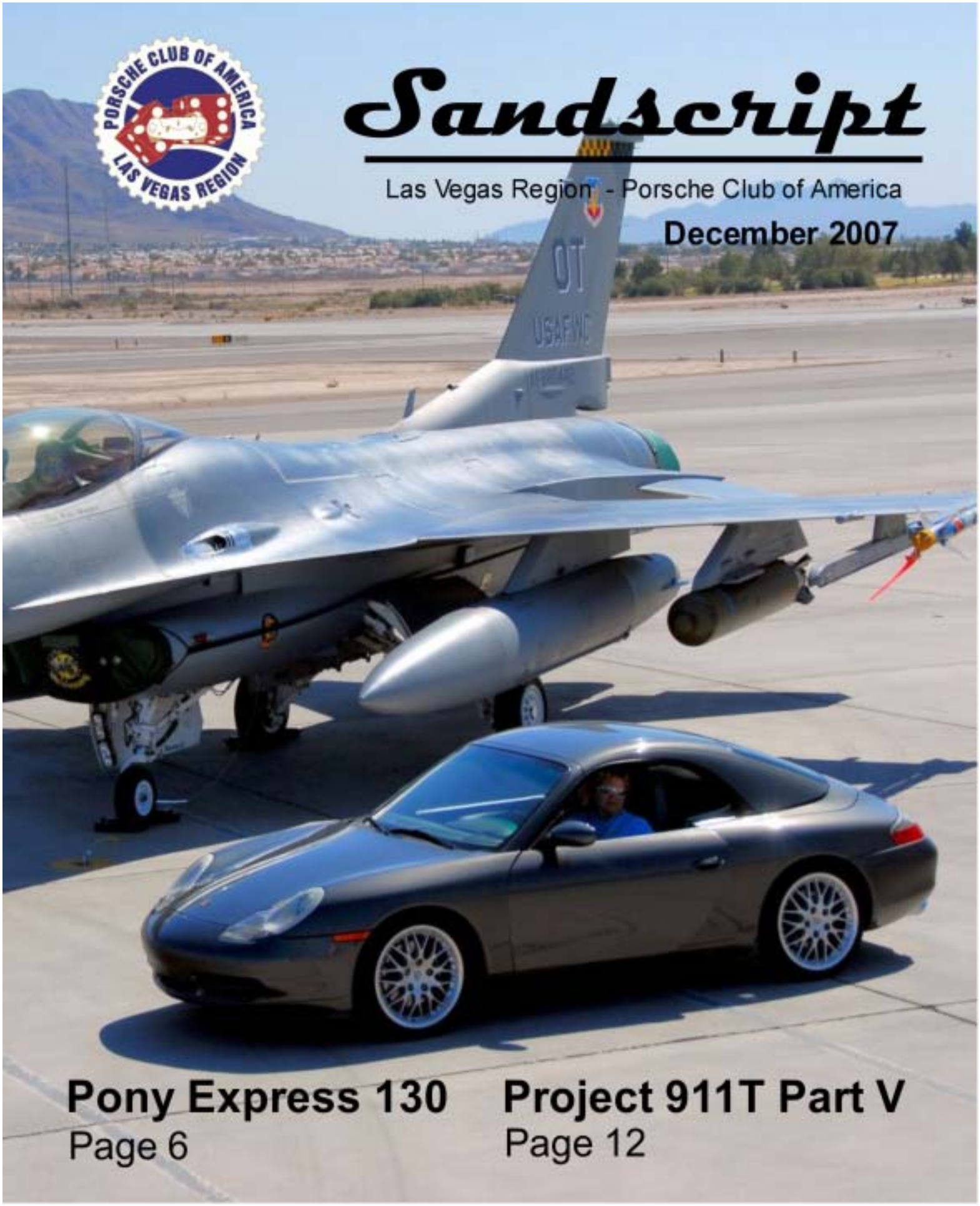
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Las Vegas Region - Porsche Club of America
December 2007

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Meetings

The Las Vegas Region Executive Board meets on the first Wednesday of each month. Please check the website for location and times. An informal breakfast meeting is generally held on the first Saturday of each month. Check the website at www.lvrpca.com for locations. The meetings are open to all members that wish to attend. General Membership meetings and changes to the meeting place will be posted on the website.

Inside This Issue

On The Cover:

Deb Bieniek participates in the One-Mile Shootout at Nellis Air Force Base.

Publication Deadline

Material must be submitted to the editor by the **15th of each month** for the following issue. Please contact Robyn Gabe if you would like to submit something.

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Pricing for color ads is available upon request.

From the Editor...

I hope that everyone is enjoying the holiday season.

The Holiday Party, hosted by Scott and Jennifer Fritz, was fantastic! The decor was beautiful, the food was tasty, and the company was fun. I would like to thank the Fritz's for accomodating everyone, as well as Jessie Broadway and Diana Mazzagatti for their expert party planning!

As an editors note, we will need an Owner Spotlight for February. If you are interested, please contact me.

It was nice to see everyone at the party. Enjoy the rest of December, and have a happy New Year!

Robyn Gabe

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Calendar of Events

Las Vegas Region

December

1	Member Breakfast @ Giuseppe's
8	**Holiday Party**
15	Santa Toy Run with Las Vegas Cruisin' Association

January

26	Visit Nethercutt Collection/Peterson Auto Museum

Calendar of Events

Zone 8

December

1-2	SDR Time Trial - Buttonwillow

January

19	Presidents Meeting and Awards Banquet

Team Porsche Scores Fifth Consecutive Victory

Roger Greene

Anchored by LVRPCA members Barbara Barron, Debra Bieniek, Fred Wagner and yours truly, Team Porsche demolished the competition in the final Open Road Race of the season, the Pony Express 130. That was the team's 5th consecutive Team Challenge victory. We've been undefeated in the past two years.

Team scoring is based on the 5 closest times to perfect for your team. A disqualification is a 2 second penalty. Team Porsche had a time of 1.099 seconds. The second place team was in excess of 6.7 seconds. Is that a butt kicking, or what?

Barbara led the team with an event 2nd closest time of 0.079 seconds in the very tough 110 MPH class. That is 12.75 feet. Fred, who elects not to use a navigator, is consistently one of the top 5 in any event. His miss this race was 0.180 seconds or 34.3 feet at 130 MPH average.

My plan was to go down averaging 164.999 MPH as the rules do not DQ you until you exceed your average target speed by 10 MPH. This meant beating my target time by one minute and 57 seconds. I would have had to pass two cars to do this. The start was delayed about an hour while a communications issue was resolved and we were told we would be released at 30 second intervals rather than the usual 1 minute interval. That meant I would have had to pass 4 cars and I decided that was too dangerous.

Route 305 has a wonderful 8-10 mile section called the "canyon" with lots of turns and few straights. Just as we entered the canyon, yellow flags were being displayed. We assumed it was for rain and sure enough the first few drops hit the windshield. The deeper into the canyon we went the harder it rained. Just as we were downshifting to make a hard left followed by a sweeping right around a hill, the skies let loose. You all know the expression for hard rain that involves a cow, a bodily function and a flat rock? Well, that is how hard it was raining. Water was running across the road, wipers on full and my navigator says, "I have no idea where we are?" There was no way to see a mile marker. Fortunately, we know the course and made it through OK. As we were coming out of the canyon we were 29 seconds late and had only about 25 miles to go. Gosh, I had to drive fast!! Anyway, we finished with a time of 0.129 seconds or 29.3 feet from perfect.

Debra had a "great" run. She was 38.266 seconds FAST. Can anyone imagine Debra coming in TOO SLOW? That equates to 6,173.58 feet at 110 MPH. But, we could hear her giggling about 5 miles out.

Unfortunately, with the rain came lightning. It started a fire that caused the event to be red flagged so the BLM could traverse up the course to fight the fire. As a result we only ran 83 miles and did not make the return run of 46 miles.

One interesting situation in the race occurred when we exited the canyon and I saw a crop dusting plane flying down the canyon weaving in and out, crossing over the road at about 25 feet. On a straight I glanced to my right and saw him flying formation with me about 50 off my right side. Thinking that this was not a good situation, I hammered the throttle on my little 3.6 liter engine and left his fanny in the dust (rain). Kind of cool to blow off an airplane!

Another interesting happening at the event was one of our Team Porsche drivers visiting an establishment advertising itself as a "WIFI Hotspot." Now I am sure that the driver only went there to use his/her computer. I mean what else would anyone do at the legal brothel Donna's Ranch?

Because our motel did not allow alcohol out around the pool, my brother and I put our single malt "coffee" in our Starbucks mugs and sat out around the pool kibitzing our competitors. I always believe in following the rules.

Folks, the 2007 ORR season is now over for us. Two LVRPCA members tried the sport for the first time, Jeff Wenger and Tony Zito. I sincerely hope that Jeff and Tony will return in 2008 and help recruit more of our Club to join in the fun.

Member articles are always appreciated. If anyone would like to write an article about Santa's Toy Run, please submit it to me by January 15, 2008.

Pictures would be great as well!

robynag@cox.net

Photos courtesy of Barbara Barron

Owner Spotlight

Deb Bieniek

At the first PCA meeting I attended, Earl Leeper was the first person I met. He asked me if my Porsche was air cooled or water cooled. That was the moment I realized that my Porsche was so much more that driving fast.

I enjoy driving my 1999 996 cabriolet everyday. As a daily driver, I've hauled plants from the nursery and carried home a silk tree buckled in the passenger seat with the top down. I stare at the car everyday from my office window.

But in its other life, my Porsche has brought me to the podium in countless open road races. No matter which class, 115 MPH, 110 MPH or 105 MPH, my car is always a fun and dependable ride, and the track events allow me to really feel what the car can do.

I never knew how versatile a Porsche can be and I cannot imagine my garage without one.

Photos courtesy of Randy Gabe.

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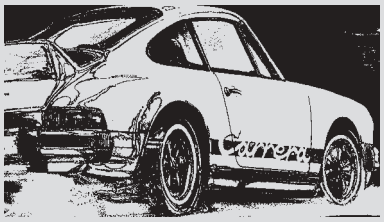
Welcome
New and Transferred Members!

Jeff Daum	2008	Boxster
Jon Foster	1978	911SC
Harvey Huffman	2008	Cayman S
Sean McLane	2006	Cayman S
Barney Nemiroff	1978	928

Transfers

Ken Short	1998	Boxster	Redwood
	1972	911	



Total Number of Primary Members: 298

Member Pictures - November Member Breakfast

Photos courtesy of David Hosford

Dr. Robert Mohan

In part I, I talked about the formative ideas which prompted this project; setting the goals, and the acquisition of the project Porsche. In part II, I discussed in detail the initial inspection of the car, the discrepancies found, and the beginning of the restoration. In part III, I described the first step in the conversion of a street car to a racecar: installing safety equipment. In part IV, I discussed performance upgrades to the brakes, wheels, and tires. In part V, I will cover the performance improvements to the suspension.

The purpose of car's suspension, despite what the Lexus and Lincoln commercials tell you, is to keep all four tires in contact with the ground. And to do so in such a way as to maximize the size of the tire's contact patch, its footprint if you will, at all times. The contact patch size is a function of geometry and force. The suspension is responsible for maintaining the proper geometry, which is keeping the wheel perpendicular to the driving surface. The weight of the car and, in some cases, the aerodynamics are responsible for applying the force. The driver can dynamically manipulate the balance of the car by transferring the weight and, therefore, the size of the tire contact patches, through braking and acceleration. As always, there are compromises which must be made. Racetracks are very smooth and even, when compared to city streets, and passenger car occupants expect a more compliant ride, even on pothole-riddled public roads. Driving for them, after all, is not a contact sport. A pure racecar will have an all-metal suspension with very stiff spring rates and minimal suspension travel limits. All of these features minimize the wheels' ability to alter that desired perpendicular geometry with the racing surface. Unfortunately, all of those features would make for a very bumpy, noisy ride on our city streets, transferring all the irregularities directly to the passenger compartment. And, sooner rather than later, a hard suspension applied to a bumpy surface will damage the suspension components or the car's chassis.

So, keeping in mind that we need to stiffen the car's suspension for the track without making it unusable on the street, we will once again turn to the Club Racing rulebook to determine what added restrictions we face. As it turns out, the suspension is the area of the car where the rules are the most liberal for the stock class. The suspension pick-up points (where the arms and struts attach to the chassis) must be of stock location and type. Which means you cannot slot them for more adjustability or move them for more radical settings. The shock absorbers and springs must be of stock type. In this case, we must use upright, outboard shocks and torsion bar springs, as opposed to inboard active shocks with coil-over springs, ALA Formula 1. Beyond those restrictions, everything else is "free." That is, we are free to choose shock absorbers (damping rates), torsion bar sizes (spring rates), sway bar sizes (anti-roll rates), alignment (camber, caster, toe-in), bushing material, and ride height. In addition, we're allowed adjustable spring plates on the rear suspension (making ride height, corner weight, and alignment changes easier), and a camber truss between the upper front strut mounts in the trunk, to add stiffness and reduce suspension-chassis flex.

I began the suspension upgrade with the shock absorbers. The 911T came with hydraulic (oil-filled) Konis, which was state-of-the-art in 1969. They have since been superseded by high-pressure gas shocks and, more recently, low-pressure gas shocks. I opted for Bilstein heavy-duty shocks, with which I've had good experiences on my other racecar. I did not choose the externally-adjustable Konis for a reason, which I will discuss later in this article. The early 911s (pre-1970) used a smaller through-bolt at the lower rear shock mount. This limits your choice of shocks, and increases the price, compared to what's available for later 911s, unless you modify the trailing arm to accept a larger through-bolt. The modification was simple, requiring a 9/16" (14.2mm) drill bit, a 4" bolt, locknut, and washers.

My next upgrade was the torsion bars. This upgrade requires some research and planning up front,

as well as some knowledge of where you're heading. A change in the spring rates can affect two things: the overall stiffness of the car (displacement per unit of force) and its balance, which is described as either neutral, oversteer, or understeer. The stiffness is increased by increasing the diameter of all four of the torsion bars relative to the stock torsion bars. The balance is affected by changing the diameter of the front torsion bars relative to the rear ones, and vice versa. The 911, with its rear engine layout, tends to oversteer in comparison to cars of more traditional design. Nonetheless, the early 911s, with less rear weight bias and less horsepower (thus, less ability to dynamically transfer weight to the rear) tend to understeer compared to their contemporaries. Thus, changing the torsion bars, and their attendant spring rates, presents you the opportunity to not only decrease the amount of wheel deflection and tire contact patch change, but to also shift the car's balance toward your preference, be it neutral, oversteer, or understeer. Having learned the art of throttle steering, my preference is for a car that tends to oversteer. So I chose to increase the stiffness of the rear torsion bars more than the increase in the front bars. The stock torsion bar diameters were 18.8 mm front and 23 mm rear. Torsional stiffness is a fourth power function of the bar's radius, so a 17% increase in radius, from 18.8 mm to 22 mm, produces an 88% increase in stiffness. Increasing the rear bar diameter to 27 mm produces the same 88% stiffness increase, but to shift the balance toward oversteer, I chose 28 mm torsion bars, which are 120% stiffer than stock. You can see from the numbers that a very small change in size can produce a huge change in effect.

The next step in the process is to remove the excess play in the suspension system. This task ties back to maintaining that optimum geometry between the wheels and the road. Once we align the suspension the way we want, we want it to stay that way under all conditions, including the heavy dynamic loads experienced on the racetrack. In order to remove and replace the rubber bushings on the suspension mounts, I had to first remove all of the suspension. While this task is straightforward, and requires only standard tools, it is nonetheless daunting. For instance, in order to remove the rear trailing arms, I had to first remove the engine and transmission, which added about two hours to the procedure, working alone without the benefit of a lift. With the suspension components removed from the car, I separated the rubber bushings from the components. For the rear suspension I did this with just a small prybar, but for the front suspension I had to use a propane torch to melt the bushings first. Once I had all of the suspension removed and disassembled, I took the opportunity to restore all of the components. This amounted to some bead blasting, wire brushing, priming, painting, and re-plating of all the bits and pieces. When replacing the rubber with a less pliable bushing, there are two choices: plastic (Delrin) or steel heim joints. I used some of each. For the lower mounts on the front A-arms, the mounts on the rear trailing arms, and the mounts on the rear spring plates, I installed plastic bushings made by Weltmeister. For the steering tie rods, I installed factory 930 turbo tie rods, which have heim joints. And for the front upper strut mounts, I installed "Camberballs" from the Pivot Group, which are spherical steel bearings. Camberballs function like a camber truss, but are less expensive, lighter weight, and less intrusive on your trunk space. Bushing technology and design has progressed quite a bit in the past decade, providing more choice of plastic compounds in the bushings that emphasize self-lubrication, longer life, or reduced noise. There are also some great new innovative designs that incorporate improved suspension geometry, improved stiffness, and even improved lubrication and servicing into the components.

At this point in the process, I took care of two other details. Since I planned to lower the car and corner balance it once the suspension was completely upgraded, I installed Weltmeister steering rack spacers and Sway-Away adjustable rear spring plates. Lowering the car lowers the center of gravity and reduces lift by reducing airflow under the car. However, it reduces the allowable suspension travel and introduces handling quirks, like "bump steer." To avoid giving a lecture on trigonometry, it suffices to say that bump steer (which is a bad thing) results from excessive angle on the steering tie rods as a result of lowering (or raising) the car beyond design specifications. The steering rack spacers raise the steering rack in relation to the chassis to keep the tie rod angle within specifications as the front wheel spindles rise in relation to the chassis when the car is

lowered. A rule of thumb which I use is never lower the car beyond the point where the front A-arms are level when measured from front wheel to front wheel (across the car). If the A-arms angle upward to the wheels, rather than downward, then the alignment characteristics are reversed from the original design (which is also a bad thing). For a 911, the rear ride height should be one half inch higher than the front ride height. Once I had the car lowered to the desired ride height, I corner-balanced it using the corner scales provided by the PCA at every club race. The ride height is adjustable at each front wheel on all 911s. The adjustable rear spring plates makes the ride height easily adjustable at the rear wheels also. The purpose of corner balancing, or "weight-jacking," is to balance the weight distribution between the two pairs of wheels on either side. For the 911T, the tables below show the corner weights before and after the balance. (See chart).

Before corner-balancing	
420 (18.7%)	470 (20.9%)
690 (30.7%)	670 (29.8%)

After corner-balancing	
440 (19.6%)	450 (20.0%)
670 (29.8%)	690 (30.7%)

Because I had already lowered the car as far as I wanted, I balanced it by raising the ride height at the left front and right rear corners approximately equal amounts. Raising the ride height has the effect of "jacking the weight" to those corners. The car is now balanced with a 60/40 split on each side.

The final step is the 4-wheel alignment. It is important that this is done after the car is lowered and corner-balanced, as these processes affect the alignment. The three measures of alignment are camber, caster, and toe-in. The factory specified settings for bias towards stability and reduced tire wear. For a road racer, I prefer a more performance-oriented setup. The competition tires are designed with extremely stiff sidewalls to make good use of negative camber. So I specified the maximum negative camber setting achievable for all four wheels. For most 911s, this will be about 2 degrees. As for caster and toe-in, the ultimate setup for responsiveness zeroes out both settings. However, if you unintentionally go beyond zero, into negative caster or toe-out, the car will be come unstable, especially under braking. A good rule of thumb is to start from the factory settings and go halfway back to zero.

Before I finish, I want to say a few words about anti-roll bars, or sway bars. In 1969, sway bars were optional equipment on the 911T, and were not included on this particular car. I made a decision not to use sway bars on the car, even though Porsche provides them as standard equipment on all 911s today. While they do serve a purpose, to reduce the body roll in a turn, there are flaws in the implementation of the design. First, they tie the independent suspension components together, effectively making the suspension non-independent. So when one wheel drops in a pothole, and the independent suspension adjusts for it, the sway bar transfers some of that work to the suspension on the other side of the car unnecessarily. Second, the design of the stock sway bars and chassis mounts is not up to the task of racing. The factory sway bars are not adjustable and will cancel any efforts to corner-balance the car. Of the after-market sway bars available, only one brand, "Charley Bars," had enough quality to be suited for real racing. The others experience frequent drop-link failures. If you install Charley Bars, as I have on my GT racecar, then the failure point becomes the stock chassis mounts. The rear brackets must be cut off, and reinforced after-market versions must be welded on. The sheet metal around the through-holes in the body for the front sway bars must be reinforced with welded plates. The cost of doing it right is about $1500, and I felt I could better spend the money elsewhere. That said, the sway bars perform a desirable function of reducing body roll by assisting the outside suspension springs through transfer of the cornering forces to the inside suspension springs. In effect, the sway bars are using the inside springs to increase the stiffness of the outside springs. I opted to replace the sway bars with stiffer springs. Now you know why I nearly doubled the stiffness of the torsion bars. While there is no ultimate solution, mine was cost-effective, maintenance-free, and added no weight or complexity to the car. As with other performance hardware, the march of time has brought improvements to anti-roll bars as well. There are

now a few high-quality sway bar kits on the market, that are suitable for racing, including Elephant Racing, Smart Racing Products, and Tarrett Engineering, to name a few.

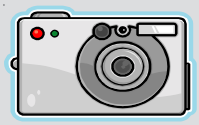
Without adjustable sway bars or adjustable shock absorbers, some might say the 911T does not have the characteristics of a race car. If, by that, they mean a car suited for professional racing and supported by a team of full-time engineers and analysts, then I would agree. But having an adjustable suspension and not knowing how to adjust it is worse than having a non-adjustable suspension optimized by the manufacturer. And knowing how to adjust the suspension requires test laps at each track and added measuring equipment, both of which were beyond the scope of club racing at its inception in the early '90s. The more suspension components you have to adjust, the more combinations you have to evaluate. The interesting thing is that all of the adjustable components do the same thing: alter the balance of the car. In high school math class I learned that to solve an equation with one unknown I only need one variable. So to solve for the unknown balance, I use tire pressure as my variable. To increase the oversteer and decrease the understeer, I can lower the rear tire pressure or raise the front tire pressure. To increase the understeer and decrease the oversteer, I can lower the front tire pressure or raise the rear tire pressure. Then I can leave the rest of the suspension components set at the optimal settings I discussed earlier.

Here's another update on the status of the project and the targeted budget. The total cost of upgrading the wheels, tires, and brakes was $1001. The cost to upgrade the suspension with new bushings, Camberballs, spacers, and tie rods; and used shocks, torsion bars, and spring plates was $1041. A four wheel alignment at a local shop was $100. Also, I spent $126 on re-finishing and re-plating all of the original parts that I re-installed. So far, the total cost of Project 911T is $8851, leaving $1149 in the budget. In the next and final installment, I will relate the process of preparing the body and motor for competition.

Got Pictures?

If you have pictures from the Holiday Party be sure to send them my way. I will be placing them in the January issue.

robynag@cox.net



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