratulations to you all!

For the good of the sport,

- Jim Bucci -

Coming Events

- **October 5:** Wednesday, 7:30pm. MoHud Membership Meeting. Orchard Tavern, 68 North Manning Boulevard, Albany.
Contact: Jim Bucci hdjimbu@gmail.com
- **October 7 - 8:** Friday - Saturday. MoHud John Stim Memorial Races in cooperation with New England Region regional races at Thompson Speedway Motorsports Park, Thompson Connecticut. Double points for MoHud members.
- **October 9:** Sunday, 8:00 – 5:00. MoHud Solo Points Event #6. OGS McCarty lot, Thruway exit 23.
Contact: Russ Burckhard russtduck@gmail.com
- **November 2:** Wednesday, 7:30pm. MoHud Membership Meeting. Orchard Tavern, 68 North Manning Boulevard, Albany.
Contact: Jim Bucci hdjimbu@gmail.com
- **November 6:** Sunday. **MoHud -Tire Rack Street Survival school for teens.** Saratoga Auto Museum grounds.
You should be planning to give a hand.
Contact: Jim Bucci hdjimbu@gmail.com
- **December 3:** Saturday. MoHud annual meeting and awards banquet. German-American Club. More details to follow.
Contact: Eric Smith ejvo8@gmail.com

The MoHud bus is not an “autonomous vehicle”...

...nor is it likely to be an anonymous vehicle



*Naming rights and sponsorship ad spaces are available. Contact: Jim Bucci
hdjimbu@gmail.com*

Help Wanted



When: Sunday, November 6th, 2016, 8:00am – 4:00pm
Where: Saratoga Auto Museum 110 Avenue of the Pines
Saratoga, NY

Volunteers are needed to shag cones, assist with registration and lunch and to be in-car coaches. Please consider spending a day helping to save teen lives.

Help with course set-up would also be appreciated on:
Saturday, November 5th, 2016 at the SPAC Lot, Route 50, Saratoga, NY
Time: TBD

We need your help to make this a successful event. In addition to volunteering during the event weekend, you can help by sharing information about Tire Rack Street Survival with your family, friends and co-workers. We have flyers available to hand out, post on bulletin boards, or to send through email.

For more information, Jim Bucci: jjbucci@hotmail.com or

Trish Bucci: trimar71@gmail.com

SOLO Report: August Event

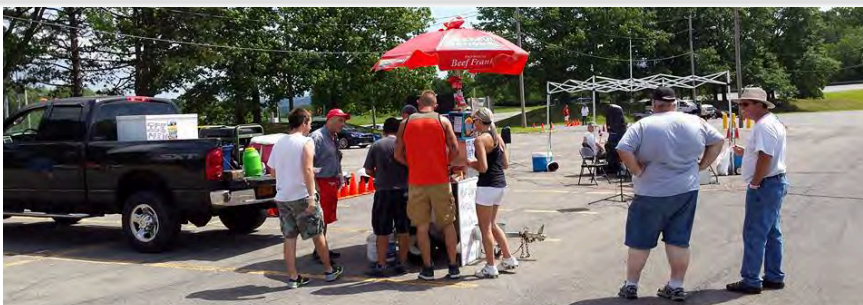
We held our fourth point's event of the season on August 24th. The weather for this event was quite a bit different from what we have been having. It was a constant struggle with the wind. In an effort to keep the tent from ending up either broken or in another county, we took the top off. This worked well until it started to sprinkle. So the top went back on. The sprinkle was short lived and the wind was relentless so the top came back off. Another sprinkle came through so the top went back on. This time we left the tent at the lowest setting to keep it out of the wind. This was a good compromise and worked for the rest of the event. The showers we had were short and light enough where they didn't wet the course so the event was not affected by them. It did finally start raining, but that was after we were loaded, the lot was checked for trash, and we were just hanging out talking.



57 competitors came out to run out of which 14 were listed as novices. During the novice walkthrough I asked how they found out about us. The two basic answers I heard were either "on the web" or "referred by a friend." Our efforts to entice people from Guptil's have not panned out so far. We have had a lot of interest, but no entries as of yet. On August 14th Johnathon and I worked the Tuner in the Park car show at the Saratoga Auto Museum. Tracey brought our car up, put our competition stickers on the Focus, and entered it in the show. While she was there, she talked to many people and handed out a bunch of flyers promoting the club. While I don't believe we had anyone come and enter our event, we had a few show up to check out what we do (thank you for your efforts Tracey).

Course designer Jon Kirschman was handed a curve ball at this event. Someone had parked their Jeep in about the worst possible spot in the lot. His design could not be laid as he planned, so he made one up on the fly. He did a good job. The result was a short, technical, and fun course. Competitors' times ran from the low 20's to the low 30's. The FTD and top Pax was set by the same person: Ian Morse driving the 89 Raptor F Mod car to the top of both lists with his run of 22.816. The fastest fendered car was Andy Furlong in the Atomic Rabbit, running a 24.777. The top of the Pax list belonged to Ian Morse with Jon Staude just .06 behind in his 89 Honda Civic. Andy Furlong held third, Jose Martinez ran fourth, and Tom Taft rounded out the top five on the Pax list. Top class winners were Jon Staude in the Pro class, Jose Martinez in Street, Charles Dickenson in CAMS, Ian Morse in Prepared/Modified, Adam Torrey in Touring/Modified, Austen Levesque in Street Prepared, and Johnathon Burckhard in Kart. Full results can be found at <http://www.mohud-scca.org/solo/schedule-results/>

Update on the bus. We finally have graphics. Thanks to Mike Squier at [Squier Design](#) for working with us to get this done.



A whole new meaning for the phrase "there are a couple of hot dogs out on the course."

Competition Report

Jack Hanifan starts us off:

Jersey Majors- the MoHud highpoint was Charlie Campbell driving Pete Smith's FP Miata. The Tom Campbell sponsored car was waiting for a new motor, so Charlie used Pete's car with a setup change from Tom and had a 1st and a 2nd to gain enough points to clinch the North East Majors Conference.

Rest of the Year-The season is coming to a close with many off to the Fun One at WGI and by the Runoffs at Mid-Ohio.

The MoHud/NER race at Thomson in October will finish the season. Remember this race counts double in the MoHud Points Championship.

Update by the Editorial Staff: The "Fun One" wasn't. Jack got clobbered at the start of his race and Jim Bucci got clobbered on the last lap of his. Jack OK; Jim was sore in several spots, but feisty, at the MoHud Board of Directors meeting a few days later. Both cars will require lots of rehab over the next few months.

MoHud at the 2016 Big Ones

SCCA Solo Nationals, Lincoln Park, Lincoln Nebraska:

Heading to Lincoln were MoHud members Jim Garry, Ken Hurd, Arn Beebe, and Andy Furlong. A total of 1,305 drivers in 70 classes completed runs over two courses for a new event participation record.

Andy Furlong, driving his green '84 Rabbit finished 11th in E Prepared, while Arn Beebe in his '89 Mustang finished 36th in C Prepared. Unfortunately, the transmission in Jim Garry's car refused to work according to spec, so he and Ken Hurd missed out on the fun. Andy's journal can be found in the supplement to this edition of the KO.

SCCA National Champion Runoffs, Mid-Ohio Sports Car Course, Lexington, Ohio.

MoHud had three drivers qualify for the Runoffs, Jared Lendrum, Charlie Campbell, and George Kline.

Charlie finished 24th in the Spec Miata race (1999 Miata), while working up to 3rd in the F Production race (1993 Miata). Third! That's a Bronze Medal in the Olympics; something to really brag about. Jared came in 5th in Touring 4 (2013 Subaru BRZ). George was disappointed not to make the big show.

The Runoffs encompassed seven days of tech, practice, qualifying and racing. Tom Campbell, another of the Campbells of Corry, Pennsylvania, wrote a report for each day, and we will include them all in KO Journal supplements over the next few months.

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These narratives are super for the perspective they give on their own experiences as well as insights as to competition in the big leagues. We look forward to additional reports, and hope all MoHud members enjoy them as much as the editorial staff has.

SOLO Report: September Event

We held our fifth point's event of the season on September 25th. The weather for this event started cool but warmed up nicely. After early temperatures in the 40's, they climbed up into the 60's. Clouds were pretty much nonexistent all day and there was a slight breeze but it wasn't enough to even notice. Because of the cool temperatures in the morning, we decided to set timing up in the bus. This worked out great. There was plenty of room and the visibility was better than expected. We were able to put the display on the roof and it was visible to just about the whole site.



Photo: Chuck Dickinson, Jr.

61 competitors came out to run. Unfortunately two cars did not pass Tech. To make matters worse, both of those cars were two driver cars so that dropped us to 57 entrants. Hopefully those cars can be fixed for the next event. We picked up a couple more novices as 18 of those entrants were listed as novices. The four that did not pass tech were also novices so we would have had 22. This is the most we have had this year. *And the hot dog vendor showed up again.* During the heat changeovers he had a line -- the competitors were glad to see him. A girl riding by saw us in the lot and also spotted the hot dog cart. Since she was hungry she stopped to get a "dog" and to find out what we were doing. We wound up giving her and her uncle a ride, and I expect that they might come back to try and compete.

Jon Kirschman continues to do a good job with the course designs. A nice challenging course that started with a slalom and serpentine to the finish. Even with the Slalom, cone counts were low. That is until my first run when I went in too deep in the final corner and hit more cones than the first half of the heat combined.

Competitors times ran from the high 20's to the upper 30's. The FTD was set by Ian Morse in his 89 Raptor F Mod car running a 26.620. The fastest fendered car was Andy Furlong in the Atomic Rabbit, running a 29.068. The top of the Pax list belonged to Jon Staude in his 89 Honda Civic followed by Ian Morse. Phil Reddington held third, Saul Morse ran fourth, and Andy Furlong rounded out the top five on the Pax list. Top class winners were Jon Staude in the Pro class, Sean Thompson in Street, Charles Dickenson in CAMS, Ian Morse in Prepared/Modified, Adam Torrey in Touring/Modified, Newlywed Adam Wright in Street Prepared, and Johnathon Burckhard in Kart. Full results can be found at <http://www.mohud-scca.org/solo/schedule-results/>

Thanks again to Mike Squier at [Squier Design](http://www.squierdesign.com) for the bus lettering. It made its debut at the event and was well received.

- Russ Burckhard -

Upcoming Solo Eevents

Oct-09	MoHud Points event 6	Season Finale	McCarty Ave
Oct-16	Poughkeepsie Sports Car Club	http://www.pscncy.com/schedule/	Lake Taghkanic
Oct-16	AMEC/ Trivettes	http://icerace.com	Edinburg NY

Membership Report

As of September 12th, Mohawk Hudson Region's membership count is at a very healthy 537, holding steady over the past month.

We had six new members between August 22nd and September 12th. Their primary interest, if offered, is listed:

- Jim Garry -

New Members

Kristina Gloskey	Watervliet	Solo
Stephen Pawlik	Scotia	Solo
Cynthia Grabski	Mohawk	Club Racing
Lauren Grabski	Mohawk	
Richard Grabski	Mohawk	
Steve Grabski	Mohawk	Club Racing

Significant Anniversaries

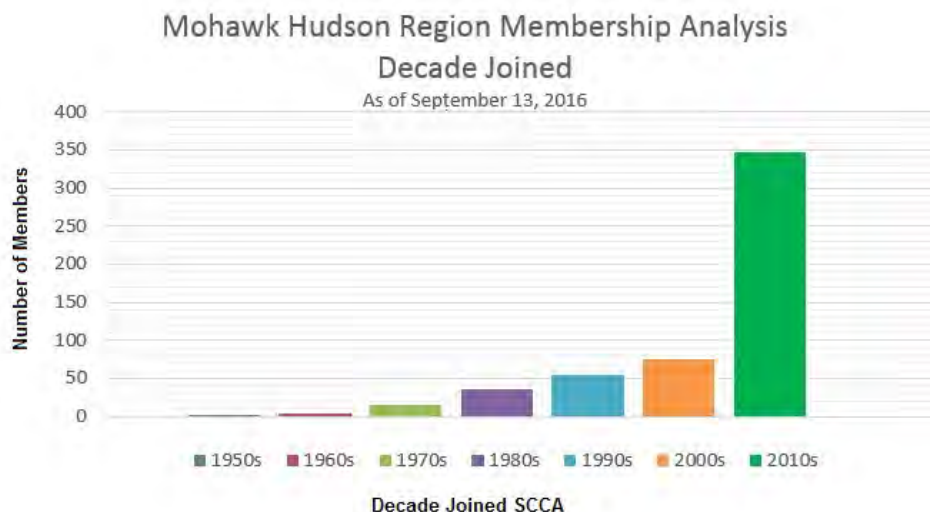
Five Years

Lindsey Burckhard
William Jandrisits
Raymond Rankins
Anita Hanaburgh

Ten Years

Jeff Kanetzky

Analytics



General Membership Meeting Minutes, September 7, 2016

Orchard Tavern: Call to order 7:30 pm

Treasurer's Report- given by Todd Boice.

Membership- it was noted by several members that Mohawk-Hudson Region is #1 in growth in the SCCA for our size region...yeah MoHud!! RE Jim Bucci commended members Russ Burckhard and Jim Garry for their continual efforts at "selling" what we do and encouraging new people to join.

Solo-- Russ related that there have been three events since June and all were well-attended. There are two events remaining this season. Solo Nationals are going on this week and MoHud has four drivers competing - Jim Garry, Andy Furlong, Ken Hurd and Arn Beebe.

Street Survival - Second and final event of 2016 is scheduled for Sunday, November 6th with set-up on Saturday, November 5th. This event will be held at SAM/SPAC. Help is needed with set-up and during the event on Sunday, details in this issue.

KnockOff - Editor Paul Malecki reminds everyone the deadline for submissions is the 15th of the month. RE Jim Bucci commended Paul for doing a great job with the KO, thank you, Paul!

Activities - Director Dick Stewart reports nothing scheduled at this time. A suggestion was made that we could attend an Albany Devils and/or Valley Cats (next year) game as a group. Dick will look into this.

Competition Report - Jack Hanifan gave an update about recent races MoHud members competed in and also reminded of upcoming races, including the John Stim Memorial in conjunction with the New England Region race at Thompson Speedway October 7th and 8th.

Old Business - RE asked if there had been any recent contact with the RPI Formula SAE team - Eric will reach out to them.

New Business -Motion was made to provide "tow money" for MoHud members attending the Solo national championships and the Runoffs, discussion followed, the motion was amended and then tabled until the next membership meeting and confirmation from Treasurer Todd Boice about whether or not money was put in the budget for this.

Year-end banquet - Eric Smith reports that we are booked at the German-American club for Saturday, December 3rd. Look for details in an upcoming KO.

There will be a Board meeting on Monday, September 26th at 7pm at The Orchard.

Meeting adjourned at 8:14pm.

- Trish Bucci -



Future Race Car Engineers:

The RPI Formula SAE team tire-testing in the Oakwood Christian School parking lot on September 17th. They are ambitiously designing their 2017 car with a lighter engine and more carbon-fiber; they hope to use CFD on the RPI supercomputer for aero tweaks.

Learn more about Formula SAE at:

<http://students.sae.org/cds/formulaseries/>

Mo-Hud Officers and Contacts

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SOLO Chair

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For more information about the Mohawk-Hudson Region SCCA, and membership in the Sports Car Club of America, go to < <http://www.mohud-scca.org> >

Membership meetings of the Mohawk-Hudson Region SCCA are held on the 1st Wednesday of the month, excepting July and August, 7pm, at the Orchard Tavern, 68 North Manning Boulevard, Albany.



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The KnockOff Journal

This Month...

- A Journal from the SCCA Solo Nationals
- Driving on the Limit



SCCA Solo Nationals, Lincoln Park, Lincoln Nebraska; reported by Andy Furlong; 1984 VW Rabbit, #17, E Production.

This was my second visit to Lincoln. I left bright and early (ish) at 7:30 on Sunday, 9/4 for the 1300 mile trip to Lincoln, NE, my 52nd birthday as it happens. The trip was fairly uneventful with just over 800 miles day one and 500 the second, arriving at about 2:30 on Monday afternoon. I saw my first competitor heading to Lincoln only 500 miles in this year, a CSP Miata from NY.

I was able to find my paddock spot, get the car unloaded and the trailer parked, and in line at registration within the hour and by 5:00 had the car inspected and found Arn Beebe over at the practice course and hung out with him and Diane for a bit to learn the course for my runs Tuesday.



Illustration 1: My rabbit in paddock. The trailer next to me contains a new NSX being run by Honda Racing people

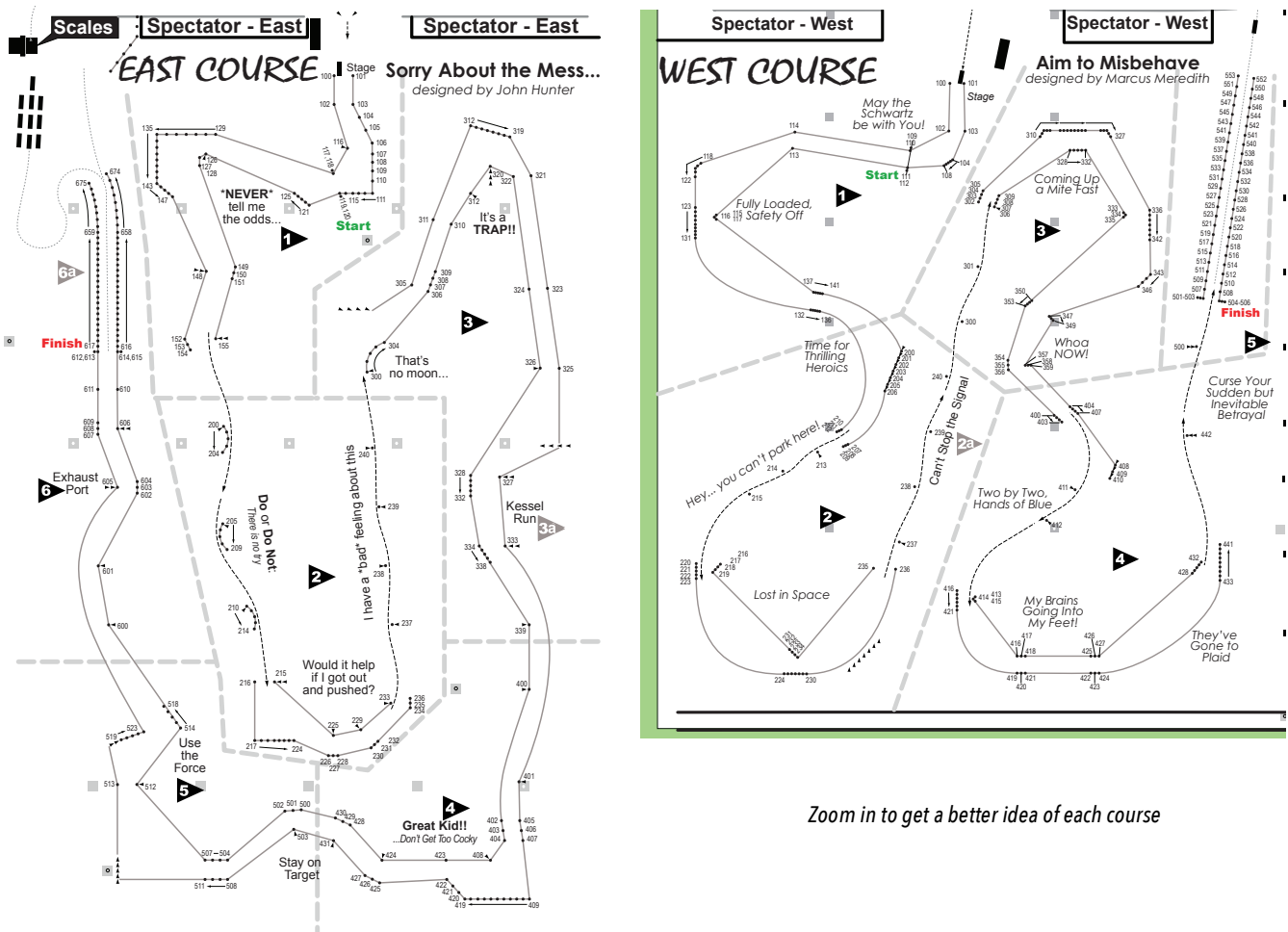
Arn and Jim Garry were paddocked with New England Region many rows down from my spot and I stopped to say hi to Jim on my way to go walk the Nationals courses. Jim and Ken Hurd were working on Jim's B-mod and it took me a few minutes to realize they had taken it apart, not a good sign. They explained the transmission had gone boom and they were going to take it to a local shop to see if it could get fixed. B-mod runs Tuesday/Wednesday and they knew it could not get fixed that fast but would instead run in A-mod on Thursday/Friday. They got the car packed up and hauled away, leaving only their bikes behind to mark their spot.

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>>> Andy, contd

Sadly they got the transmission back together on Thursday but it was not right and they did not compete at all. It became a ritual every time I saw an NER person to ask if they had any word from Jim and Ken and any signs of progress or hope. I tried to convince people that they were probably kidnapped and hanging on a wall somewhere being forced to make posts on social media since no one had seen or talked to them since they drove off site, but nobody was biting.

The two courses are very different. The East course is longer and narrower with fast speed maintenance elements feeding into some slower tight elements. The West course is more square with less speed variation but lots more medium speed elements with a fairly fast finish section.



Zoom in to get a better idea of each course

Tuesday morning I walked the West course a few times (I was running West first, then East on Friday) then went out to the practice course for my first runs and to break in the new set of tires. I thought the course was pretty good except for the bump that threw my car sideways a few feet in a medium speed right hand sweeping turn. It looked like I was turning some decent times and the car felt pretty good. I had made a change the day before coming out, removing the front sway bar to reduce understeer and adding some spring to keep it from rolling too much. Despite the wisdom of not changing the car just before a big event, it felt like it was working well so I kept the changes. I did bring everything to put it back to the previous setup if I did not like it.

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>>> *Andy, contd*

I got done with my runs and went over to the West course where Arn and his co-driver Jeff were just getting started on their runs. The course looked to be a lot of fun but with a lot of people hitting many cones. Jeff finished ahead of Arn for the day. When they got done I went and got ready for a second set of runs on the practice course. I was running about the same times as earlier and was mostly trying some different lines to confirm my assumption that with the big courses, keeping speed on the fast sweepers saves more time than keeping a tight line. The timer said I was right. With the small lot we have in Albany I don't get to run such big sweepers much and it's easy to forget and revert to the small lot, tight line technique and lose too much speed. I then got to spend a couple hours scraping used rubber and seam sealer off my tires to get them ready for Thursday.

Wednesday was forecast to have rain in the morning so I did a couple walks and got everything closed up, then went to hang out with Arn and Jeff in grid. They were running second heat and the skys opened up on first heat third runs and it was absolutely pouring when second heat started. I was Arn's umbrella person and kept the rain out while they got ready but that was the only help I could offer. Arn does not have rain tires; 12" slicks, 450hp, and 2900lbs combined with deep water equals very hard to drive and very slow. By second runs it stopped raining and times started to drop. By third runs times were way down but both Arn and Jeff had off courses on their last runs and had to stand on their very wet runs.

Thursday morning I got in one last walk, it was very grey and I decided to load up the rain tires just in case. While walking the course, a line of weather came through, grey and overcast on one side, bright an beautiful on the other. I've never seen weather make a single line, horizon to horizon, sadly it was not to be the only time. There were 16 drivers signed up for EP this year, but several cancelled at the last minute and there were only 13 in Lincoln, a bunch of Hondas, Mike Steere's Focus, and **TWO** VW's, my Rabbit and a Scirocco.



Illustration 2: This line ran horizon to horizon with perfect weather coming in for the day

My first run was OK, clean but with a number of mistakes. Mike came in right behind me with smoke coming out. We grabbed my toolbag and looked to see what it was. A power steering line had failed, his car was out for the day. Brian Levesque was co-driving with Mike and I told him to see if he could fit in my car. He tried it and said it was good so he went and got himself changed over to my car, I gave him a quick primer on my Rabbit (he's seen it lots of times at NER events but never driven it before) and he went out for his first run. He came back 0.2 seconds out of the lead! Did I mention that Brian is a much better driver than I am? He ended up 6th only 0.7 seconds out of the lead, I ended up 10th, about 1.5 seconds back from Brian.

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>>> *Andy, contd*

After Brian drove, I was thrilled to see how close my car can be to the front and was pleased that I was over a second closer to the front than last year. By the end of runs Mike had gotten a new hose ordered and it would be there in the afternoon so both of them would be driving Mike's car on Friday. Brian thought he made a few driving mistakes and would have liked to make some setup changes to my car but in general found it to work well and be fast. Woohoo, my car is still fast, I just need to make me fast again!

Friday morning was grey again but rain was not forecast to hit until afternoon. I brought my rain tires along anyway, just in case. Besides, a pair of them make a nice place to sit in grid. My first run had a cone and was not particularly fast. My second run had the same cone and was only slightly faster. I was not in sync with the course or my car and could just not get the course to flow smoothly. My last run I focused on at least staying clean but it was also my slowest run. The good feelings from Thursday were gone and I dropped to 11th place. Better than the 13th place from last year and about 125 places higher on the overall index.



Illustration 3: EP grid and a DSP RX8 on a grey Friday morning

Friday after lunch I reported for my work session, Impound for the 5th heat. I actually started working just after 4th heat got running and ended up releasing 3rd heat, East course from impound. The skies were getting much darker and the weather reports were looking bad. I had the car loaded and the truck packed so I parked near Impound and brought my rain gear along. As 4th heat ended and 5th was getting started, another line appeared in the sky. The far side was very dark and ominous. I went to the East course timing trailer to get the 4th heat results and release them from impound but a serious wind storm hit just as I got there and started blowing the cones and timers all over. They were suddenly way too busy for me and I went back to Impound. Then the rain and lightning hit. They shut everything down quickly and got everyone off course to safety.

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>>> *Andy, contd*



Illustration 4: Oh look, another huge, straight line of weather change! Batten down the hatches

They tried several times to restart the heat but the rain and lightning kept coming back. It was almost three hours before it could start back up again. I was able to get the 4th heat West people released from impound in between storms. The East 4th heat left during the first rain without being officially released, many of them were open cockpit cars with no rain protection so we understood. We then heard that the decision was made to restart the heat from the beginning and throw out the dry runs that some had gotten. The last runs finished at about 6pm, the heat had started around 2. Then the protests were filed about tossing the first dry runs, fortunately that involved people higher up than me ,so I was able to finish my work assignment shortly after 6.

After hours of standing in the rain I had no interest in going to the awards banquet so I went back to my hotel, got dry and got some dinner and made an early night of it. Saturday morning I was on the road by 7am and made it to Toledo, Ohio on day one and then made it home at 5:30 Sunday for an equally uneventful ride home.

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On the ride home I came up with several things I can do to make my car faster and easier to drive for next year: move the seat a bit, brake and suspension changes, and change the clutch-limited-slip differential for a torque-biasing gear type. I need to look at how I can get focused better on the course both when walking it and when driving. And I need to run more places that have bigger open, faster courses. I will definitely be going back to Nationals to see if I can continue to improve each year.

-- Andy Furlong --

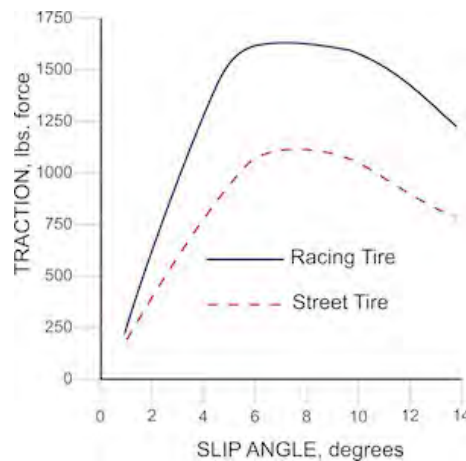
The BIG Question

by Ross Bentley

“How do I know when I’m driving the limit?” If that’s not the BIG question, then I don’t know what is!

My goal for this article is to answer this BIG question in the most concise and useable manner possible. But keep in mind this is not only a BIG question, but a BIG topic.

Let’s start with a quick recap of what “the limit” is. Looking at the graph below of slip angle versus traction, you can see that a tire builds grip as it slips a little, peaks, then begins to lose traction. The shape and peak of this curve is different for every type and size of tire, but the basic characteristics are the same – the tire gains grip the harder it’s pushed until it peaks and begins to taper off. A high performance tire, such as a racing tire, will typically have a higher limit, but will be less progressive, and therefore the grip will taper off quicker; a lower performance tire will have lower limits, but a flatter peak. In other words, it’ll be more progressive.



You can substitute g-forces for slip angle in a comparison against traction, too, and the graph will look very much the same as above: tire grip builds and then relaxes.

You feel that, right? You feel the g-forces build and then taper off or relax. You know, at a gut level, that tires work this way – they gain grip the harder you drive, but eventually relax their traction. And most important, you know that once a tire reaches its limits, it doesn’t immediately lose all grip. It’s not like you go from lots of grip to absolutely no grip. Instead, it gradually tapers off.

You hear it, too. Tires sound different at different points along this graph. Squeal may be too much. Howl may be close to limit. No sound may be below. You need to calibrate the sound you hear to what you feel. Some drivers will say they can’t hear their tires. That may be true with a very loud engine or tires that don’t make as much noise as others, but in most cases, when these drivers really focus on what they can hear, the sound of the tires is evident.

You sense yaw visually. If you’re looking way ahead and your car begins to yaw or rotate (think of this as looking directly down on your car from above, and it rotates around the center point of your car), what you see on the horizon will change dramatically. And that gives you a hint of how close you are to the limit. Then, when you calibrate what you see with what you feel and hear, you’ll become more sensitive to where the limit is.

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Limits, contd...

Of course, the only thing holding your car on the track surface are your four tires, and that's why the understanding of your tires' characteristics is so important. And you can see that with experience, and deliberate practice of sensing what you feel, hear, and see, you'll develop the ability to know how close your car is to the limit.

You can sense the limit, but you can also raise or lower the limit. It's not just sensing and driving the limit, it's managing the car to maximize the limit. See, it's one thing to drive the car at the limit, and it's another to manage the car - weight transfer, angle/direction, application of controls - to maximize the limit. Let me explain it this way: If I come up to a corner, abruptly release the brakes, quickly crank the steering wheel, then slam down on the throttle, the car will be at the limit - but a lower limit than if I did all of that smoothly. It is a limit, but not the limit.

And, just when you think you're driving your car at its limit, you might find that someone else can hop in it and go a little faster. You may have been driving at a limit, but not the limit, because you didn't have your car balanced in a way to maximize traction.

As humans, we're pretty good at pattern-matching. That is, we see, feel or hear something a few times and then can notice the pattern. When you feel "that" amount of g-force pushing against your body, you hear "that" sound from the tires, and you see "that" amount of yaw... put together, you recognize "that" pattern as the limit. That limit - the combination of the pattern of what you see, feel and hear - will change slightly, depending on the track (i.e., surface, elevation changes, banking in the turns), and speed, if your car has any amount of aerodynamic downforce. But with experience, you recognize these changes, too.

So, let's look at four things you can do to sense and drive the limit more consistently:

- If, in the middle of a corner, you turn the steering wheel more and the car reacts immediately, you're not at the limit. If you turn it but the car doesn't completely respond, the tires are slipping. Too much and you're beyond the limit; too little and you're not at the limit yet; just the "right" amount and you're driving the limit.

- If you can change the direction of the car by applying more or lifting off the throttle, the car is close or at the limit. If you lift and the car doesn't do much, you're below the limit; if you apply more throttle and it doesn't do much, you're not at the limit. If you adjust the throttle and the car reacts, you're at or close to limit.

- Pay attention to the g-forces building up and then relaxing. Be aware of how the forces against your body increase, peak (sometimes maintaining that level for a while through the corner), and begin to taper off. If you're unwinding and straightening the steering as the g-forces taper off, that's probably a good thing. But if you still have a lot of steering angle in the car, and you feel the g-forces taper off, that's a sign that you're over the limit. Practice feeling for the building, peaking, and tapering off of the g-forces.

- Make the car do something. This is a Speed Secret I've mentioned many times before (especially as it applies to driving in the rain), but it's critical to the topic of driving the limit.

That last point, making the car do something, is critical to consistently driving the limit. Mark Donohue once said that while exiting a corner with the car on the limit was like walking a tightrope, turning in at the limit was like jumping onto a tightrope, blindfolded.

Warning: This last point is not for novices, and maybe not even for intermediate drivers. "Slow in - fast out" is good advice to follow if you're relatively inexperienced. But once you're able to slightly over-drive a car without spinning off the track, you'll want to work on "fast in - faster out." And that requires entering corners slightly faster than you sense the car can take, and then adapting to it. In other words, go slightly beyond the limit, and then dial it back. If you find that you're over-driving the corners too much, and you're slow to accelerate out of corners, then you've gone too far.

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Limits, contd...

Of course, it's one thing to be able to drive the limit in one part of a corner, and it's another to be able to do that throughout an entire corner... and an entire lap. Driving the limit at every little bit of track is what separates the best from the rest. That takes mental discipline, a finely-honed sense of the limit, focus, and well-defined skills. Which are topics for future weeks....

"We broke something. I think it was traction." - Carl Edwards, when asked what put him out of a race.

To consistently drive the limit, you have to step over it every now and then. I've heard people give this advice to drivers: the only way to know where the limit is is to crash the car every now and then. I don't buy that. But I do buy the fact that you have to go over the limit at times. You can go over the limit without crashing the car, though. That's the important message - and your goal.

My point is that before you can consistently drive the limit, you have to be able to drive beyond the limit. Once you've driven beyond the limit, and kept the car on the track, it is much easier to dial it back a little, back to "at the limit."

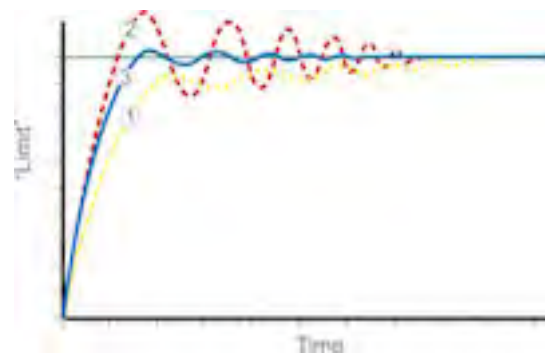
Many successful autocrossers use this approach to the three runs they get: the first one is a little conservative, just to learn the course; the second run is driven beyond the limit; and the third and final run is dialed back just enough so that the car is as close as possible to its limit. If the driver never over-drove the car and course on the second run, it's likely that they wouldn't get to the limit. If you can't overcompensate, or over-drive, you'll never be able to home in on the limit. If you can't over-drive the car, you'll never be able to drive the limit consistently.

Some drivers can do this for one corner or one lap. But to do this consistently, lap after lap, is the goal, right? For many drivers, it's keeping the car consistently at the limit. In the graph below, there are three different drivers' approaches to driving the limit. Number 1, the yellow line, creeps up on it slowly, taking small steps. Number 2, the red line, takes big steps, often going way beyond the limit. Number 3, the blue line, takes medium steps, going slightly beyond the limit and bringing it back, homing in on the limit. If your goal is to drive the limit, then the approach shown by the yellow line is not going to cut it... if you want to consistently drive at the limit, then you're going to need to be a little more aggressive in your approach to reaching it.

The problem with the approach shown by the red line is some of the peaks are way beyond the limit. In fact, they may be so far beyond the limit that a crash is imminent.

Sure, the blue line approach requires a well-developed ability to sense the limit, but if you use the suggestions I made in my main article, you'll get there.

What's most important is to practice sensing the limit in a very deliberate way. I also highly recommend using the Sensory Input Sessions that I've written about in the past, as well as in my books.



Reprinted by permission from Speed Secrets Weekly by Ross Bentley, a performance coach, race car driver, author, and speaker. An Indy Car driver in the 1990s, he continued his professional career in endurance racing. Bentley won the 1998 GT3 United States Road Racing Championship and the 2003 SRP11 Class Rolex 24 Hours of Daytona. Thanks to Jim Garry for arranging this permission.
