

# BLUE HAT WITH A CORVETTE!

## RICK HARDEN'S 300.4 RECORD AT 2020 WORLD FINALS

### AN INTERVIEW WITH RICK AND HOLLIE HARDEN

By Bill Hoddinott

Rick and Hollie Harden of Spring, Texas, acquired their '92 C4 Corvette as a record-holding Bonneville racecar in 2014. That year at World of Speed, the very first meet to which they took it, DISASTER STRUCK!

At about 240 mph, the left rear tire ran over some junk on the course and BLEW! Instantly the car turned around backwards, leaped in the air, turned around again, did a back flip and came down nose first, partially disintegrated, and finally came to a stop after a wild ride for Rick!

There was no fire and the roll cage and all the safety equipment held the driver safely in place, so he walked away from the wreck with no injury except shock with a severe shaking. There are two videos by William and Steven Clapp of the crash on YouTube. It tells the whole story. Search on YouTube for "Corvette Blows a Tire at Bonneville" to see it.

Nothing daunted, Rick and Hollie took the wreck back to their home shop and over the next year, rebuilt it entirely back to better condition than ever. The front and rear frame sections were badly bent, body panels smashed along with the drive train, exhaust, suspension and wheels; all destroyed along with a long list of other important performance parts. Fortunately, the center section of the car escaped damage thanks to Rob Freyvogel at Carbinite and the 2" heavy duty roll cage.

Rick and Hollie have had their own general auto and truck repair business in Spring since 1995 and have gone far beyond the ordinary repair business into the restoration and race prep of late model and vintage sports cars. Thus, they have had wide-ranging experience with high-performance equipment, fabrication and upgrading new and old racecars. Along the way they have mastered all forms of production car and racecar electronics, which are such a critical factor today; especially with the turbochargers such as their Corvette has for its Chevy Big Block-based race engine. Rick is essentially qualified to build a racecar entirely from scratch, since that's what his rebuild of the C4 amounts to.

The car was ready for Speed Week in 2015, but the meet was canceled. In 2016 the team was out there again and they Qualified on the record, but the 4L80 Chevy truck automatic failed on the Return run. The fury of the 1500 horsepower engine was too much for it. In 2017 they got into the Bonneville 200 MPH Club with a 261.95 mph class record in A/Blown Fuel Modified Sports. The next year at Speedweek 2018 with the best salt conditions they have ever seen, they raised this class record in A/BFMS to 269.325 mph with damage to the turbos! Hollie and Rick put in some overtime to get back to Texas to replace the Bell turbos, reload and were back for more at the World of Speed meet 30 days later. They raised the A/Blown Gas Modified Sports to 290.751 mph, using the same race gas, VP/16, in both classes and learning that the tires were becoming a safety problem! Both rear tires chunked rubber on the Qualifier. Rick was prepared and installed a new pair of Goodyears for the backup run with the same results: the rear tires chunked rubber. Rick's calculations of aerodynamic downforce and overloading the Goodyears by ink blotting the rear tires to inspect the contact patch had been learned from Nate Jones at Cowboy Tire; but were slightly skewed due to flat and hard salt track conditions.

Rick and Hollie want SAFETY along with speed, and they believe in the science of race car aerodynamics. Knowing Corvettes are not designed for this kind of speed, they took the car to the Darko wind tunnel in Utah three times where Tom Burkland helped with the legal aero improvements

to make sure the car was safe to run in the 300 mph range. They credit Tom for invaluable help with the car.

In '19 the Speed Week course was a little wet and rough, so they had their engine pumped and sealed for the next post record inspection and came back for World of Speed 30 days later. Despite a still rough, challenging course they were able to qualify three times for A/BFMS; but never went to impound due to two small fires and not running a number fast enough for a two-run average attempt over 300 mph. So, they waited until the next year to come back with a new tire combination. Their goal of a 300 mph record was finally reached at World Finals, and Rick was proud to receive his Blue Hat for entry into the Bonneville 300 MPH Club!

It was thanks to a letter from Ted Higginbottom, a fellow racing Texan, to the Bonneville Racing News' office, that your scribe was able to get in touch with Rick and Hollie. I also had the pleasure of interviewing Ted and Tracy Higginbottom about their extensive racing on the Texas Mile and the ECTA Arkansas Mile tracks, up to 220 mph so far. Both Ted and Tracy race Corvettes. That story previously appeared in the Bonneville Racing News.

It was great fun interviewing Rick and Hollie about their racing program, since it was an experience like many of these stories: your scribe hearing so many new ideas and learning so many things he never heard of, he would put down the phone and walk away with his head spinning!

Bill Hoddinott: Rick and Hollie, thank you for agreeing to an interview for the readers of SCTA Racing News Magazine. That 300 mph record you set in 2020 was a TREMENDOUS achievement! There are two others with production car bodies, but it is a very very tough thing to do since the aerodynamics are against it. You're doing something with the car the factory engineers never dreamed of and wouldn't approve of if they did! You're on your own and must find strategies with which to do it safely. The very first consideration is that you get LIFT in production bodies at very high speeds and I want you to tell us how you dealt with this.

Rick and Hollie Harden: Sure, Bill, you are exactly right, and we'll tell you how we did it. Most of it anyway!

Bill: Before we get that far, let's go back and start at the beginning. Tell us about your auto repair business and how you came to acquire your C4 and then about the nasty crash you had with it. It's good for younger racers to learn from the experiences of the very successful people in the sport."

R&H: Sure. We opened our auto shop in Spring in 1995 and then and still now, took in the usual car and truck repair and maintenance work. As you noted above, electronics are a big part of cars and trucks over the last 30-40 years, so in this trade you had BETTER learn how to handle them or STARVE!

Bill: I've been patronizing a local Indy shop for the last 50+ years for any maintenance I couldn't do myself. My pal that owns the business went to trade school to learn electronics before he started at this shop, which he took over when the previous owner retired.

He tells me there are all manner of mysteries about the malfunctions of the electronics and their computers and finding good information to correct them; since the auto manufacturers sometimes keep the information away from the independent garages to try to force their car buyers to patronize THEIR dealers. He says sometimes the challenges will "bring you to your knees". But he has the knowledge, courage and energy to fight through anything and every obstacle in his business, and I'm sure you do too.

R&H: (chuckling) yes, Bill, the electronics can be a challenge and you can't give up. Our Corvette is loaded with racing electronics that allow the engine to put out 1500 horsepower on the Long Course at Bonneville, with two 50,000 rpm turbos for the Big-Block Chevy-based engine and hold up.

Bill: How is the present car geared for 300 mph? What rpm do you see then?

R&H: We have learned from experience, by building my best friend Dave Hlebichuk's C/GT Corvette to compete for records, that you need to add 25% to your goal so I am geared for 340 mph+ at 7200 rpm. This is a lot for that big 468 cubic inch engine to endure for that last mile of the course. At 6500 we are on a 300 mph pass. All the internals are the best racing parts available. Nothing less can hold up to this power output and the heat involved in turbocharging.

But we want to tell you that from the outset with our business, we took in specialized racecar restoration and race preparation work. We built up a reputation with people that wanted to participate in vintage sports car racing all over the country. Someone has to do that work, and not too many shops are around that can take it in. You have these old, obsolete engines and powertrains that may have been very limited production originally, so there never were many spare parts for them. Then they were raced for years, and maybe crashed a few times; and someone acquired the remains, and brought it to us to make a competitive car out of. You can see this means you have to be very resourceful to make a good vehicle the owner can take out and it will be fast and reliable for him.

We got into that and made contacts, found the resources, and got the work done well. We still take in any of it people bring us. This was good preparation for building our own successful racecar, especially after we wrecked it in 2014!

Bill: How did the car come to you in 2014?

R&H: We had been coming to Bonneville with our friend Dave Hlebichuk and his 'Worlds Fastest ZR1 Corvette'. I was crew chief and Hollie pit crew member, since 2009. In 2010 Dave put me in the seat so I got my A License to qualify to drive over 200 mph. Hollie and I both got sick with 'Salt Fever' so we needed to find our own ride! Thinking and looking we found this car that had been built and raced successfully at Bonneville for two years, 2012 and 2013 by the Vison/Allison team with the car's engineer Rob Freyvogel behind the wheel that set the A/BGT record at 251 mph. Then they retired it and put it on the market for a pretty high number, north of \$100K. That was more than we could afford to spend, so we waited. We noticed that the car kept being advertised and the price was dropping. Finally, it came down to something we felt we could handle. We got in touch with the sellers and were able to make a deal.

Bill: So the car was essentially in the same form then as it is now?

R&H: Yes, but the crash tore everything up so much the whole car had to be rebuilt. So we had the opportunity to do it our way. One important change we made later was to a B&J three-speed with overdrive. The Chevy truck automatic in it before was not really tough enough to stand this kind of power, rpm and speed so we kept having trouble with it. For a Bonneville car you need EVERY component to be rugged and reliable. It's heart-breaking to go all the way out to Bonneville, enter the meet, and have something fail on the first pass you make. The B&J can easily handle this kind of power. You can start without a push truck with the clutch, and then use the air button shifter for changing to second, third and overdrive.

Bill: What is the B&J overdrive ratio and what gear set do you have in the rear axle?

R&H: The B&J overdrive ratio is about .75 and the original Dana IRS rear axle gear is 2.59 using the stock Corvette posi-traction. The Dana rear axle has mostly held up well on salt, but when there is good traction or rough course conditions, that may have caused some breakage inside it.

Bill: Not many people have had the experience of crashing at 240 mph at Bonneville, but Rick, you have. So, for the education of readers, would you tell us exactly what it was like?

Rick: I felt the car sashaying more at the 4 1/2 mile than I was comfortable with so instinctively popped the chute. The left rear tire failed and instantly the car started to snap into a spin. I was

thinking the chutes would grab the rear of the car and keep it straight on the course. Unfortunately, NOT! So now the car is turned around backwards and its rear spoiler lifted it high up into the air as you see on the video!

Your mind works fast at a time like this and my first thought as the crash was happening was ANGER that the chutes hadn't controlled the car and kept it straight on the course after the blowout like I had expected they would. That was one part of the reason for having them on the car. Anyway, the car jumped up into the air and all I saw was white salt – blue sky – bright sun – white salt – blue sky and more sun until the car laid down and slid down the course with the chutes out. There was no fire and when it stopped, I released my safety harness and jumped out. Just about this time the crash truck came rolling up, and the crew rushed to me; but I was okay, mad as could be and didn't really need anything from them. Needless to say, I felt disgusted and shocked that my racecar was all torn up! And I already knew how much work and expense it would take to repair it.

BH: We hear that the G Forces are severe on the driver in a crash like this and often involve brain or internal organ injuries, or even death. Did you experience any pain from the bouncing and crashing G Forces? Did you experience any PTSD later on from the experience?

Rick: Strangely, no, Bill. The harness kept me in place just like it should and I wasn't aware of being slammed around, during the crash. This must have been due to the particular way the car was crashing and having a roll cage that exceeded the minimum rule requirements. A tire failure due to running over sharp junk on the course is always a slight possibility. People do have engine failures at Bonneville and pieces of shrapnel blow out. And no one can guarantee it can be 100% cleaned up or spotted later on by the course stewards. It is even possible that some of it lurks under the salt and the rain and so forth brings it to the surface again maybe months or years later. So, this is just a risk factor we have to accept. As for PTSD, I did have a little bit of that, perhaps. Not enough to make me retire from this sport we enjoy so much. I will say that in my truck or car if due to rain of whatever I feel the rear end slip sideways a little, it gives me a little off-balance feeling in my stomach.

But there is a LOT we can do to make our racecars as aerodynamically stable and safe as possible, and after we rebuilt the car, we explored every one of them. Especially with the advice and suggestions of Jeff Bryant, Tom Burkland, Rob Freyvogel, Nate Jones, and many others. Everyone at Bonneville knows Tom is a graduate mechanical engineer and a high-level professional as Chief Engineer at Petersen, Inc. in Utah. His company takes on the really big engineering projects and they have to work from fundamentals of strength of materials, physics and aerodynamics. Everybody also knows about the Burkland Family Streamliner Tom and his parents Gene and Betty built, and Tom drove to Bonneville and FIA world records well over 400 mph. Tom worked as a volunteer at the Darko wind tunnel in Utah when it was in operation, and he also comes out to the Bonneville meets and works as a volunteer for SCTA and USFRA and make himself available gratis to any team that wants to talk safety and speed.

BH: Tim is certainly one of the top people of the all-time Bonneville movement, Rich, and he has helped me personally with reviewing my articles for BRN for technical accuracy before publication, many times. What are the things you have done for safety and stability on the car?

Rick: The car is as low as we can get it on the course to keep air from getting under it, to start with. This reduces wind drag and gets the CG as low as possible for better safety in a spin, less liability to dig in and flip. There is about one inch of clearance. Next is the spoiler on the rear, which gives a lot of down force. We have close to 1000 pounds of lead and steel ballast in the car, installed as low as possible to give a low vertical CG. We followed Jeff's and Tom's advice religiously, to get the Center of Pressure about six inches behind the horizontal Center of Gravity, to give natural and safe steering into the crosswind which is almost always present. You realize that air as a fluid becomes very powerful at these speeds, 250-300 mph and more. And every speed change changes its direction and force on the car or motorcycle. This is a lot to say grace over and shows the great

value of wind tunnel testing. We went to the Darko wind tunnel no less than three times. We found by study and mathematical interpolation such mysteries as at 275 mph there might be a down force on the front of the car, and at just 25 mph more, a lift of 200 lbs. But that would not be enough lift to cause trouble, considering the very heavy weight of the ballasted car at 5000 lbs plus.

Teams that don't do this kind of scientific study are just groping in the dark, and taking chances, when you're talking production car bodies, Bill. The same thing applies to Center of Pressure and Center of Gravity. The importance of these for every kind of racecar is well known now at Bonneville and costs very little to do, so I can't imagine why some people continue to ignore them.

Bill Hoddinott: Rick and Hollie, why don't you go through the details of your powertrain now.

Rick and Hollie Harden: Our goal was always a 200+mph SCTA record at Bonneville. The car was set up to run A/BGT, A/BGMS or A/BFMS and needed to run around 260 in either class to record, although I had a much higher goal than a 2 Club record and was thinking big! Back at the shop, I wrote on a dry-erase board in permanent marker "300 MPH"! We also put stickers on the car with a list of our track records and goals from Texas Mile, Arkansas Mile, ECTA Mile and Bonneville and the ultimate goal "300 mph Dreaming", So we went for blown fuel modified sports class with the 468ci Big Block Chevy-based racing engine. The Big Block Chevy appeared long ago and using stock GM parts was always recognized as the engine with the most horsepower potential for the least cost. However, we have two 88mm turbos and need a lot of boost. So we have the Dart iron Big Block with the BME racing aluminum cylinder heads to fit the bill. There are no GM parts in our engine.

It contains the best racing forged Bullet crank, Carrillo rods, Bullet camshaft and JE pistons since if you go for the really high power, and you want it to last, you need solid parts and a great recipe. It's a long way to Bonneville and when you get out there you want an engine and gearbox that can make at least four or five passes on the Long Course without any problems from the high heat and rpms. Thanks to Mike Strasburg at B&J Transmissions we don't worry about the transmission any more with the new Four Speed. We keep focusing on finding the next weakest link to improve on. You find the money for the serious racing parts.

Sampson Racing Engines and Henderson Performance Technology of New Braunfels, Texas have maintained our long blocks and kept up with our engine performance management program. Since we don't have an automotive machine shop or a chassis dyno at our operation, the 3 hour drive to HPT or SRE for a tough bullet-proof motor is worth every second!

BH: I am intrigued that you have two turbochargers in the cockpit where the passenger would normally sit in the car. Tell us about that.

R&H : There isn't enough room in the engine bay of a Corvette for turbochargers if you want easy access to the NGK spark plugs and Jesel valve train under the SRE covers. They pretty much have to be elsewhere. The cockpit floor where the passenger originally sat is a good place. The turbos sit together in a cage made of one-inch tubing, covered with ballistic blanketing and heat shielding of 2 layers of 1/4" aluminum plate. These turbos by Bell/Holset spin at 50,000 rpm or so. Obviously, there were some safety concerns about them.

BH: Wow, I can visualize the exhaust headers feeding pipes that in turn feed the two turbines, and the output from the compressors has to go back up to the top of the engine.

The exhaust system could come to yellow heat and this means a lot of heatproof shielding over it, or it would be a fire hazard as well as just heating the cockpit unpleasantly in typical summer air temps. Besides this, the turbines have to have their own exhaust pipes out the back of the car and this also has to be covered and insulated.

R&H: That is all true, Bill. When the car went to its first meet and passed tech, the car was checked by the SCTA officials for excessive interior heat from the turbos after each run. The pipes come up through the floor from the headers and the compressor air goes through the firewall up through an ice water intercooler into a throttle body on top of the engine. This arrangement does provide decent throttle response, with some turbo lag down below 4000 rpms that helps me keep the needed forward momentum going for a record run down the salt.

BH: Is there an EGT sensor for each header so the computer can adjust each EFI nozzle continuously to keep EGT in a safe range? I understand with turbos exhaust valve heat is a serious consideration. People are using 1800-degree-rated Inconel.

R & H: The computer is programmed to deliver fuel based off manifold pressure, oxygen sensors, tps and a few other inputs with a custom-tuned fuel map created by Corey Henderson at HPT. We installed one EGT sensor which is located in the down pipe at the front turbo. We have seen over 2000 degrees F without having a meltdown or catastrophic damage. And yes, we have Inconel exhaust valves. To go for big records, we need big power and some parts have to run close to their limits. We have had some trouble with the exhaust valves leaking if the engine is shut off while slowing down after a run so the engine is allowed to idle until I get it on the return road. I have extra CO2 onboard to cool hot parts as needed. You can't expect them to endure this kind of heat for but so many passes if they are not allowed to cool down properly. One clue we get that the engine is getting tired is the amount of oil recovered in the catch tank. When an excessive amount of oil shows up, we pull the engine and take it back to SRE and HPT for reconditioning.

BH: How much manifold pressure do you use?

R&H: As much as 30 psi, depending on course conditions and how much traction the tires can hold.

BH: That's a lot. Does the driver have much noise from the turbos right next to him?

R&H: Not much inside the helmet with a full containment seat. You can barely hear them with all the shielding until around 5K rpms when I can hear the winding-up whistle noise as I pedal the throttle to keep the tires somewhat hooked up. There's a lot going on and it's a big job just to know when to shift and pedal to get it down the track and not allow boost to drop too much. At Speedweek 2018, I knew the turbos were done when the whistle noise was far more noticeable during the run. There is a whole day of work getting everything out of the way if you need to work on the turbos.

BH: I know the bearings of the turbos need full pressure oiling from the engine oil.

R&H: Yes, you need proper pressure and volume of oil to keep them cool with the drains to be properly regulated with the Stealth 5 stage dry-sump oiling system. We are using the oil pressure port from the engine block to feed the turbos through several hoses. The oil goes into the bearing and then out the bottom, and eventually back to the suction side of the dry-sump pump. We have had our troubles with the recipe using restrictors and one-way check valves and seem to have them working properly without overheating the oil.

BH: Tell me about the ignition and how the spark lead works. I hear with turbo engines, the electronics retard the spark lead as the boost comes up, to avoid the development of detonation. I read that the spark lead on the turbo engine of the Speed Demon can come right back to only 6 degrees at maximum boost. The object always being to get the peak combustion chamber pressure at about 15 degrees after top center on the power stroke, when the piston first begins to have leverage on the crankshaft through the connecting rod.

R&H: We have an MSD 7AL electronic ignition which is fired by an MSD crank trigger. Spark lead is initially about 36 and as the boost builds up, the computer reduces it back down to about 20. The NGK V-Power spark plug gaps are adjusted down to .020" and are easy to read after a run.

BH: What is your choice among the race gases at Bonneville?

R&H: Last year the 302.371 mph run was on VP C16. Before that we were using the equivalent in ERC but VP has now replaced ERC at Bonneville.

BH: I think we have a pretty good grasp on your power train that has pushed the car clear up to this terrific 300 mph SCTA Bonneville record. What are your plans for the car going forward?

R&H: 300 mph was our goal and the car has now achieved that. The National Corvette Museum in Bowling Green, Kentucky wants to display it for a year. It will be displayed as the "World's Fastest Corvette". We will be proud to have it there. We're still working out the details and hope to take the car to them soon. I also hold the record in the Gas class at 290.751 mph. I know the car could easily put someone else in the 3 Club in that class.

After that our plan is to build another Bonneville Corvette to race in a different class.

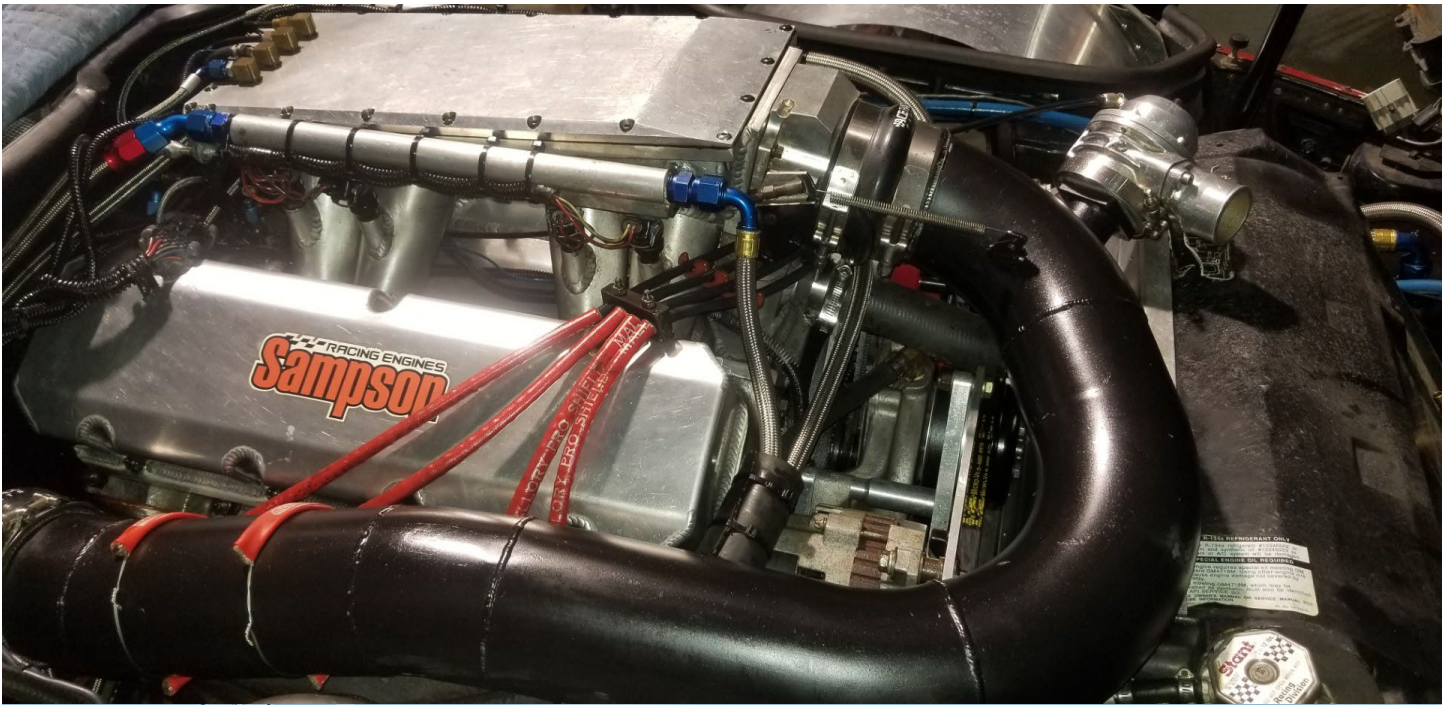
BH: Well, Rick and Hollie, thank you very much for taking the time to tell readers about your car, and once again congratulations on setting this tremendously high class record of 300 mph in A class. It's about 25 mph more than the record in AA class which has unlimited engine size! And best of luck with your next project.

R&H: Our thanks to you and Jill Iversen at SCTA, Bill. We enjoyed the interview!!

End

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BONNEVILLE NATIONALS INC.  
2020 WORLD FINALS  
COURSE ONE DOWN RUN

Vehicle #            Class  
      883            A/BFMS

Date                Time  
10-01-20            15:08

Location	Speed
Mile 2	245.234mph
2-1/4	273.806mph
Mile 3	282.536mph
Mile 4	297.315mph
Exit Speed	302.643mph
Mile 5	302.371mph

Wind: 0mph from the SE  
TEMP: 75.0F            HUMID: 15%  
SP: 25.95in            DA: 5863ft