



Ruf 997 RGT
A Tradition Continued



TPC Cayman S Turbo
Boost Adds More Fun



Sportec's SPR1
800HP Road King

Autobahn Ambition

The PORSCHE Tuner Magazine

Spring 2008 Issue

EDO's 997 GT2 R

Is it more than a Beast?



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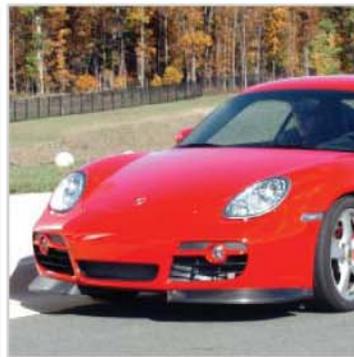


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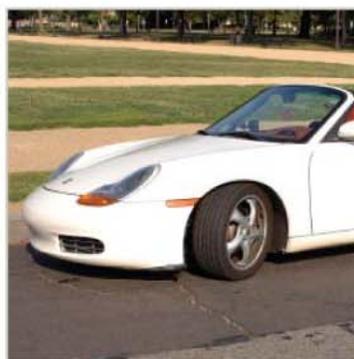


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2007 Rennsport Reunion III - *Daytona, FL*

Current Trends

What Defines a Sports Car These Days?

By: Robert Besl
and Kevin Sims



Those who have born witness to a Cayenne Turbo S driven at full speed might have asked that very question: Just what is a sports car these days? Well, look no further, we have made it our goal to establish a new classification to define a new age of sports cars. Some 20 years ago, life was a lot simpler, automotive and otherwise. Back then, we had sports cars (think Porsche 911) and we had super sports cars (think Ferrari F40). Sports cars were fast and exclusive, super sports cars were faster, more exclusive and, more often than not, more extreme than sports cars. Talk about simple. Now we have, say, a Bugatti Veyron. Is it fast? Definitely. Is it exclusive? You bet. Will it lap the Nordschleife in less than 8:30 minutes, most likely not. So is it a sports car? Answering this question is not as easy as it would seem. It does not fit into the old equation. After all, the Bugatti is actually intended to be an ultra-fast luxury car. Ugh? Now is the confusion more evident.



Then we could take a look at Lotus' ever-enjoyable Elise, probably the best playmate you could pick for track days. It is a sports car at its best, but one

that gets blown away by the extremely large Porsche Cayenne Turbo S SUV in a straight line. So, is the Cayenne a better sports car than the Elise? Heavens no; however, when a 4,500 lb SUV can zip past a sports car it's a sign that the rules have indeed changed.

Perhaps the definitions we have grown accustomed with need to be overhauled. Before we start assigning new segments, let us discuss some criteria to help classify things:



Above, Right: The Ruf Rt12 has 3 engines options; a 530 HP, a 560 HP, or a 650 HP unit. Additionally, the 2WD car can be ordered with 4WD per request. Bottom, Left: The new 630 HP TechArt GTstreet Cabriolet.

- **Production volume:** We need to consider both the absolute production volume in a market and the relative production volume, i.e. the percentage of a manufacturer's entire model range. Whereas small volume manufacturers realize very low or even statistically negligible production numbers, the entire production run by a high volume manufacturer can easily reach five or six digits.
- **Price:** The segments we are looking at are characterized by an

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Below: Porsche's 911 GT2 features RWD and a 530 HP, twin-turbo engine that motivates it to a 204 MPH top speed.



above-average price compared to other vehicles from more normal auto market; however, there is a huge price spread from a Chevy Corvette to a Bugatti. Price does help tell the customer what they should expect from their speed wagon.

- **Production technology:** There are considerable differences between a full-production run and limited production run. Production management distinguishes between job-shop production, batch production and mass production. Mass production is typically based on assembly line work. The restrictions inherent in this highly mechanized, rigid and specialized system rule out the production of lower volumes. Series production is characterized by a limited number of products that do not necessarily have to be absolutely identical. In addition, the highly specialized vehicle usually features a high level of craftsmanship. According to these premises, job-shop manufacturing is the standard production system for lower volumes or limited lot production runs.

- **Degree of individualization:** High volume producers have implemented this approach since the early 1990s. Individual customer demands are usually met through specialized organizational units within the firm. BMW's M and Mercedes's AMG divisions are the most well known examples. Fully owned

by their holding companies, they take advantages of all the available resources. Small volume manufacturers lack such resources. Instead, they rely on personal service starting from their first customer. A vehicle's specifications are usually determined in coordination with early customers. This facilitates establishing intimate long-term customer relations. Ferrari and Lamborghini are exceptions, as they are small manufacturers owned by multinational corporations that supply funding and engineering assistance.

- **Innovation:** It is typical that as the more specialized a sports car becomes the more innovation it possesses in its design. Innovative product solutions often trickle down to lower categories as time progress.
- **Purity of Vehicle Purpose:** Sports cars are built to meet a much wider range of needs than examples from 20 year ago. The NS-X started a revolution as it was the



Above: TechArt's Magnum, a Cayenne Turbo based SUV, sports a 600 HP twin-turbo V8 with larger turbos, higher flow intercoolers, and a TechArt sport exhaust.

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exotic car without the day-to-day annoyances. A sports car's drivability and its every day usefulness became big selling points. In today's market this revolution has grown into the sports car confusion we discussed earlier. Cars like the Mercedes SLR McLaren and the Bugatti deliver great drivability with hair raising performance. And on the other end of the perspective, there are sports cars like the Pagani Zonda and the Koenigsegg CCX that are more purist focused. Cars that are born just to be "real" sports car.

Now that we have outlined a few criteria for our process, let's start classifying:

- **Sports Cars:** We all know what classifies a sports car, but let's review it a bit. These are performance oriented cars with swoopy styling that not only attract attention, but entertain their drivers. They are either 2-seaters or 2+2 arranged. As compared to other classifications, their production volume is much higher and price is reasonable so that many people can attain them. The Chevy Corvette and the Nissan 350 Z come to mind as such cars. There are slightly more expensive examples, such as the Porsche Cayman and 911 (standard models), that meet this mix. These cars tend to be produced in higher volume on assembly lines and feature innovation that is high-tech but not quite state of the art. Sports Cars are popular models for tuners to modify.
- **Super Cars:** These cars are sports car on steroids. Some of these cars are totally unique, such as the Ferrari F430, and some are based on sport car model lines like the 911 Turbo or 911 GT3. Innovation and performance help separate these cars from the



Top: Sweden's Koenigsegg CCX is a 245 MPH machine with a 806 HP, twin-supercharged Ford based engine. Bottom: Italy's 599 GTB Fiorono continues Ferrari's V12 tradition with its 6.0 liter, 620 HP engine.



typical sports car. The purpose of the super car is more focused on the performance side of use and less on daily drivability. Production methods also tend to be less assembly line oriented, although not always. The Porsche 911 Turbo is surely a super car, but its production does not re-

ally differ from its 911 Carrera S stable mate.

- **Ultra High Performance Cars:** We come to our first new classification. The Ultra High Performance Car is the 'baddest' boy on the block. These cars are designed with performance,

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The Bugatti Veyron 16.4, formally the fastest production car, accelerates to 60 MPH in 2.46 seconds with its 987 HP, 8 liter W16 engine with quad-turbos.



exclusivity, and individualization as their main goal. Luxury and traditional “grand touring” function is not usually integrated in these cars. The Ultra High Performance Car has a purity of existence, they are meant to haul ass with the highest amount of technical innovation available on the market. Their cost is huge and production is limited to a hand full a year. They include unique designs, such as the Pagani Zonda, and cars developed from other super car beginnings, such as the Ruf Rt12. What separates the ultra high performance car from the super car is its low production numbers, high degree of individualization, and purity of high performance purpose.

- **Cross-Over & Luxury Sport Cars:** This classification is intended to help bring understanding to confusion. The cross-over & luxury sports car is a new class that describes cars with a sporting na-

ture that feature function from other areas outside the sports car realm. Is a Porsche Cayenne Turbo S a sports car? No. Is it a SUV? No. It combines the sports car and SUV to make a “cross-over” model that creates its own classification. Cars in this classification have a weak degree of purity of purpose. They attempt to do it all and in many cases quite successfully. The price range for this class is quite broad as is their production methods. The natures of such cars are their ‘mutant’ cross over ability.

Next we will select cars and discuss which classification Autobahn Ambition feels they fits into:

- **Ferrari 599 GTB Fiorano:** Successor to the 550/575, this front engine coupe is powerful, capable and has an impressive price tag. Individual customer needs are fulfilled through the choice of colors available, equipment options and special components

from Ferrari’s racing department. The factory facilities are structured using both the principles of assembly line work and job-shop manufacturing. With about 800 cars built and sold per year, the 599 GTB occupies about 20 percent of Ferrari’s entire annual production capacity. It thus is not an Ultra High Performance Car and is a Super Car.

- **Ferrari Enzo:** Only 399 of the F50’s successor were built between 2002 and 2004. The Enzo’s body shell and most of its interior is made from carbon-fiber. Engine technology and gearbox components are derived from F1. Given the price tag and the fact that it occupies only three percent of Ferrari’s annual production capacity, the Enzo definitely is part of the Ultra High Performance Car segment.
- **Koenigsegg CCX:** A relative newcomer to the US market, the now EPA and DOT approved CCX has actually been around since 2000. This carbon-fiber coupe comes complete with an F1-style push-rod suspension set-up, carbon-fiber/magnesium alloy wheels and a vastly powerful, Ford derived V8. Exterior and interior colors are fully customizable. About 25 cars a year are made in job-shop manufacturing. That and a price decisively north of \$500k make the CCX a worthy Ultra High Performance Car member.
- **Mercedes SL 55 AMG:** Supercharged V8 roadster with gobs of torque from renowned Mercedes-Benz in-house tuner AMG. Cars undergoing the transformation in the Affalterbach job-shop facilities are taken straight from the Mercedes SL assembly line. Order it from your local dealer just as you would order the new C-class. The full range of extras is available plus quite a few amenities AMG will gladly provide

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The Pagani Zonda Roadster F is equipped with a 7.3 liter AMG V12 with 650 HP and provides open-air driving with a removeable carbon-fiber roof.



and charge for. Being a privately owned company, AMG GmbH is not obliged to report any production volumes, we estimate that several thousand vehicles are built and sold per a year. Since it contributes to a considerable portion of the SL's total annual production, the 55 AMG is not Super Car eligible. It combines Super Car performance with a luxury convertible format and we classify as a Cross-Over & Luxury Car.

- **Mercedes SLR McLaren:** The engine is derived from the SL 55 AMG, but receives a significant power upgrade. F1 partner McLaren contributes its extensive composite materials knowledge for the chassis, making the SLR the first road legal vehicle to come with a front crash structure completely made out of carbon-fiber. UK-based production is organized according to the job-shop system. About 500 cars are made a year, about four percent of Mercedes-Benz's total production volume. Considering its MSRP, the SLR should be

an Ultra High Performance car, but we feel different. It combines extreme performance with the luxury of a grand touring car, thus we view it as a Cross-Over & Luxury Car.

- **Lamborghini Reventon:** With only 20 cars being manufactured, this 650 HP beast boasts a 6.5 liter V12 engine and styling inspired by the F-22 Raptor. This raging bull is essentially a revised Murcielago LP640 with a staggering cost of \$1.4 million and tops out at around 210 MPH. Considering its high price tag and big performance, the Reventon seems destined for Ultra High Performance Car status. After much deliberation, we've come to the conclusion that it's an expensive Super Car. It takes more than sprucing up a LP640 with fighter plane styling and some extra engine displacement to develop an Ultra High Performance car. Such a car requires more technical innovation and distinction.
- **Pagani Zonda:** Prior to partnering with McLaren, Mercedes-

Benz supported Italian manufacturer Pagani Automobili S. p. A. to develop and build a super sports car. The AMG V12 powered, carbon-fiber Zonda is widely known to be one of the finest cars around, with superior build quality and exquisitely fabricated details. It is completely hand-built; even the pedals and controls are custom-made. Production volume is roughly 25 cars a year. Only the Zonda's successor – scheduled for 2009 – will make to the US. Regardless, we have a prime Ultra High Performance Car candidate with the Zonda.

- **Porsche 911 Turbo:** Fast, reliable and more than suited for everyday driving, this sports car icon is better than ever today. Production volume is well in the five-figure realm, which is about 15 percent of the 997s leaving the Stuttgart assembly line each year. Exclusive customization options are high but given the volume and price, the Ultra High Performance Car criteria are not met. It's a Super Car.
- **Porsche Carrera GT:** About 1,270 CGTs were built between 2003 and the end of 2005. One of the finest sports cars in history, the CGT features a carbon-composite monocoque, aluminum push-rod suspension and a high revving V10 that did not make it to Le Mans due only to cost reasons. Customization was limited in order to reduce production complexity in the Leipzig job-shop system. At three times the 911 Turbo price, the CGT clearly makes it into the Ultra High Performance Car echelon.
- **RUF Rt 12:** Pfaffenhausen's answer to the Porsche 997 Turbo is the hand-built Rt 12. Exterior, interior and even drive train specifications are fully customizable. 25 cars leave the factory each

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year, making the Rt 12 an Ultra High Performance Car candidate par excellence.

- **Chevy Corvette ZR-1:** Bowling Green, Kentucky's new 6.2 liter, Eaton-supercharged monster is a \$100,000 plus Corvette. The car features ceramic brake rotors and a magneto-rheological damper system similar to that of the Ferrari 599. The first production example sold at Barrett-Jackson for over \$1 million. Its 4 rotor, Eaton supercharger provides efficient heat dynamics that make it nearly as effective as a turbocharger, but without any lag (take notice 928 turners). The aluminum framed car is GM's first Super Car. Time will tell if it earns the respect.
- **TechArt GTstreet:** TechArt upped its game with its 3.6 liter, 630 HP GTstreet with hopes to win the 2008 Tuner Grand Prix. The car features limited production exclusivity, a revised body kit that was developed in a wind tunnel, and the company's pledge to customize the car to any customer's request. Like the Ruf cars, TechArt uses an unmarked Porsche frame to produce their GTstreet car. The car is without a doubt an Ultra High Performance Car.
- **Bugatti Veyron 16.4:** The current acceleration champion for production street cars is a paradox as much as it is fast. Weighing in at a hearty 4162 pounds it is not a light-weight for sure. Its monstrous 8-liter, W-16 cylinder engine is quad turbocharged and develops a not-so modest 1001 horsepower. With such power it motivates its girth to a whooping top velocity of 253 mph. Of course, the customer needs a key from the dealer to quite literally 'unlock' the last 30 MPH or so. The Bugatti is spacious and has

The 2008 Lamborghini Reventon is a revised Murcielago LP640 with a F-22 Raptor inspired body and a new 6.5 liter V12 producing 650 HP.



plenty of luggage space. No car has ever been built like it. At a cost of over \$1.7 million, it would seem to be an Ultra High Performance shoe in, but its not. It's a Cross-Over & Luxury Car. You may ask, "How can this car be in the same category as the Porsche SUV?" Well, because it's a cross-over. It combines the luxury of a Rolls-Royce with the performance of an F1 race car. It has single-handedly created its own class. The French built car was inspired by Bugatti's opulent, pre-war past. It is the ultimate car that delivers its owner luxurious comfort and unsurpassed speed in a stylish package that could not be mistaken for another car.

- **Porsche 911 GT2:** With the 997-based GT2, Porsche has finally produced a factory 911 that breaks the 200 MPH barrier. The rear-wheel drive machine produces the same performance as the Carrera GT at half the money. Porsche's famed test driver, Water Rohrl, drove the

newest-911 GT2 less than a second faster around the Nurburgring than he did the Carrera GT. That's an amazing task for a rear-engine car, but illustrates the performance potential of the 997 platform. Porsche plans on producing a mere 1,300 GT2's in its whole production run. That's roughly the same number as the Carrera GT, making the GT2 a rare bird indeed. Is the GT2 an Ultra High Performance car? No. Unlike the Carrera GT, the new GT2 is not a distinctive design and is produced along side its 911 Turbo brother. As much as we would love it, we have to be honest. The GT2 is a super car.

We hope that this article has been a help in reclassifying the modern sports car world. We recognize that not everyone will agree with our position. In fact, we hope that this article inspires discussion.

Feel open to forward us your opinion to kevinsims@AutobahnAmbitionMAG.com. We will include your thoughts in a future editorial on the subject. Let the discussion begin! **AA**

Porsche Factory Release

Porsche Release >> 2008 911 GT3 RSR

By: Kevin Sims
Photos By: Porsche Press

Porsche launches the most powerful racecar ever based on a normally aspirated 911 platform for the 2008 race season. The new 911 GT3 RSR boasts a 3.8 liter boxer engine that is only marginally altered from last year's race winning model. The boisterous engine generates a mighty 465 hp at 8,000 RPM with a heady 317 lbs/ft at 7250 RPM. Nevertheless, can she take the stress? Porsche engineers believe so as they confidently bump up the engine's rev limiter to an astonishing 9,400 RPM.

The most outwardly unique feature of the 2008 GT3 RSR is its aerodynamically enhanced front end that's designed to reduce front-end drag while improving air flow to cooling ducts. Overall downforce is optimized by utilizing air ducting with

newly-designed side-mounted front air outlets. To compliment the aero upgrades, extensive changes were made to the suspension cinematics to foster more mechanical grip. In addition, Porsche recalibrated the flat angle of the drive shafts to give racing teams a broader array of possible suspension set-ups. Engineers deleted unnecessary body girth to further reduce weight and make the car even more nimble.

Experience from the ALMS championship RS Spyder has resulted in a new sequential six-speed gearbox for the 2008 GT3 RSR. The unit is considerably lighter than last year's offering and helps improve the GT3 RSR's weight distribution. Porsche engineers have redesigned internal components with the aim of reducing

friction, thus improving the transmission's ability to deliver vital horsepower to the ground.

The 911 GT3 RSR is the flagship of three cars being offered by the Porsche Motorsports division for 2008. The other racecars include the GT3 Cup and the GT3 Cup S. Only 35 units of the GT3 RSR will be produced making it one of the most exclusive 911 derived cars to leave the Weissach racing factory. At a price of 349,800 Euros, all the GT3 RSR units have already been earmarked to teams in the AMLS, EMLS and other important international race series.

With the enhanced GT3 RSR, Porsche Motorsports should be looking forward to another successful racing season in 2008. **AA**



Above: The 2008 GT3 RSR enjoys a 465HP engine with a 9,400 RPM rev limiter.



2008 911 GT3 RSR Specs

Engine

Six-cylinder aluminium boxer engine, water-cooled, four valves per cylinder; 3,795 cc; stroke 76.4 mm; bore 102.7 mm; 465 bhp at 8,000 rpm; 317 lbs/ft at 7,250 rpm; dry sump lubrication; individual throttle butterflies.

Gearbox

Six-speed gearbox with sequential jaw-type shift; single-mass flywheel; three-plate carbon-fiber clutch; rear wheel drive; limited-slip differential 45/65 %.

Body

Galvanized steel-Monocoque; aerodynamic front end with front spoiler; aerodynamic front underbody; adjustable rear wing; 90-litre safety fuel tank with fast filling function; air jack; welded-in safety cage; electric fire-extinguishing system.

Suspension

Front: McPherson spring strut axle; Sachs four-way gas pressure dampers; double coil springs; front axle arms adjustable for camber; adjust-

able sword-type anti-roll bar (L & R); power steering.

Rear: Multi-arm axle with rigidly mounted axle sub-frame; Sachs four-way gas pressure dampers; double coil springs; rear axle tie-bar reinforced and infinitely adjustable; adjustable sword-type anti-roll bar (L & R).

Brakes

Brake system with balance bar control.

Front: Single-piece six-piston aluminium fixed calipers; inner-vented, 380 mm in diameter; racing brake pads.

Rear: Single-piece four-piston aluminium fixed calipers; inner-vented, 355 mm in diameter; racing brake pads.

Wheels

Front: Three-piece BBS light-alloy wheels (11J x 18-34)

Rear: Three-piece BBS light-alloy wheels (13J x 18-12.5)

Weight

Approx. 1,225 kg (A.C.O.), 1,200 kg (FIA)

Above: The new GT3 RSR features a newly designed front end to optimize downforce.



2008 Porsche Racing News

Porsche Opens '08 ALMS with Sebring Wins

By: Kevin Sims
Photos By: Porsche Press

Sebring, FL – March 16, 2008 – Porsche clinches their 18th overall victory at the 12 Hours of Sebring with the #7 RS Spyder of Penske Racing taking the checked flag. The victory also marks Penske Racing's first overall win at the famed Sebring circuit. The 3.4 liter, V8 Penske Porsche was piloted by the driving team of Romain Dumas (France), Timo Bernhard (Germany), and Emmanuel Collard (France). The #7 Penske Porsche claimed a one-minute margin of victory over the second place overall Dyson Racing Porsche RS Spyder of Butch Leitzinger (USA), Marino Franchitti (Scotland), and Andy Lally (USA). The Audi R10 TDI of Capello/McNish/Kristensen placed third overall despite being more powerful and being classified in the higher LMP1 class.



“This is a great win for Porsche Motorsport and Penske Racing,” said Tim Cindric, president of Penske Racing, “Sebring is the toughest road race of the year, and we had not won it on our previous two attempts, so this victory is extra special.”

In the GT2 class, Porsche unveiled the 2008 updated GT3 RSR with a magnificent triumph. Flying Lizard Motorsports took the top class honors with two of their GT3 RSRs. A crash between the leading Ferrari 430 and the second-place Farnbacher Loles Porsche put both cars out, ending a promising run for Farnbacher Loles. After the shunt, the “Lizard” cars took the top two GT2 positions and finished the race unchallenged. **AA**



2008 European Racing News

Porsche Wins LMP2 Class at '08 LMS Opener

By: Kevin Sims
Photos By: Porsche Press

Barcelona, Spain – April 6, 2008 – The Van Merksteijn Racing team secured for Porsche a LMP2 class victory at the Barcelona LeMans Series (Europe) season opening race. The Dutch driver duo of Jos Verstappen and Peter van Merksteijn beat their 14 opponents in a fiercely contested class battle. They finished the race at the Circuit de Catalunya in sixth overall by completing 208 laps.

“What a race!” said ex-Formula 1 driver Jos Verstappen, “The overtaking and lapping were sometimes adventurous. For me the very dense traffic on the track was a totally new experience, but it was huge fun. The Porsche RS Spyder is a simply magnificent race car.”

Misfortune prevented the other RS Spyder teams of Essex and Horag Racing to secure better positions. The Essex Porsche held an easy lead in LMP2 when a rival crashed into them after mistiming a braking maneuver; thus damaging their RS Spyder’s rear underbody. The Horag Racing Porsche experienced a puncture from road debris damaging their RS Spyder’s body. As a result, both teams lost valuable time performing repairs.

“As a result of the huge number of cars, there was a lot of contact out there. Congratulations to the RS Spyder teams. They passed their baptism of fire with flying colors. With first and third in LMP2 we achieved a super result,” said Hartmut Kristen, Head of Porsche Motorsport. **AA**



Porsche Racing News

Porsche Captures Both LMP2 Titles in Detroit

By: Kevin Sims
Photos By: Porsche Press

Detroit, Mich – Sept. 1st, 2007 – The Penske Porsche RS Spyder solidified their dominance over the mighty Audi R10 by seizing a victory from them with only four laps remaining. Audi was left to wonder how they lost their ground in a season that has seen eight straight overall wins for Porsche. With the overall victory and Dyson Racing's second place LMP2 finish, Porsche clinched the American LeMans Series LMP2 engine and chassis manufacturer's championship.

The winning car of Romain Dumas (France) and Timo Bernhard (Germany) started the race behind their Penske Porsche teammates, Ryan Briscoe (Australia) and Sascha Maassen (Germany). Early on in the race, Briscoe incurred a penalty for "avoidable contact" with a GT2 car tendering the lead to Bernhard. A series of pit stops resulted in several lead changes. During this time the Dyson Racing Porsche RS Spyder of Guy Smith led for 12 laps. Their fortune was short lived as Briscoe put himself back in the lead before handing the car over to Maassen with 90 minutes to go.

The Audi R10 of Pirro/Werner jumped into the lead after the re-start of a yellow flag session. At this point in the competition it appeared as though Audi's more powerful diesel had the momentum to break Porsche's overall winning streak. To make the situation more stressed, one of the Acuras spun and knocked off the rear spoiler of Maassen's Porsche



The Porsche RS Spyders displayed their continued dominance by winning an 8th straight overall victory in the ALMS series at the Detroit.



RS Spyder. The incident required him to make a pit stop which placed his car two laps back. Fortunately, Dumas was in position to chase down the Audi with less than three minutes to go.

"The Audi could pull away on the two long straights, but I could get close at the short corners. I did not want to risk my LMP2 first position, but I found a place to pass. He then passed me back, but I caught him again at the next corner. I knew I could turn faster laps, but it was hard to get past him because of traffic and his power out of the corners," said Dumas.

Dumas's intuition proved correct as he passed the Audi with a mere four laps remaining to take home the overall victory. The contact with the Acura resulted in Maassen having to settle for a seventh place LMP2 class position.

Bernhard/Dumas have not clinched the LMP2 driver championship; they are 37 points ahead of Briscoe/Maassen with only 49 points left to be earned in the season. Andy Wallace/Butch Leitzinger of Dyson Racing pulled into a third-place tie with Acura drivers Brabham/Johans-



son in the LMP2 points with their second place class victory.

The Guy Smith (England) and Chris Dyson (USA) Porsche RS Spyder was competitive all afternoon and appeared to be setting up a Dyson Racing second and third place finish in LMP2. Their luck changed when their Porsche RS Spyder momentarily stuck in third gear allowing them to be passed. The gearbox issue resulted in them slipping from second to fifth place in the LMP2 standings.

The action in the GT2 class proved to be just as exciting. The Flying Lizard Motorsports Porsche 911 GT3 RSR of Bergmeister/Van Overbeek severed an oil line in a collision with another car. A fire ignited causing extensive damage to their Porsche. As a result, the Flying Lizard Motorsports team had to withdraw the car from the race. The Tafel Racing Porsche of Robin Liddell/Wolf Henzler also retired as a result of that accident.

However, the Flying Lizard Motorsports team was not entirely out of the race. The team's Porsche 911 GT3 RSR

The Porsche flag is flown again at another first place podium finish.



of Patrick Long (USA) and Darren Long (USA) gave chase to the GT2 class leading Ferrari 430 during the last 45 minutes of the race. With every lap, Long was gaining ground on the Italian racecar. During the final 15 minutes the Ferrari only outpaced him by less than a second.

Traffic proved to be Long's Achilles heel as the Ferrari increased its gap between them by 20 seconds as the checked flag waived ending the race. Nevertheless, Long's efforts gave Flying Lizard Motorsports a pride restoring second place finish in lieu of the lose of their other Porsche. **AA**

Dumas/Bernhard win Driver's Championship

By: Kevin Sims
Photos By: Porsche Press

Braselton, GA – Oct. 6, 2007 – Romain Dumas (France) and Timo Bernhard (Germany) completed their season-long quest for the 2007 American Le Mans Series LMP2 driver's championship by winning their fifth class victory in a row.

"Timo and I are very pleased to win the LMP2 driver's championship together – our first title as a driving pair. Penske racing prepared a perfect car, and they gave me the go-ahead to chase for the overall win once we determined the LMP2 title was secure. I tried my best, but we are very satisfied with the season we had – especially those six overall wins," said Dumas, who earned his first ALMS drivers title.

Bernhard had won two ALMS titles prior to this year's LMP2 Driver's Championship and was happy to share this illustrious moment with his co-driver.

"I knew from the first time we co-drove together in 2005 that we could win



a championship, but this year was beyond my dreams. We had a great team effort today, and the whole Porsche and Penske organization deserves this championship," said Bernhard.

The Audi R10's extra 200 horsepower over the Penske Porsche's Spyder RS proved to be the deciding factor in the Audi Team's overall victory at the Petit LeMans. With 30 minutes remaining in the race, Dumas's Penske Porsche had the overall lead by a vast margin of 37

seconds when a yellow flag tightened up the field late in the race.

The Audi team seized on the opportunity and out powered the Porsche to take the lead. Ever vigilant, Dumas kept the Audi LMP1 prototype within sight and hoped for a chance to reclaim the lead. However, it was not to be. Regardless of Porsche's impressive 8 consecutive ALMS overall victories, the Audi R10 took the glory and had its day in the spotlight. **AA**

Porsche Tuner Update

Gemballa GT 4.0L RS

By: Kevin Sims
Photos By: Gemballa

Gemballa expands its model range by releasing their version of the Cayman S. Deviating from their company's turbocharged past, the Gemballa GT 4.0L RS features an in-house developed, normally aspirated 4.0 liter engine. The design increases displacement from the stock Cayman S's 3.4 liter capacity by 0.6 liters. Horsepower figures are yet to be issued.

The Gemballa styling team took a relatively modest approach to the new car's exterior appearance. The GT 4.0L RS features a silver colored air exit port at the front of hood ala the Porsche GT3. Further silver-toned styling cues are utilized in car's front spoiler and sided mounts air intakes. Both carbon-fiber items integrate well into the car's shape. A large body colored air spoiler is mounted at the rear to improve downforce capabilities.

The chic car employs a beautiful set of 20-inch black racing wheels with narrow sectioned tires. The car is said to feature enlarged brake calipers and taller vented rotors to improve stopping power.

Gemballa's tradition of 'over the top' styling is applied in the car's interior and is unquestionably the model's grandest feature. Sporting full Alcantara leather

with a vibrant mixture of black and yellow, the extraverted interior provides the GT 4.0L RS with real visual energy. The car's carbon fiber racing seats retract to reveal the cargo hold and share the interior's black/yellow coordination. The interior is topped off with a beautifully polished set of alloy pedals.

AA



SpeedArt BTR-XL 600 Cab

By: Kevin Sims
Photos By: SpeedArt

SpeedArt introduces a 997 Turbo Cabriolet that spices up the senses as it unleashes commanding performance. The BTR-XL 600 Cab, which stands for bi-turbo racer extra large, highlights a 600 horsepower engine with 589 lb/fts of torque. According to SpeedArt, the car propels itself from 0 to 124

MPH in 10.8 seconds and tops out at a cruising speed of 201.9 MPH.

The BTR-XL 600 achieves this power increase through a twin-turbo system provided by VTG and a sport exhaust system featuring a new header, catalyst, and piping for the turbos. The exhaust volume can be adjusted from a switch

in the interior to provide the desired amount of street attitude.

To give the car added bling and stability at speed, SpeedArt provides an aerodynamic package. The wind-tunnel tested kit includes a front bumper with an integrated chin spoiler, side skirts, a rear diffuser and an adjustable rear wing. All aero components are made of carbon-fiber and are body colored.

SpeedArt provides their customers with the option of a KW, H&R, or Bilstein adjustable suspension featuring springs, shocks, and sway bars. SportTech can set the ride height to be anywhere between 20 to 50 mm lower than stock. Brembo provides brake upgrades per the client's request. The car is equipped with either RSC II Elegance BE, 3-piece wheels with black centers or Cross Racing, 3 piece units with a white center. **AA**



Upcoming Release

Sportec's 802HP Supercar Goes 4-wheeling

By: Kevin Sims

Sportec is adapting all-wheel drive technology to their extraordinary SPR1 model. The new car will feature the same 802 HP engine as the rear wheel drive version and possess a targeted top speed of Mach 0.314 or 239 MPH. Despite the additional weight of its all-wheel drive system, the car promises blitzkrieg acceleration with 0 to 60 runs in less than 3 seconds.

The SPR1 program was established by Sportec to develop a Porsche that would surpass the Bugatti Veyron's top speed and become the fastest street-legal car in the world. The 997's basic platform has features that make it a good contender. As compared to other contemporary cars, its narrower body, lighter weight and less obstructive frontal area give the 997 platform a clear advantage.

The original SPR1 was developed from a factory 997 Carrera, as the Tur-



The rear-drive SPR1 was clocked at 240 MPH at Nardo with its Twin-Turbo, 3.6L, dual injector engine.

bo 997 was not yet available. Sportec stripped the car's frame and welded a fully integrated roll cage to provide increased structural rigidity. The cage is only visible from the rear part of the interior, but extends beyond the A-pillar to reinforce the car's front suspension. The SPR1 features a rear and front spoiler that provides remarkable stability at speeds over 250 MPH.

Extensive modifications were made to the 997 engine to generate the horsepower needed to meet the top speed goal. Despite popular practice, Sportec opted to retain the stock engine's dis-

placement of 3.6 liter to ensure reliability. Sportec manufactured custom cylinder heads to work with a twin-turbocharger system that delivers 1.2 bar of manifold pressure. The car's custom pistons yield a compression ratio of 8.4 to 1 and are linked to a machined billet steel crankshaft via titanium connecting rods.

Sportec provided the SPR1 a distinctive multi-bank intake manifold that features 2 rows of fuel injectors. While the engine is below 4500 RPM only one fuel injector row operates. The second row activates only during full throttle situations and above 4500 RPM. The result-



ing affect is a perfectly swirled fuel spray that optimizes engine combustion. Two separate ECUs operate the complex system and prevent full fuel capacity to each row's fuel rail while both are being used. The SPR1 engine generates a thunderous 802 HP at 8400 RPM and a hardly modest 590 lb/ft of torque at 4800 RPM. All this power is delivered to the asphalt through monstrous Michelin Pilot Sport 2 tires, 245/30 ZR-20 up front and 325/25 ZR-30 out back, that are mounted on Sportec designed wheels. Sportec utilizes ceramic composite brakes fore and aft to bring the 2965 lb car to a stop.

The upcoming all-wheel drive version of the SPR1 will surely provide the driver with added traction to handle the engine's tremendous horsepower and torque. We would also imagine that the new system would assist in the car's high speed stability. We look forward to reporting more about this exciting car.

AA

The All-Wheel drive SPR1 promises to be quite the disciplined beast. The system will only add 185 pounds to its weight. Look for the four-wheeler to do 240 MPH plus.



Ruf RGT

Worthy of its Inspiration

By: Kevin Sims
Photos by: Randy Stevens



Ruf strays from its tradition of turbocharged autobahn cruisers to produce the normally aspirated RGT for the racetrack. The RGT, inspired by the famous '73 Porsche Carrera RS, was built to be a dual purpose track/street car.

According to Wayne Corley of the Ruf Auto Centre in Dallas, TX, "The RGT is intended for buyers who participate in club sponsored DE track events. With its lighter weight and no sound deadening, the RGT is built more for the racing enthusiast. It's designed to be easier to strip out and to allow for more adjustability in its set-up. The car's fender flares can be ordered to any width to accommodate whichever wheel sizes. The flares can be easily removed to assist in making painless adjustments at the track."

The RGT's similarity to the Porsche GT3 RS is quite understandable since they are both track hounds. The car from Pfaffenhausen, Germany boasts a beefier, 3.8 liter power plant compared to the GT3 RS's 3.6 liter unit. The RGT pro-

Above: The Ruf RGT, inspired by the '73 911 Carrera RS, is a 445 HP normally-aspirated dual street.track machine that gives racers outstanding adjustability.



duces at its flywheel a generous 445 HP at 7,600 RPM with 309 lb/ft of torque at 5,100 RPM. The RGT’s compression ratio is equal to that of the GT3 RS at 12.0 to 1. However, displacement is not the only source of extra ponies for the RGT’s 997 derived engine. The RGT is equipped with a variable camshaft system that optimizes power and torque across the complete power band by rotation speed and engine load dependent adjustments of the intake camshafts. A digital engine management system with drive by wire throttle is applied to provide spontaneous response behavior. Ruf provides each RGT with two modified catalytic converters, an in-house designed exhaust, and a high flow air filter to bolster the engine’s power hunting objective. In addition, the RGT’s connecting rods are made of titanium to reduce the engine’s reciprocating mass. Ruf makes use of a stouter 6-speed gearbox with a dual-mass flywheel and a limited-slip differential to transfer power to the ground.

The RGT, like all Ruf Automobiles, feature a Ruf VIN number and are derived from an unmarked Porsche frame.



Ruf RGT Specs

Engine

Cylinders 6 boxer
 Displacement: 3,746cc
 Bore x stroke: 102 x 76.4mm
 Power: 445 bhp @ 7,600 RPM
 Torque: 309.8 lb/ft @ 5,100 RPM
 Compression Ratio - 12.0 : 1
 Engine control unit: Bosch ME7.8 with fly-by-wire throttle
 Gasoline: 98 ROZ super+ unleaded

Transmission

Power delivery rear-wheel drive
 6-speed-manual transmission, dual-mass flywheel
 Clutch diameter: 240 mm
 Gear ratios:
 1st gear - 3.82; 2nd gear - 2.26;

3rd gear - 1.64; 4th gear - 1.29;
 5th gear - 1.06; 6th gear - 0.92
 Final Drive Ratio - 3.44

Chassis

Front axle McPherson-strut, anti-roll bar
 Rear axle LSA multi-link suspension, anti-roll bar
 Driver safety aids with ABS, ASR and ABD

Brakes

6 piston aluminum monobloc front calipers; 4 piston aluminum monobloc rear calipers; Ventilated and cross-drilled cast iron discs
 Bosch ABS 8.0

Brake disc diam: 13.8” front, 13” rear

Wheels & Tires

Front: 8.5” x 19 - 235/35 ZR 19
 Rear: 12.5” x 19 - 325/30 ZR 19

Size & Weight

Length - 175.9”
 Width - 73.7”
 Height - 50.8”
 Wheelbase - 92.5”
 Weight: 3,163.6 lbs

Performance

Top speed - 197 MPH
 0 - 62 mph - 4.2 secs
 0 - 125 mph 13.5 secs

An integrated roll cage, wrapped in Alcantara, is installed to further strength the car's frame and to provide the weekend racer with track proven safety. Ruf endows the RGT with aerodynamically enhanced front bumpers that features five different air channels to serve engine and brake cooling needs. A retro “Carerra RS” ducktail spoiler is blended to the RGT's kevlar, rear engine lid. A much larger, adjustable rear spoiler of carbon-fiber can be mounted over the ducktail if the driver deems it necessary. The car's aluminum doors, which weigh a mere 30 lbs each, can be ordered with lighter carbon-fiber units to further reduce weight.

The car's sport suspension is designed for the dual purpose of track and street use. Ruf provides its customers with the option of a specially designed Bilstein or KW gas absorber and spring suspension system. Both units feature a full range of adjustability and cus-



Above, Right: The RGT features an adjustable rear wing made of carbon-fiber that can be removed from the car's rear ducktail. **Bottom, Left:** The RGT's custom interior incorporates body colored accents.



tom sway bars designed to match their unique design. The RGT comes standard with three-piece Superleggera aluminum wheels with a width of 8.5" in the front and 12.5" in the rear. The car's tires are 235/35 ZR 19 up front and 325/30 ZR 19 out back. As mentioned earlier, customers have the option of any wheel and tires sizes they desire. Brembo provides Ruf with a custom brake system for the RGT featuring red-painted monobloc calipers with ventilated and cross-drilled brake discs.

The resulting effect of Ruf's labors is a car that is astoundingly responsive and brutally fast. The RGT propels itself to 60 MPH in a measly 4.2 seconds and to 125 MPH in an impressive 13.5 seconds. With such acceleration it is easy to forget that this car's purpose in life is racetrack athletics. Its combination of light weight, racing adjustability, and razor sharp reflexes make the \$238,000 RGT a brilliant turn-key DE racing solution that can be driven to and from the race track. **AA**

EDO Competition's 997 GT2 R

A 996 Beast Learns New Tricks

By: Kevin Sims



The supercar tuning maestros at Edo Competition have built upon their Oschersleben best lap time winning 996 GT2 R by releasing an even nastier version. The 997 GT2 R is an evolutionary step rather than a completely reinvented car. Its chassis is an enhanced version of the 996 GT3 which was the basis for their best lap time winning car. Also like the Edo 996 GT2 R, the new car's engine is sourced from the factory Porsche 996 GT2 water cooled, twin-turbocharged flat 6 cylinder unit that has been greatly mod-

EDO 997 GT2 R

“New GT2 R customers are offered the option between two different engines; a 542 HP unit and a mightier 680 HP powerplant.”



ified. New GT2 R customers are offered the option between two different engines; a 542 HP unit with 557 lbs/ft of torque or a mightier power plant that develops 680 HP and 642 lbs/ft of torque. Either engine is capable of propelling their driver to a 0 to 60 time of less than 4 seconds and a top speed of over 200 mph.

The real story is that the 997 GT2 R has a completely revised carbon fiber body to update the car's look to that of the current Porsche 997. The new conversion kit includes a new front fascia featuring a revised front skirt, a more aerodynamic carbon fiber front lip spoiler, larger radiator inlets, and bigger brake cooling ducts. In addition, the front fenders have been widened to allow a larger front wheel track to improve handling stability. The more pronounced front fenders required Edo to develop a unique fuel door.

To improve the car's high speed driving at night, Edo equips the 997 GT2 R with stronger litronic headlights. Makrolon provides the 997 GT2 R with special rear and side windows that assist in reducing the car's weight. An Edo designed rear air spoiler is included to work with the front spoilers in generating more down force at higher speeds. The complete body kit is available for any Porsche 996 car and includes quarter panel and rear bumper components that feature ducts to aid in brake and engine cooling.





Edo partnered with KW to provide the 997 GT2 R a new sport suspension with individually adjustable compression and rebound damping settings. The result is a car that is more adaptable to the driver's racing needs. The new machine is equipped with wider footprints as well. Edo employs Michelin Pilots that are 235/45-18 in the front and 335/30-18 in the rear on 10" and 13" wheels. To improve the car's stopping ability, Edo upgraded the car's brakes with 15 inch rotors up front and 14 inch rotors out back. Each wheel features larger 4-piston calipers as compared to earlier 996 GT2 R.

As with all Edo Competition conversions, customers have a large selection of

wheels, exhaust systems and additional suspension components to personalize their 997 GT2 R. The new 997 GT2 R conversion can be applied to any 996 Carrera, 996 S4, 996 GT3, 996 Turbo or 996 GT2.

In an ever competitive Porsche tuner market, Edo has developed a 996 conversion that would update any car into a mean Autobahn intimidator. With tons more horsepower, improved handling, and enhanced aerodynamics, the 997 GT2 R package appears to be hard to beat. We look forward to seeing how the new car performs against its rivals at the Oschersleben raceway in Germany. **AA**

Edo 997 GT2 R Specs

Engine

Water-cooled, twin turbocharged flat 6-cylinder

Power: 542 hp at 6,790 rpm

Torque: 557 ft-lb at 4,300 rpm

Performance

Top speed: 205 mph

0 - 62 mph: 3.8 secs

0 - 124 mph: 11.0 secs

Brake System

Rotor diameter 15 inch front/14 inch rear with 4-piston fixed calipers

Suspension

Adjustable EDO/KW sport suspension with individually adjustable compression and rebound damping

Wheel dimensions

Tires: Michelin Pilot, front 235/45-18, rear 335/30-18 on 10" and 13" wheels

TPC Cayman S Turbo

Bestowing the Boost that Everyone Desires

By: Kevin Sims
Photos By: John Squire



Turbo Performance Center in Jessup, MD provides the Cayman S owner the opportunity to allow their imagination to go wild. The TPC Cayman S Turbo represents a “No Fear” performance rectification for a Porsche that’s been held back by the factory to allow the flagship 911 to shine.

According to TPC’s Michael Levitas, “The idea behind this project was to compliment the Cayman’s positive attributes with enhancements that would allow the car’s true nature to flourish.” The Cayman S Turbo not only presents its driver with forced induction, it features body and suspension upgrades to make the car the perfect street/track package.

TPC prides itself in providing customers with track honed modifications that live up to advertised promises. After spending an afternoon with Michael and his creation, we discovered the car entices the soul and surely lives up to its hype. Right off the line the car demonstrates its



proWess by supplying thunderous torque not usually displayed by a turbocharged car. As the revs climb the engine’s pull mounts exponentially. Acceleration is rocket-like. The sound emanating from behind one’s head is a harmonic sympathy of high pitched whistles and deep bass laden groans turning to screams once beyond 4500 RPM. The car seems to inject adrenaline in your veins. This little crocodile reminds one why they desire a sports car; to blow the cob webs out of their mind. TPC does to the Cayman S as Led Zeppelin did to the blues; they intensify a classic standard with hypnotic power and majesty creating a driving presence that is all their own. We are thrilled to have a conversation with Michael Levitas about TPC’s blissful Cayman S Turbo.

>> What inspired you to develop the turbo system for a Cayman-S?

Michael Levitas: The turbocharged 930 was responsible for transforming Porsche from a name known only by racing and sports car enthusiasts to a house-hold status. Most people feel that the original 930 Turbo was one of Porsche’s most significant cars. It looked like a racecar for the street. Let’s not forget that in 1976, when it was released, its performance

was quite breathtaking. With the heritage of the 930 in mind, I felt that a Cayman S Turbo would create the same excitement. Considering our company’s racing and turbocharging experience, it was logical that TPC be the company to develop the project. Die-hard enthusiasts will notice several styling cues from the original 930 such as the rocker panel’s “Turbo” script. We felt that the Cayman S Turbo needed a rear tail to capture the “930” mystique. To us the Cayman S Turbo encapsulates the essence of a racecar for the street. I believe that Dr. Ernst Fuhrmann, father of the 930 Turbo project, would be proud.

>> What began your interest in the Porsche Cayman-S?

Years ago I raced against a lot of the 914-6s. These cars were a great platform to build a racecar. Being mid-engined, they possessed great weight-distribution and could be modified to be a mean competitor. The same can be said about the Cayman S. The concept of a mid-engine Porsche is an interesting proposition. Taking the great platform that Porsche developed and cranking up the performance would deliver an outstanding car.

>> How do you feel the stock Cayman-S compares to the 997?

The stock Cayman S does have some shortcoming compared to the 997. Porsche seems to have restricted the Cayman S in the engine department. The car is also “detuned” in the chassis area. The struts in the Cayman S lack a lot of rebound valving in the front and holds the car back. Porsche made a decision to make the 997 their premier product. The platform of the Cayman S is definitely capable of more performance. We made it our goal to produce a Cayman S Turbo that would exceed the performance of the prized Porsche 997 GT-3.

>> What components does the turbo system include?

Our turbo system is a very complete package. It’s inclusive of the exhaust system, the wastegate system, the turbocharger, and all of the components to drive the ECU. The exhaust system comprises of everything that is needed; the muffler, and all the plumbing that goes to the turbo. After reviewing a wide-range of turbocharger options, we selected a single Garret based turbo that is similar in capacity to the unit in the original 930 Turbo. We have designed the Cayman Turbo system to be easy to



With its expansive front splitter and large rear spoiler, the TPC Cayman S Turbo looks like a road warrior.

Top: A pre-production TPC engine with its turbo installation. Bottom: Notice the TPC car's wastegate to the left.



install. The factory ECU does not need to be modified in any way with the exception of plugging in our Plug-In-Play (PNP) computer. The PNP simply piggy-backs the factory ECU to enable it to add supplemental fuel. Our computer drives the primary fuel injectors and operates boost control. Through research, we determined that the stock Cayman S fuel pump is quite adequate for the turbo upgrade. The pump is the same unit in the 997 and is able to support many performance upgrades. The weight of the Cayman S Turbo is not greatly affected by the addition of our turbo package. Not using the notoriously heavy stock muffler gave us quite a bit of weight reduction. The net result of adding our turbo package and deleting the stock muffler is a modest weight gain of 10 to 11 pounds.

>> What modifications are made to the stock Cayman S engine and gearbox?

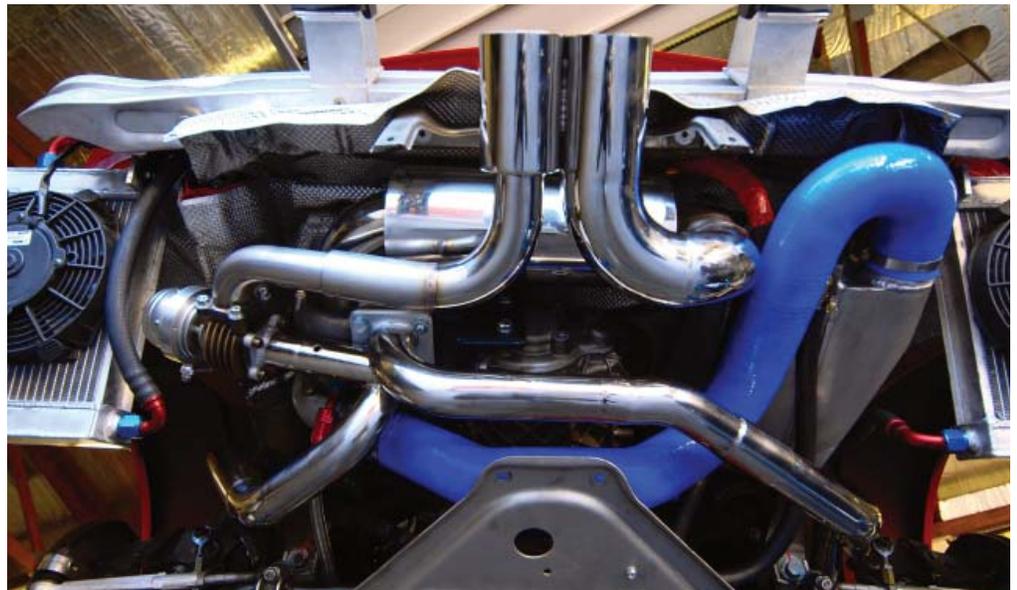
Through an exhaustive research program, we found that the stock engine and gearbox are both extremely bullet proof. Porsche has produced an outstanding power and drive system. Learning from our research, we decided to make no changes to either unit. Porsche's modern multi-valve head has a robust combustion chamber which allowed us to retain

the stock compression ratio of 11.1 to 1. Our turbocharger's conservative 5 psi manifold pressure boost does not affect the engine at all. We do recommend an upgraded clutch package that we offer our clients. The stock clutch is up to the job of handling the extra power; however, we expect that most of our clients are going to be driving the car relatively hard. A fortified clutch would greatly extend the unit's longevity under "enthusiastic" driving conditions. Plus, our upgraded clutch allows for faster exit speeds when

downshifting in tight corners. For people who are track minded, the upgraded clutch is a necessity.

>> What horsepower and torque figures should a Cayman S owner expect to generate with TPC Turbo conversation?

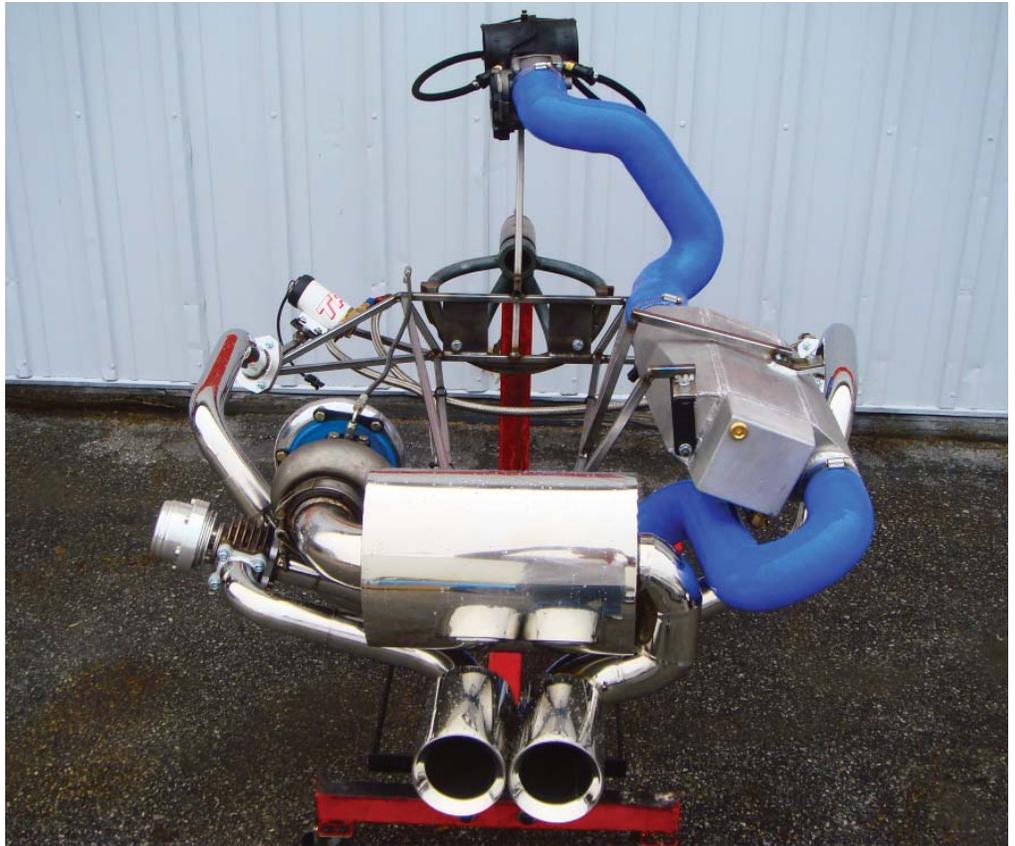
At the start of the Cayman S Turbo program we made a goal of 400 RWHP. We are happy to report that we exceeded our expectations. Our little crocodile really puts some power to the pavement. Our test car is generating a maximum of 422 RWHP and 400 lb/ft of torque at the tires. Our production package will be around the same numbers. In addition to engine dyno testing, we chose to do a real world comparison test with the GT3, which we consider to be the current benchmark for modern sport cars. We took a '07 GT3 and our Cayman S Turbo test car to the Capital Drag Raceway to do some quarter mile runs. We dragged them side-by-side for three separate runs and found that our Cayman S Turbo consistently ran a half second quicker than the GT3. Our test car also put 5 mph to the GT3 in the quarter mile's trap speed. We chose quarter mile testing because it really does tell a tuner a lot about how much real horsepower and torque a car is producing. The GT3 is quoted at producing 420 HP at its flywheel. Considering that the Cayman S Turbo was quicker and upped



the GT-3 by 5 mph, it would seem logical that our test car is producing around 470 to 480 flywheel horsepower.

>> What suspension modifications would you recommend to make with the addition of the turbo system?

We took a stock Cayman S to Summit Point Raceway in West Virginia to do some suspension testing to discover the answer to your question. This track was chosen because it is my home track and I know the circuit extremely well. We generated some good lap times with the stock Cayman S suspension, but the front damper did not have a lot of rebound. Then we came back with our JRZ-RS struts installed. Our JRZ-RS shocks and struts are high gas twin-tube designs that feature 2-way adjustability. With these shocks we found that the crocodile enjoyed a set up very similar to the 997. It preferred lots of front rebound and little compression. In addition, we discovered that its rear preferred a decent amount of compression and a moderate amount of rebound. Using the stock tires and these optimized shock tunings, we picked up almost 3 seconds per lap, which is just tremendously big. We then tuned the suspension further by adding our sway bar package. We found this to be a key component. We gained almost 4 seconds per lap ahead of the factory car without any engine modification whatsoever.



We tuned the chassis so well that it puts down power incredibly well. The Cayman S JRZ suspension system, which is currently in production, incorporates springs, shocks & struts, upper camber plates, and a sway-bar package. With these upgrades the ride height of the

Cayman runs pretty close to European specifications, which is 20 mm lower than the American car. The resulting handling performance is outstanding and highly recommended to our Cayman S Turbo clients.

>> How does it compare to the stock Cayman-S?

The turbo and JRZ suspension upgrades really wake the Cayman S up. Our Cayman S Turbo should be the car Porsche is producing. The turbo package drops the quarter mile time by a solid second and a half and the 0 to 60 mph time also plummets by roughly a second and a half. The difference is huge, it's over the moon. To give you an idea of how strong the Cayman S Turbo is compared to the stock Cayman S, let's look at the Dynojet numbers. At 4000 rpm, the factory Cayman S runs roughly 200 lbs/ft of torque to the tire. Our car generates 300 lbs/ft at 4000 rpm to the tire. When the factory Cayman S is running at 5000 rpm it's twisting off 220 lbs/ft of torque to the tire. Our Cayman S Turbo is push-

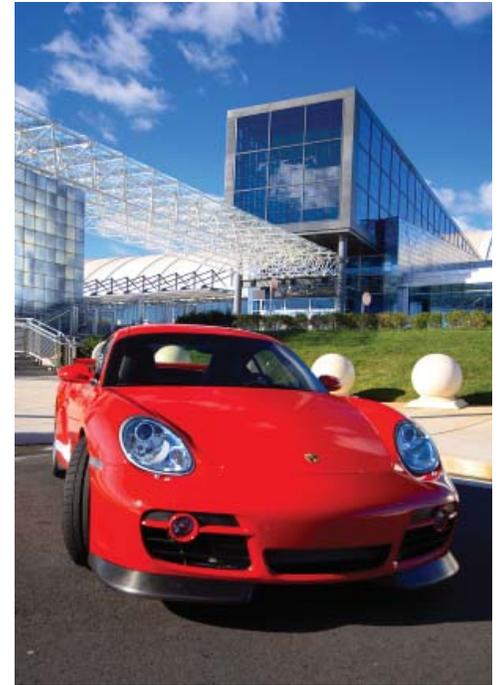


A close-up of the TPC Turbo package for the Cayman S.

TPC Cayman S Turbo

"When the factory car runs out of breathe it produces 260 RWHP, while our boosted crocodile makes 422 RWHP," explains Michael Levitas.

Top, Right: TPC offers an enlarged carbon-fiber front splitter with the turbo package.



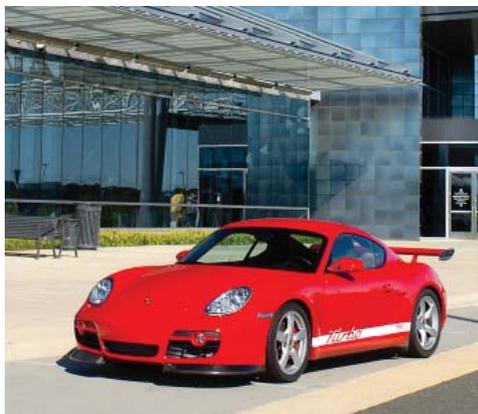
ing the pavement with 340 lbs/ft at 5000 rpm. When the factory car runs out of breathe it produces 260 RWHP while our boosted little crocodile makes 422 RWHP at the same point. Even at fixed ground, the factory car is making 255 at the tire and ours is making 375 RWHP. In short, our car produces roughly an additional 100 lbs/ft of torque and a little more than 100 HP everywhere in the rpm range. I think any one who takes a spin in our Cayman S Turbo would really notice how balanced a performance package the car represents. We have brought to the Cay-

man S a level of balanced performance that is equal to a factory racecar and greater than a 997 GT3. We have done an incredible job of matching the car's chassis to the turbo engine. We have revealed to the world what the Cayman S is cable of doing.

>> What was the most challenging aspect of developing the Cayman S Turbo system?

The most challenging part was finding the proper turbine trim. We were quite surprised by the amount of turbine flow

required for a multi-valve engine. We had to use a bigger turbine driver than a 993 3.6 liter Porsche engine that makes 500 HP at the track. We worked diligently on the Dyno to find the right combination. We spent 6 months working with different pressure ratios, exhaust and manifold pressure trying to find that perfect turbine balance to ensure the engine would have outstanding performance and longevity. The resulting test car is in near-to-production form. We have already begun the industrialization of the performance kit.



The TPC Cayman Turbo S photographs were taken at the Steven F. Udvar-Hazy National Air and Space Museum in Chantilly, VA.





>> What body and wheel options does a TPC Cayman turbo customer have to choose from?

In addition to the turbo and suspension package, we have produced a fantastic aero package for the car. The factory car's aerodynamic balance is exceptionally good. The biggest hurdle was to develop an arrow package that was as aesthetically pleasing as it was aerodynamically proficient on the race circuit. We wanted to ensure there was not too much down force in the front without having balance in the rear. What we came up with was basically a rear wing assembly that was close to that of a factory GT3 RS and balanced it with a front chin spoiler assembly that affixes to the factory front bumper cover. We found that by changing the front bumper cover to a bolder look gave the car a bad imbalance at high speed. We worked very hard on the issue and developed a package that accomplished a unique look with a functional aerodynamic advantage. Our company is different in that we are not only concerned about styling; we are deeply fretful with how an aero change performs on the race track. We drive the car at VIR and test the various designs to see which provide greater stability through track's high-speed S's. The aero package we selected performed better than the stock Cayman S.

>> How does the maintenance of a TPC turbo Cayman differ from a stock Cayman-S?

No difference. Maintenance is basically the same. We advise the customer to change the oil every 5K and too reduce the spark plug change intervals down to 15K as opposed to the factory recommended 60K. The added compression from the turbo boost starts to wear the electrodes a bit more. I would also recommend that drivers let the turbo cool for 30 seconds or so prior to shutting down the engine. This simple routine will greatly prolong the life of the turbocharger.

>> How does the turbo system affect the Cayman's day-to-day drivability?

We focused on making the resulting car very drivable. In fact, our car's drivability is quite frankly better than the stock Cay-

man S. The added torque at lower and mid rpm provides a steady pull making the car very traceable. Most companies would have lowered the compression ratio thus killing some of the drivability. We took the approach of complimenting what the factory had already developed. Our car doesn't really drive like a tuner car. It feels like a factory Porsche. Its torque band is quite wide. The turbo spools very quickly and has little lag. The car is as comfortable on a commuter drive to work as it is doing fast laps on the race track. The Cayman S Turbo is the perfect day-today car that can be driven competitively at the track.

>> Who do you see being a TPC Cayman S Turbo customer?

I see the TPC customer as being anybody and everybody who has purchased



a Cayman S. I believe anyone who has purchased a Cayman S did so because they are looking for a certain performance envelope. Customers of Caymans are not looking for their car to be a grocery getter or to look cute on a Saturday afternoon. Cayman drivers are more performance minded people than Boxster or even standard-997 people. Porsche has built a great sports car with the Cayman S. What we have done with the Cayman S Turbo is bring out performance that is lurking beneath the car's surface. I believe every Cayman owner will appreciate that fact and desire more from their car.

>> What is the cost for the complete package?

Our price for the turbo system is going to be \$7900 US dollars with an additional price of \$1500 for installation. We have worked on making the installation process as painless as possible. It only takes about 20 hours for us to install the turbo system. Compared to other turbo conversions by other companies, our system requires much less time to install thus reducing the cost to customer. The JRZ suspension upgrade we mentioned earlier would cost a customer around \$5900. It includes springs, shocks & struts, upper camber plates, and a sway-bar package and yields an impressive handling car. We recommend it to any Cayman S owner. The clutch and aero packages would be more. We are currently working on the pricing for these items. We have inten-

tionally designed the packages to be affordable. An interested customer could go out and buy a used Cayman S for \$50,000 or so. They then can come to TPC and for roughly \$15,000 own a car that out performs a \$100,000 plus Porsche 997 GT3. Someone would have to go out and buy a lightweight version of a Ferrari 430 to be able to compete with our Cayman S Turbo. Let's face it; the Ferrari would cost over \$300,000. That's a ton of cash. Our car is a real performance value. We believe that the true super car experience seeker will have a hard time finding a car better than the TPC Cayman S Turbo for the money. We are currently taking orders for Cayman S upgrade packages. Our first "Turbo" customer cars are currently in the shop having installation work completed.

>> What experience has TPC had in developing turbo systems?

We began developing turbo systems in 1987. TPC, which stands for Turbo Performance Center, worked for quite a few professional race teams in those days. We hit our stride between 1990 and 1993 in the IMSA series with Nissan and Mazda. However, we worked with every manufacturer running in IMSA with the exception for Porsche. We did a premier job with the IMSA endurance racing Mazda RX7 project that yielded a turbo engine with nearly 500 HP. Through these successes, we learned valuable knowledge which we applied to street cars. All of TPC's car modification experience has been de-

rived from race car engineering. It is the soul of our existence. Fortunately, racing has been good to us. In 2006, TPC won a GT Class victory in the Rolex 24 Hours of Daytona in a Porsche GT3-RS.

>> What have been your Porsche turbocharging highlights?

A highlight that quickly comes to mind is our turbo Porsche project for the 90' Bonneville Salt Flats event. TPC is the only independent company to have built a sequential twin-turbo system for a Porsche. We were aiming to set a record for a class called the E-production supercharge. The class only allowed a maximum displacement of 3.4 liters. The Ford Division held the current record with their supercharged T-bird which ran a speed of 197.8 mph on a five mile course. We qualified for the event with a speed of 176 mph in the quarter mile. Our car's speed was much faster than the record holding T-Bird's at the quarter mile mark. Despite this fact, we were not able to have a chance to bet the record. The lake bed's water table was dangerously high and the event was canceled. The car that we built was impressively fast. Hitting the 176 mph at the quarter mile mark was unbelievable for the time. We had proofed our point. Since this time I have been a big believer in the performance capability of a street Porsche. The factory-prepared cars are already fast, however, it is when they are modified that they really strut their true calling. **AA**



2000 Boxster 3.4 Conversion

Roock Autosport Rescues a Distressed DE Machine

By: Kevin Sims
Photos By: John Squire



Michael Johnson's converted 3.4 liter Boxster is an example of turning adversity into opportunity. While tracking his car at a PCA Driver's Education event, a known Boxster deficiency presented its ugly head. Michael was navigating a particularly high G, long duration left hand turn when the engine

became starved for oil. After taking the turn, he heard a piercing "clicking" sound from behind him. The result was not pretty. The engine, in effect, became a German paper weight. The scenario is an enthusiast's ultimate heartbreaker.

Having bought a Boxster due to its affordability, Michael was interested in finding a way to repair the car without

breaking the bank. After an exhaustive search, he came upon a white light in the darkness; Fabien Roock and his Roock Autosport shop in Atlanta, GA. It appeared that Michael's impaired engine created the perfect occasion to upgrade his car.

Fabien presented Michael with an idea of replacing his stock 2.7 liter

2000 Boxster 3.4 Conversion

"Michael's 3.4 liter converted Boxster is now a 300HP, mid-engined reason to go to the track or to tear up some curvy back roads."



engine with a boisterous 3.4 liter engine from an early 996 model. The shocking part was that Fabien's suggestion was not outrageously more costly than simply installing a stock unit. Moreover, the conversation would surely make the car a more potent road warrior. The decision was a no brainer. He had Rook Autosport perform the work and is amazingly satisfied with the results. Michael's car is now a 300HP, mid-engined reason to go to the track or to tear up some curvy back roads. We are thrilled to have a chat with Fabien Rook about Michael's Boxster 3.4.

>> Tell us a little about Rook Autosport?

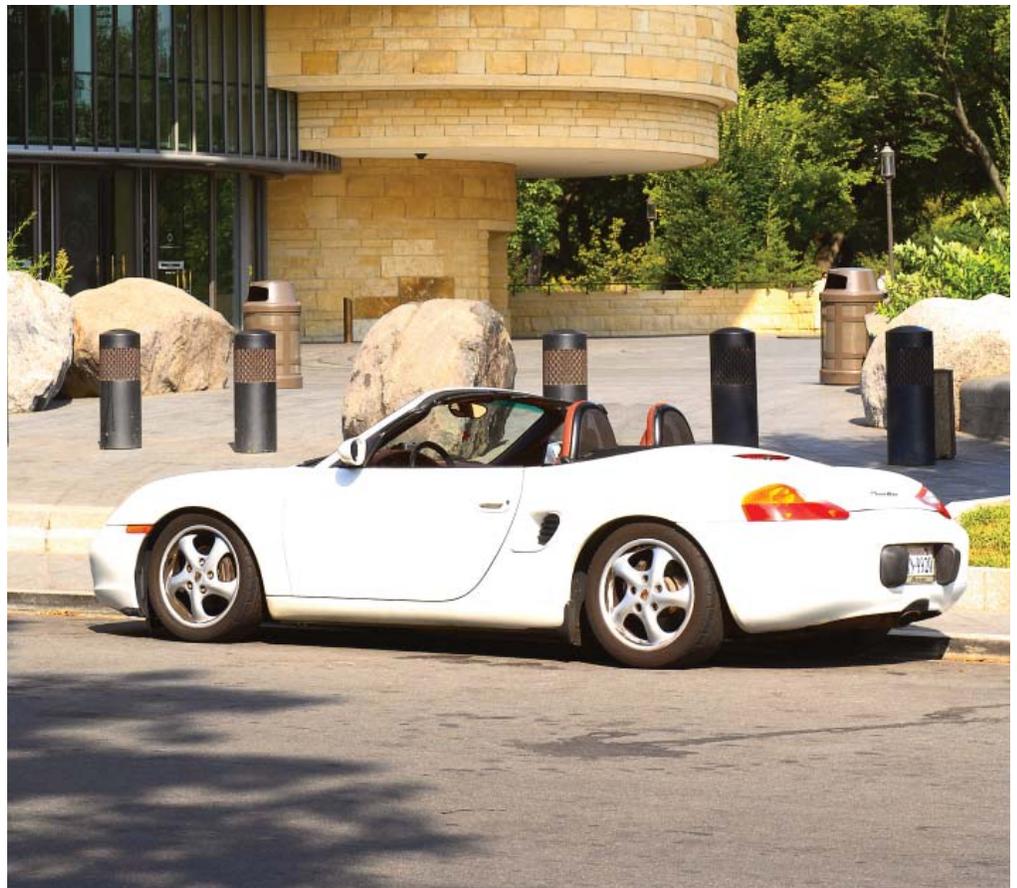
Fabien Rook: I started Rook Motorsport in Europe in 1990 as a company that prepared Porsche customer racing teams. Sometime later, we established Rook Autosport in the United States with an east coast shop in Atlanta, GA and a west coast operation in Los Angeles, CA. Since our beginning, we have had international racing success by winning victories at the 24 hours of LeMans and the 24 hours of Daytona. In addition, we achieved a FIA GT World Championship. We have also raced in the American LeMans Series and finished second in the points in 2000 and 2001. Our team has

Upgrading a Boxster with a 996 engine reveals the car's beastly nature. The extra torque makes for more potent standing starts and quicker exits out of curves.

had more than 150 race starts since 1990. From our racing experience we have the background to build reliable street cars for the performance minded Porsche driver. Our shops in America are dedicated to this function. So, when Michael called us about his misfortune we were in the position to help out.

>> Michael mentioned to us that he was actually presented with more than one option. What were they?

Yes that is correct. We offered him three possible normally aspirated engine solutions which included the Porsche factory 3.4 liter, 3.6 liter, and 3.8 liter engines. The most powerful was naturally the 3.8; however, it is a very expensive undertaking. Since Michael's Boxster had the 5-speed gearbox, we recommended him to choose the 3.4 liter route. The base 5 speed gearbox is a particular limiting factor because it is a weaker unit. We usually advise that customers only employ the 3.6 liter or 3.8 liter engines if they have the 6-speed gearbox. Financially the 3.4



liter is the best way to go since it is an easier conversion and the engine is less expensive. He took our advice and opted for the 3.4 liter engine. Once he had made the engine decision we informed him that he had two different source options. He could either buy a new 3.4 liter engine from us via Porsche or search for a used 3.4 liter unit that he would buy separately. He decided to go with the used engine option. In this situation, he provided us with the used unit and we charged him for the labor of the conversion. He was fortunate enough to locate and buy a used 3.4 liter engine for around \$5K. We thought this was an outstanding price. Bargains can be found on Ebay and other online resources. The biggest price problem that customers are faced with in purchasing a new 3.4 liter engine from Porsche is that

they are not reimbursed for the core charge. Porsche does not accept a 2.7 liter engine as a core in exchange for the 3.4 liter. This adds about \$3K to the new engine’s cost. Michael’s complete conversion was below \$15K.

>> What work was performed on the used 3.4 liter engine prior to its installation?

We did not rebuild the engine. Michael’s unit came with mileage certification, so we were pretty confident with the condition of the engine. We performed a leak down and found the engine to be in great shape. Since the engine was out of the car we performed a full service on it; which included spark plugs, replacing the main sealing, and everything that the Porsche shop manual recommends. It is smart to do the schedule maintenance at this time to be sure there is no engine misfiring. We also installed a higher

performance clutch on Michael’s car since he is known to track the car. We did not modify the transmission at all. It is stock. He also opted to upgrade his exhaust to a sportier system.

>> What is the most challenging aspect of performing the engine swap?

The mechanical side of the job is not at all complicated. Any certified Porsche shop could perform the job. It is in the electronics that require specialized skills. Our conversation is unique in that we use the existing electronics as compared to other companies. Using a different engine ECU is probably an easier selection; however, a lot of other items on the car will not work once the ECU is changed.

With our approach, we make adjustments in the harness while using the existing ECU that results in no errors, such as dashboard problems.

The challenge is to get the car running



An owner of a Rook converted Boxster has the covert pleasure of knowing that their car is a wolf in sheep’s clothing.

2000 Boxster 3.4 Conversion

“The Boxster’s frame has no issue in handling Rook’s newest 500 HP, 3.8 liter conversion...extra power is a welcome upgrade to this car’s platform.”



without any engine warning light and engine misfiring issues. We also remap the ECU to fit the needs of the upgrade Porsche engine. Our experience in racing has given us the knowledge base to figure out these issues. The conversion also requires switching over oil and water tubes to fit the new engine. In addition, we also like to retain the appearance of an OEM unit. With one of our cars customers will not see bright yellow tubes and other clues that the car has been modified. In the case of Michael’s car, we did not make any internal engine modifications. We had talked about installing an X51 camshaft, but Michael wanted to make the car as streetable as possible. The total conversion usually takes about 60 to 80 hours to complete.

>> What is the resulting affect to performance after the 3.4 liter engine’s installation?

As Michael would agree, it is another car. We installed our RB310 package into Michael’s car and the power ranges from 303 to 310 HP. With the X51 software we would be able to achieve around 320 HP. While there are some losses in power in comparison to the same engine in a 911



Carrera due to the Boxster’s intake path being longer, the car is a blast to drive. Not only does it accelerate much faster than the stock car, but its improvement in drivability is enormous. The 3.4 liter engine generates much more torque than the original 2.7 liter engine or even a 3.2 liter Boxster S engine. Since the Boxster is lighter, Michael’s car is quicker than

a 996 Carrera of the same vintage. The Boxster’s mid-engine format also allows for improved handling balance than the 996 Carrera. The result is an enjoyable car to drive either on the track or the street. The Boxster’s combination of mid-engine handling and open top fun makes for a great car. All we have done is made the Boxster package even more exciting by adding the new engine’s power. It is important to note that the Boxster’s frame is more than up to the job of handling more power. For example, the Boxster’s frame has no issues in handling our newest 3.8 liter conversion with the X51 software and additional tweaking that produces around 500 HP. Regardless of the engine package selected, the extra power is a welcome upgrade to the Boxster platform.

>> What differences in maintenance are created by the installation of the 3.4 engine?

The engine maintenance is the same. A Boxster and 996 Carrera shop book is pretty much the same. We advise customers to bring the car’s information sheet with them when maintenance is being completed. It is important that mechanics

use the 3.4 liter Carrera 60K maintenance package on converted cars. All the diagnostics for the engine remain the same. We designed our conversion to be easy for any Porsche mechanic to work on. The Boxster’s driveshaft is a little more service intensive as it is the weakest part of the project. Both the standard Boxster and the Boxster S driveshaft have a problem with the rubber cracking. We recommend that a customer has the driveshaft inspected every time an oil change is performed. If the car’s driveshaft displays any sign of cracking, then we advise the customer to replace the unit immediately. We have produced roughly 50 cars with this conversion and have the background to help us know what any issue may come up. Our customers have been satisfied with their car’s reliability. We have one customer that has driven his converted Boxster around 80,000 miles since the engine swap. He has the car maintained at his local Porsche dealer and we never see him. Remember, our converted engines are stock Porsche units unless other modifications are requested.

>> What suspension modifications were made to Michael’s car?

All the suspension work had been done on the car prior to the installation. We did not alter it any further. Michael had installed Eibach springs and sway bars.

I had previously recommended that he install the Bilstein PSS9 suspension package of shocks and coils, which he did. He has found the combination to be a good compromise between street and track duty.

>> What would be the cost associated to installing the other engine options that Michael did not select?

If Michael had chosen a new 3.4 liter engine from Porsche his price would have been in the \$17K to \$18K region, depending on the exhaust options. Customers that want to spend more money can either select the 3.6 liter or 3.8 liter options. A new 3.6 liter engine conversion would run about \$20K to \$25K when everything is done. Of course, if customers want additional modifications over the stock setup that price will increase. The most powerful option is the 3.8 liter X51 engine that is rated at 385 HP. This would cost a customer around \$30K and up. The 3.8 liter option includes a larger brake upgrade due to the higher performance capabilities of the powerful engine. The same brakes are available on the other two engines at additional cost.

>> What has Rook Autosport learned over the years about the process of installing these engines into Boxster?

We have found that the most important

aspect of making this conversion is not to exchange the Boxster’s harness and ECU with that of the Carrera’s. By choosing to alter the existing Boxster components we have avoided many of the computer export headaches experienced by other companies. The six to eight months we worked on the project was surely a nightmarish experience but we are extremely happy with the results. We are able to deliver a car that performs as a “factory” car. Since our first conversion in the 2000/2001 time frame, we have built over 50 converted Boxsters with various engine sizes. Prior to releasing any of these cars to our clients we thoroughly test each car to ensure its quality. Michael is one of these satisfied people. He drives the car on the track and as a daily commuter. To date, the car has performed brilliantly. Once he took delivery of his completed car, he commented that Porsche should have produced the Boxster with this engine from the beginning. He has reported to us that on the racetrack he has consistently improved his lap times by about a second or so depending on the track. With the addition of the car’s extra power he has found it necessary to up his driving game to match the car. He is confident that once he is driving the car to its potential that his lap times should improve even more.

AA



TRG 996 GT3-R

Club Racing with the Real Deal

By: Kevin Sims
Photos By: John Squire



Rod Ryan is among a select few living out a childhood dream by racing a Porsche Factory racecar in PCA's Club Racing Series. He purchased his first Porsche, a 914-4, at the impressionable age of 17. While owning the car he developed a real taste for driving and envisioned himself one day being a racecar driver. While life's responsibilities required putting his racing ambitions on the back burner, his love for Porsche could not be restrained. Since the 914, he has owned a string

of Stuttgart classics including several 356 coupes, a Boxster, a '69 911 S and a '73 911 Carrera RS. Once family and professional commitments were attained it was time to revisit an old love. It was with his '69 911 S that he was first able to live out his Porsche racing dreams.

Rod's '69 S had been previously converted into a racecar and had a long track history. He drove the car at PCA Racing events and found racing to be as exhilarating as he hoped. This experience, however, taught him that tracking a converted street car involved unexpected

maintenance intervals and continual mechanical development to keep it competitive. Although he had a deep respect for the "street-based" racing scene, he discovered that the time and energy required for such cars was not for him. Despite this apparent mismatch, he still possessed a primal desire to race and hoped for a more time effective way to experience the type of driving he dreamed of as a 17 year old.

Bob Miller of At Speed Motorsports offered Rod the perfect solu-

Rod Ryan's Porsche 996 GT3-R, formally raced by The Racer's Group in the 2000 and 2001 seasons, is just the machine to satisfy childhood dreams of racing a Porsche.



tion; race a factory prepared 2000 996 GT3-R with his company providing full race, maintenance, and logistics support. Bob's option is a viable solution for people such as Rod who first and foremost want to focus on the driving aspect of racing. Professional racing companies such as At Speed Motorsports can provide the amateur racer with the kind of experience that can only be obtained from battling it out on the racing circuit. Having raced a 996 GT3-R in the 2001 and 2002 World Challenge Series, Bob's

company offers a familiarity with the car that is priceless and extremely difficult to replicate. We are pleased to have a conversation with both Rod and Bob amount their racing cooperative.

>> What preparations did you make to ready yourself for racing a 996 GT3-R?

Rod Ryan: I had participated in the PCA's Driver Education while I was racing the '69 911S. The education I received from the PCA program was a great starting

point. I recommend the program to anyone wanting to learn how to race. After I bought the 996 GT3-R, I realized I needed to step up the training to match the car's performance. I took classes at Skip Barber and participated in their open wheel series during the summer of 2007. I competed in 8 races and really enjoyed it. It was an invaluable experience. The race start for me is the most concerning part of a race. The Skip Barber series was the best venue to gain "real life" race start familiarity. I also participated in the PCA's DE with the 996 GT3-R to gain important seat time in the car.

>> How is your relationship with At Speed Motorsports?

Rod: It's been excellent. They worked with me on honing the '69 911S for racing. Despite a few mechanical disappointments, I had a great time with them running the '69 911S. It was due to my positive history with them that I trusted Bob's recommendation to race a factory racecar.

>> What does At Speed Motorsports provide to a customer like Rod?

Bob Miller: We bring all the experience of having run these factory racecars in the venues where they are actually built to perform. So when a customer comes to us with a need to take care of these factory machines we've put it to its test and we've seen everything break that generally can break. We know when it will happen and how to make it not happen. Also, quite frankly, as a guy who came up through the ranks of PCA Racing as I did, I can show Rod how to avoid all the pitfalls racing can present. I'm making sure he is not making the mistakes I made. Because I have 12 years of mistakes that I learned from, I can get him through that so he has a great experience and a great time. I have been impressed with the speed of Rod's learning curve. He is able to move forward so much faster than I did. Back when I started, PCA club racing was in its embryonic stage. Now it's a full fledged, forward moving race series. I'm able to guide Rod and do a lot of coaching for him. I co-drive with him so I can lay down laps and he can see how

those laps compare to his. Such personalized mentoring helps push everything forward.

>> What extra attention does a factory RS racecar require that a new customer needs to be informed about?

Bob: The amazing aspect about factory racecars is the “purpose-built” engineering that Porsche Motorsports designs into the car. They have about a hundred German guys exclusively designing these machines. Racing them and breaking them, and racing them and breaking them again. By the time they design a factory car for a customer, a non-Porsche team, their design concepts have gone through every possible problem. Believe it or not, factory racecars are less problematic than building your own street-derived racecar from the ground up. Porsche Motorsports has completed all the quality control testing to ensure the factory racecar is reliable. They need less general care than the street car that has been converted into a racecar. We know exactly when to replace parts, that the parts exist, and have the assurance of knowing that Porsche has designed them. We know when components are going to fail and replace them before they do.

>> What is the yearly maintenance one would expect to perform on a factory RS racecar?

Bob: It’s pretty simple. Owners should replace the axles and wheel bearings once a year. Each year the rubber bushings throughout the suspension need to be replaced. The professional race shop’s approach is to track the slow death of the engine with leak downs after each usage. What this provides is a barometer for the overall metallurgy that’s inside the engine. The leak down reports that this particular bearing is deteriorating at this rate and all these other bearings are deteriorating at that rate. Doing such wear tracking allows one to accurately estimate the deterioration of the engine. Generally, we’ll let an engine go to about 20% leak down and then its time to start having the “rebuild” discussion. Think about it, you’re driving a German car. The German people are the most methodical people in the world. So they have set up a schedule that is very methodical. It quotes that at “30 hours” such a part needs to be replaced because they know at 40 or so hours it will break. In my opinion, the schedule is a bit of overkill, especially at the club racing level. Porsche states that Rod’s engine is a

30 hour unit. By ourselves we have put 50 hours on it and it probably came to us with 30 or 40 hours on it. So it’s going to have 70-80-90 hours on it before we rebuild it. Porsche wants us to do it at 30. That just goes to show how well designed it is in terms of the true life of the engine. In our experience, tracking the leak downs really assist in finding this margin of overkill.

>> In your professional experience, how much racing experience is required to race a factory racecar?

Bob: To explain the answer I will tell you a story I told a customer the other day. If you are flying a Piper Cub then you know how to fly. If you want to fly an F-18, you are still flying. When you take a turn in a Piper Cub, it can do certain things. If you turn in an F-18 it can do certain other things, but it’s still basically the same procedure and set of basics. A customer certainly should have a level of experience before you step into a factory RS racecar, but it doesn’t mean you have to be a Derek Bell. These cars will go as fast as you want them to go based on how far you push that pedal. What these cars do is react quickly. They do things faster and have a level of capability that





is so much higher than a street car. So, driving them at 80% will feel to the amateur racer like ‘Good Lord, this thing’s on rails!’ It is important to learn where your capabilities are and then gradually increase your skills. Safety is first.

>> Since Rod has bought the car, what work has been completed?

Bob: The car came out of The Racer’s Group, Kevin Buckler’s operation. They ran it in 2000 professionally, and I think in ‘01, and then it was sold off. It went to another owner, and then to another owner and in the meantime nobody did much of anything. The owners after TRG let the car sort of deteriorate. When we got it, we really needed to stabilize the car. That meant a lot of suspension work; worn out lower arms, worn out joints and such. We actually had cracks in the front and rear sub-frames, so there were a lot of changes just to stabilize the overall car itself. We haven’t performed any work on the engine and the transmission. Unfortunately, metallurgy says that over time things wear out and nobody had done much of anything with this car. It probably took about \$20k to stabilize the car. Now it’s absolutely incredible. The price that we paid for it and what came

Derived from a production 996’s design, the 996 GT3-R’s mechanicals are purpose-built for racing. Porsche Motorsports re-engineered the car to compete in racing series throughout the world. Rod is proud to be racing a true thoroughbred racecar.



with the car made it financially feasible despite the needed repairs. The only actual upgrade we made was to correct an issue that the 2000 RS models had. When Porsche designed the suspension it had massive bump-steer problems within the geometry. What The Racer's Group tried to do was correct this by raising the pick up points in some of the geometry. This meant they had to cut things, weld things, and move things up. What we have done is take brand new parts from an '02/'03 car and tried to advance that geometry a little bit further to completely remove the bump-steer. In '02/'03 Porsche had figured it all out, so it made sense to make this modification.

>> What is your advice for a customer who wants to race?

Bob: What I tell customers is to tell me your budget, and within that budget I'll find you the best car in the country for what you want to do. Whenever I can match that budget with a factory produced car, that's what I try to do. At the moment the 964 cup car is about \$55k to \$70k, the 993 cup car is about \$70k - \$80k, the 996 cup car is about \$65k - \$100k, and when you go to a 997 it's \$140k - \$180k. So somewhere in there, if your budget fits those numbers, I'll try to match you with a factory car for all the reasons we talked about. The factory produced cars are probably the safest racecars roaming the planet. They all have completely

According to At Speed Motorsport's Bob Miller, a race car built by Porsche Motorsports is ultimately more cost effective than a converted street Porsche due to the fact that Porsche has already paid for the racing development.



welded in cages from the factory, crush tested and FIA approved. If you have a crash in one of these cars, the rigidity of these chassis is absolutely incredible. It's just off the charts versus the guy who has a street car and puts in a cage. If you have anything from \$30k for a 944 turbo cup car to a \$180k for a 997 GT3-R and you want to go racing, the best way to do it is with a previously raced factory car.

>> What has been the most satisfying aspect of supporting a customer like Rod?

Bob: The most satisfying thing for me is taking a guy like Rod who is turning

1:25's at Summit Point Raceway and witness him reduce his times in a weekend to the 1:20's. He's psyched, he's having fun, and he's going 10% faster! During the next weekend, he is going to be faster. He wants to go professional racing. We want to put him in a position to achieve that goal. We love to take customers and move them forward through the ranks.

>> What has been your most fun experience in the car?

Rod: Racing at my first PCA Club Race at my home track of Summit Point, WV. I could barely sleep the night before the race. Every time I'd go off to sleep, I'd wake up and remember that I was going to be racing a Porsche racecar tomorrow. All sorts of thoughts were spinning through my mind. Once I was at the track I wandered around a bit with all kinds of nervous energy. I could not wait to do some fast laps in the car. Once the race started, I relied on what I had learned through my racing education and just got to it. It was almost like an out-of-body experience. My times of 1:20 were a good start for me. The faster guys were going 15 seconds quicker than me, so I have some improvement to do. Perhaps I could have pushed it more, but I just wanted to take it easy. The whole adrenalin rush created by the experience made the time and effort worthwhile. I can't wait for the next race. **AA**



928s in Open Road Racing

Autobahn Cruiser Finds its Racing Arena

By: George Suennen
Photos Owned By: George Suennen



The high-speed stability and handling of Porsche's autobahn grand touring 928 is perfect for use in "high speed time over distance" rallies such as the Open Road Racing series. These events are held in Nevada, Texas and Nebraska where there are wide-open stretches of road that allow big boys a chance to fully open the throttle on their toys. Operated with the cooperation

of each state's Department of Transportation and local law enforcement, Open Road Racing, sanctioned by MKM Racing Promotions, gives the top-end performance auto enthusiast the opportunity to compete against other speed freaks in a safe environment that is as close to street racing as one can legally participate within the US.

Open Road Racing's arena of battle is a 50 to 85 mile section of highway that

is closed to the public. The promoters lay out a driving course that can be either one way or in both directions. Established by average speed targets, each speed class has a published target time that all the racers shoot to meet. Hitting the target time means you achieved the class's marked average speed for the course. Precision driving is the name of the game. Overall class and event wins

928's Open Road Racing

"Open Road Racing's arena of battle is a 50 to 85 mile section of highway that's closed to the public... perfectly suited for the top-end oriented Porsche 928."

are awarded to those racers whose driving runs were the closest to that target time. Each class has maximum and minimum speeds that are enforced by hidden radar traps.

Participants sign up for a speed class in a division for which they are certified. All drivers must have a valid competition license or previous Open Road Racing experience, be over 18 years old, and be in good health. Each division has its regulations and requirements. As the speeds get higher, the requirements get more stringent. Street Stock is the lowest division with speed classes of 85 and 90 mph. This entry-level class requires seat belts, a fire extinguisher, and a helmet for each occupant. Open Road Racing offers the Super Sport 1 and Super Sport 2 divisions for the more speed addicted. These classes require cars that are practically full blown race cars with a full roll cage, racing seats, 5 or 6 point harnesses, fuel cell, fire suppression systems, a removable steering wheel, and tires rated at speeds over 200 mph.

Not all 928 owners want to install the required safety equipment to run in the faster classes. Such drivers should consider the Grand Touring division. This division only requires 5-point harnesses, SA2000 helmet, and a fire extinguisher. The speed classes are from 115, 120, and 125 mph, with a tech limit of 140 mph.



Open Road Racing events require large stretches of highways to allow high horsepower cars the running room to be driven at their maximum speeds. Events are held in Texas, Nevada, and Nebraska.



Summary of Open Road Racing Divisions

<i>Division</i>	<i>Speed Classes</i>	<i>Tech Limit</i>	<i>Vehicle Safety Equipment</i>
<i>Street Stock</i>	85, 90	110 mph	Fire extinguisher (FE), S tires
<i>Touring</i>	95, 100, 105, 110	124 mph	FE, U tires
<i>Grand Touring</i>	115, 120, 125	140 mph	FE, 5 point harness (5pt), V tires
<i>Grand Sport</i>	130, 135, 140, 145, 150	168 mph	FE, 5pt, Roll Bar (RB), W tires
<i>Grand Sport</i>	155	172 mph	FE, 5pt, RB, Y tires
<i>Super Sport 1</i>	160	180 mph	roll cage, fire system (FS), fuel cell, seats, (Y) tires
<i>Super Sport 2</i>	170	200 mph	SS1+ removable steering wheel, 2nd FS

This division will give you a good opportunity to drive your 928 fast while still keeping the expenses down. It also allows you a chance to see if Open Road Racing is something that catches your fancy. Most racers start in this division.

The near-stock 928's best roaming range is the Grand Sports division. It has speed classes from 130 to 155 miles per hour. The division's maximum allowed speed, or tech limit as it is known in Open Road Racing, is 168 mph. Land sharks (as 928's are affectionately known)

an outstanding platform to compete in the Grand Sport division.

MY PERSONAL EXPERIENCE

After I bought my 1990 928 S4 in June of 2000, I ran the car at Thunderhill Raceway, located in Willows California, a couple of times to get the feel of the car. The car was in great condition but needed a few maintenance items (brake lines, pads, and fluid as well as a timing belt and water pump). With the assistance of Marc Thomas at DEVEK, I entered the

ly modified Super Sport rally car. In my early years the car's modifications were kept close to stock. I started with externally adjustable Koni shocks, a new suspension set up with roll bars from DEVEK Performance, a rear muffler bypass (RMB) and Nology plug wires from 928 Specialist. A change in rubber was also made; using BF Goodrich KDW tires on the stock Design 90 wheels.

In 2002, I ran the car in the inaugural Bonneville 100 event that uses Highway 39A near Wendover, Nevada. My co-



wanting to compete in this division will need a roll bar, 5-point harnesses, a fire extinguisher, a SA2000 helmet and a SFI approved racing suit with boots and gloves. Tires are required to match the targeted speeds. With this in mind, 928s in this division should be running W rated or better for the 135-150 mph classes and Y rated for the 155 mph class. A well-maintained 928S would be able to run in lower classes of this division without too much modification. A stock S4, GT or GTS could run in the 140-145 mph class without a problem, while those cars in the 150-155 mph classes should have some engine and suspension modifications to be competitive. Regardless of which class is selected, the 928 represents

Pony Express 130, my first Open Road Race, in September of 2000. The event took place on Nevada Highway 305 from Austin to Battle Mountain, an 84.15-mile course. As it was my first experience doing Open Road Racing, I entered the Grand Touring division in its 120 mph class. There were nine 928s running that particular year. All the shark owners were very open to new people and shared information about race strategy, course notes, and car set up. My inaugural year was an impressive experience, so much so that it motivated me to continue in this sport.

Since the first year of competing in Open Road Racing, my car has evolved from a relatively stock late model 928 to a high-

pilot/navigator, Dennis Kao, and I competed in the Grand Touring division's 140 mph class. The navigator's job is an important one in Open Road Racing. They keep track of where the car is on the course, inform the driver of what is coming up, communicate how far they are from the target time and make recommendations on speed adjustments. The Bonneville 100 is a two-way event meaning that the course uses both lanes. It runs in one direction 51.95 miles south then backtracks 49.95 miles north. We planned to run the uphill southbound direction faster than the course's target time in order give us a "banked" time advantage. While we could not drive faster than the tech limit (or face disqualifica-

tion) we planned to take a leisurely pace on the downhill northbound leg and focus on hitting the target time. This strategy would place us in a good winning position. As luck would have it, though, another racer crashed on the return leg causing the race to be red flagged. In such cases the class race is ended and no race results are recorded. Since there was a first leg, however, its results were used to determine the overall event results and we finished 5th with a 143.595 mph average.

My experience in that year's Pony Express 130 illustrated the importance of a navigator in road rally racing. I decided to seek a new challenge by running in the Grand Sport division's 145 mph classes as a solo driver. Without a navigator I discovered that it was difficult to keep track of timing while driving. My 928 ran so effortlessly at these high speeds that it became difficult to precisely monitor my time. By the time I approached a particularly twisty slow section of the course, nicknamed "The Gap", my average speed was so far ahead of the target speed that I had to bleed off lots of time in the remaining sections to have a good finish. Unfortunately, I ended up bleeding off too much time and finishing 4th with a 143.947 mph average. After this event I learned my lesson and decided to always run with a navigator. It was too hard to both drive the course at speed and keep track of time.



Learning from past experience, Rich Sanders was my navigator at the 2003 Bonneville 100. We finished 2nd, missing the target time by a mere 0.6 seconds and an average 144.965 mph. Tim Bosserman occupied the navigator's seat during that year's Pony Express 130 and Gambler's Run events. The Gambler's Run is a 50-mile course on highway 225 out of Elko, Nevada. Running both directions, it's 32 turns and varying elevation changes makes for an entertaining course and is well suited for the 928. Despite not having many straights, the course still has a lot of high-speed sections with many different types of transitions. We did very well, finishing 2nd in both events. After a number of years participating in Open Road Racing, I craved more power to be able to run in the higher speed divisions.

Tim Murphy released a supercharger kit for the S4 sometime in 2003. It was a complete package, including all the parts, instructions, and support needed to get a 928 to the next level. Bill Ball, Tom Cloutier, and Dennis Kao helped me with the install. After a winter full of upgrading work, the car was ready for the 2004 season. With the new modifications the car was able to run in the highest Grand Sport class, the 155 mph class. The newly supercharged car won 2nd place at the Bonneville 100 and 1st place at the Gambler's Run.

For the 2005 season I decided to push the envelope further by upgrading the 928 with an X-pipe from Tom Cloutier and Random Technology High-flow Cats. The improved exhaust efficiency coupled with the supercharger resulted in a rear wheel horsepower rating of 438 at 8 psi of boost. With this kind of power my car was ready to run in the Super Sport 1 division. This division has only one class set at 160mph and has a mind-boggling tech limit of 180 mph. To make my car Super Sport legal, DEVEK installed a full roll-cage and an ATP fuel cell. I also added a fire suppression system from SPA. To help in the grip department, I added 17" Cup 2 wheels with BF Goodrich KDW2 Y rated tires. Also, Carl Fausett at 928 Motorsports provided me with supercharger technical support and





replacement belts. With all the upgrades the car was a formidable foe. In 2005, my car placed 1st at both the Gambler's Run and Pony Express 130 in the Super Sport division.

For the 2006 season, I added a 2nd fire suppression system and fuel cell, plus a removable steering wheel. Other upgrades included Corbeau Racing Seats, new 5-point harnesses, and 18" 993 wheels with Michelin PS2 (Y) rated tires from Dave Lomas at Motorsport SLC. According to Open Road Racing rules, my car, with these modifications, could run in the Super Sport 2 division having a tech limit speed determined by your tires speed rating. In my case that was 214 mph! I chose, however, to run in the Super Sport division's 160mph class. I again won the Bonneville 100 and Pony Express 130. I was clocked at 187 mph in the speed traps and at 190 mph on the event's GPS device.

In the winter of 2006, I had DEVEK install a new front air dam to enhance the 928's high-speed aerodynamic characteristics. It was my goal to hit 200 mph. With the '90 S4's rear gearing of 2.54 and the 18" PS tires the 200 mph mark seemed in reach. I decided that if I couldn't reach 200 mph during the first race I was go-

ing to install a smaller supercharger pulley and a 4-inch intake provided by Tim Murphy to increase my power. Regardless of circumstances, I was ready to hit the 200mph barrier in 2007.

It was not to be. Disaster hit at the 2007 Bonneville 100 in June. With Rich Sanders as my navigator, we had run a 160.160 mph average on the race's first 50 mile leg. We were optimistic of a strong finish. On the return leg of the event the engine gave out while going 188 mph approaching the speed trap. After examining the damage it was discovered that the dipstick blew out, allowing the oil to be pumped out of the engine. In my particular supercharger kit the oil return line for the supercharger feeds into the dipstick tube. Obviously, there was a problem and the lack of engine oil caused the number 2 rod bearing to fail thus shattering the rod, cracking the cylinder, destroying 6 pistons, cracking the oil pan, and ruining the crank. After 114,000 miles and 16 Open Road Races, it appeared it was time to get a new motor. Considering that 9 out of the 16 Open Road Races I competed in were at speeds over 155 mph and the engine was force inducted with a supercharger kit, I feel as though I could not really complain.

Chris and Susan Cummings trailered the car to Salt Lake City where Dave Lomas and Garrity at Motorsport would rebuild the engine.

Since my engine misfortune, I have received a tremendous amount of support from the folks on the Rennlist 928 forum. I received donations of a crank and forged rods from an 87 S4 from Adam Birnbaum and an oil pan from Rich Sanders, as well as \$550 in money from Rennlist members. The crank has been sent to Taylor Engines in Southern California for drilling, balancing, and finishing. Dave Lomas provided an 87 S4 engine block, pistons and 951 rings. I reused the heads off my 90 928. I had the valves and guides replaced and had the head re-machined. While the mechanics were in the engine, they upgraded the supercharger to a Vortech V1 T-Trim, installed a new oil breather system, and 2.20 ring and pinion gears. After two and a half month process, the car was finished and dyno-tested at 504 rwph with 10 psi of boost. I will still need to do some more tuning and a few maintenance items before competing but with the new engine and upgrades made during the rebuild, I'm looking forward to the 2008 season. I feel confident that the 200mph mark is within our reach.

REIGNING KING OF THE 928S

Tim and Cheryl Dey in their '88 S4, nicknamed the Beast, are the 928 stars of the 2007 Open Road Race season. The Beast's engine is a 6.5 liter stroker built by Marc Thomas of DEVEK Performance in Hayward California. This massive engine cranks out a whopping 517 RWHP on the dyno. It also runs a DEVEK tuned suspension and aerodynamic body enhancements.

During the 2006 season, Tim and Cheryl ran the car with some success in the Grand Sport Division at the Nevada Open Road Challenge (NORC), the Bonneville 100 and the Pony Express 130. At the NORC they won a Grand Sport

divisional 3rd place in the 150 mph class with a 149.9837 mph average and a Grand Sport divisional 2nd place at the Pony Express 130 in the 145 mph class with a 144.953 mph average.

Tim had DEVEK install a full roll cage, fuel cell, and fire suppression system for the 2007 season. Since their 928 was still a "street" car, its roll cage and fuel cell installation were designed to allow the car to retain its full interior. The result was a work of art. Their car also received 18" wheels and Michelin PS2 tires. With these modifications the car was now ready for the Super Sport division. Tim and Cheryl started the season with a first place victory at the NORC event at an average speed of 160.198 mph. Unfortunately, a cracked harmonic balancer caused them to miss the Bonneville 100. Once the repair was made they ran in the Super Sport division's 160 mph class at the Gambler's Run event yielding a second place finish to Roland Roth in his 1999 Ruf CTR. During the NORC Tim and Cheryl became a member of the "200 MPH" club by hitting a documented 200.38 mph. At the Gambler's Run they were clocked at 204.92 mph through the speed traps. Their car is only the second 928 to be a member of Open Road Racing's most exclusive club.

The Pony Express 130 turned out to be a disappointment for all involved.

Don Pylman, in his 1999 NASCAR Ford, crashed 6 miles from the finish line causing the race to be red flagged. Don and his navigator, Greg, survived the 160 mph crash but Tim and three other vehicles, including myself in Paul Mooradian's Z06, were not able to finish the race.

The high point of the season was a first place standing at the Silver State Challenge in the 170 mph class. Tim and Cheryl had averaged over 180 mph for the first 40 miles and cruised the last 11 mile straight at 202 mph. This was the fourth event in which the Beast hit 200 mph making it a season best for a 928 in Open Road Racing.

OTHER SIGNIFICANT 928S

For 2007, Bill Ball ran his 89 S4 at the Bonneville 100 and Gambler's Run in the Grand Sport 145 mph class, despite a disappointing 2006 season with lots of suspension issues. He switched his Koni shocks for Bilsteins, replaced his Yokohama tires with new BF Goodrich KDW2s and swapped out his aftermarket front swaybar for the original. He had removed his Roots supercharger in May and didn't reinstall it in time for this season. In effect, he was running his car "stock" yet still took 3rd place at both the Bonneville 100 (average 145.089 mph) and the Gambler's Run (average 143.865 mph). With his suspension

under control, Bill plans to reinstall the supercharger with a new intercooler for next season.

Matt Edison was a rookie this year. He borrowed Rich Sander's 5-point harnesses and installed a fire extinguisher in his stock 1988 S4 5 speed. He ran the Bonneville 100 in the Grand Touring division's 120 mph class with his friend Dave Deets as navigator. They placed 3rd with a 119.889 mph average. He liked the experience so much he bought a used roll bar and installed it before the Gambler's Run in July. At the Gambler's Run he ran by himself and placed 4th in the Grand Touring 120 mph class with a 119.928 average against some stiff competition. For the Pony Express 130, he moved up to the Grand Sports division's 130 mph class with Rich Sanders as navigator. Rich had signed up to navigate for me in the 160 mph class, but since my car wasn't ready and the work on his '87 S4 was still in progress, he rode with Matt. They finished 3rd with a 129.984 mph average and hit 151 mph in the speed traps. Matt had an outstanding first year and looks forward to coming back next year in a higher speed class.

TEAM PORSCHE

The 928s represented themselves well at the 2007 season. They garnered several victories, got a new inductee into the 200 mph club, and helped Team Porsche win the Team Challenge at all three MKM events. The Team Challenge is a competition between different groups of competitors, usually made of teams of cars from the same marque or model. Teams are made up of 5 to 15 members. Scores are calculated based on the sum of time variances of top 5 finishers of each team. Since Porsches make up only 10-15% of the cars at these events, this was a major achievement. So, other than my unfortunate engine demise, this was a good year. As for the future, the 928's of Team Porsche are excited about next season and I look forward to putting my new engine through its paces. **AA**



2007 Targa Newfoundland

A Lesson in “If It Can Go Wrong, It Will.”

By: Bob Saville, Photos By: Garth Gullekson of Darlington Mediaworks and Valerie Kloosterman



The Targa Newfoundland tries a person's soul. It presents the racer an insurmountable array of driving situations, while testing your car's durability under stress. Competitors in the event must battle a lack of sleep, usually little food during the day, and must possess the stamina of a marathon runner. The Targa Newfoundland is not for the faint of heart or for the casual weekend racer. It is, however, one of the greatest racing challenges in North America. Overcoming the event's trails and tribulations, mechanical and emotional, help forge personal character as much as it tests

your team's racing ability. President Kennedy once said, "We go to the Moon in this decade, not because it is easy, but because it is hard." The same can be said for the Targa Newfoundland. For the amateur racers that compete in this grueling event, such as my wife and me, the Targa is without a doubt a "moonshot" like challenge.

In every great endeavor there are moments in which one accomplishes their goals and there are times when one chalks up their best shot as a learning experience. Then there are times, similar to Apollo 13, that are really hard to classify without using an explicative. Moments in which victory is the last thing on your

mind and one simply prays that more "learning experiences" won't come your way. At such times heroic notions as President Kennedy's seem like a crock and that getting through to the end is a huge achievement. Times when one asks "Why am I here?" start to permeate in your psyche and are answered with a stiff mental shrug in order to maintain focus. There are times when racing truly tests your sanity. My wife, Nadine, and I were faced with such an experience during the running of the 2007 Targa Newfoundland and here is our story.

Bob and Nadine Saville at the start of the 2007 Targa Newfoundland driving their beloved race prepared Porsche 914 "Huey".



THE TARGA NEWFOUNDLAND

Targa Newfoundland bills itself as the ultimate motorsport adventure, which is an extreme understatement. Modeled after the old Targa Florio in Italy, the Targa Newfoundland is a week long adventure that tests you and your car's stamina, mental and physical strength, and skill. Everyone has wanted to run flat out through their subdivision or buzz through the middle of town without fear of being stopped by the police. The Targa, as it is known by competitors, is the event to satisfy these desires. The event takes you through little fishing villages, local suburban neighborhoods, back country roads, and some of the most beautiful countryside in the world.

The Targa Newfoundland is five competitive days of driving. Each day involves driving stages as fast as you can from start to finish, getting your car ready for the next stage and then doing it all over again on a new stage. Multiply that by 40 stages and you have the Targa. In the evenings, you make sure your car is all in one piece, do repairs as necessary, and park in the town's ice rink for a car show (we are in Canada, after all,

and all towns have hockey rinks). All the locals can come out and see up close who and what just ran through their neighborhood flat-out.

Unlike normal races, each class has a handicap factor based on the year and modifications of the car. Your car is given a time to beat for each stage: beat the time, and you've aced it. Take longer than the time, and you get penalty seconds. The team with the lowest penalty time after all 5 days wins.

One of the event's big honors is to win the coveted Targa Plate. To be granted this honor a team must beat the established "Trophy time" for every single stage all week. If you have one really bad stage or mechanical difficulty, then you're out of contention. The award is a measure of consistency and endurance. A surprising few win the Targa Plate each year.

Competitors in the Targa are viewed as being in the Big Time by the locals. Everyone watching the event considers you a celebrity and asks for your autograph. Children, teens, adults; everyone clamors for your attention in a way that most people usually don't have to con-

tend with. For that moment, Targa competitors are the most amazing individuals in these people's lives. For the people of Newfoundland, the Targa is more of a happening than a mere racing event. The fanfare is quite unexpected by first time competitors.

OUR TARGA BACKGROUND

In 2004, a friend of ours, Casey Holzman, asked me if I would like to navigate for him in the Targa Newfoundland. I had not heard of the event, but for some reason I said yes. Casey and I had a great time and finished very well. We ran again in 2005, however didn't have a good week, crashing Casey's car on the first day. After the 2005 event, Nadine said she wanted to compete, so we established NaroEscape Motorsports as a team to run the Targa. Nadine had been a part of our crew in '04 and a Competitor Relations Officer for Targa in 2005, so she knew what she was getting into. Once the team was created we went about planning and building our car – a 1971 Porsche 914-6 that we named "Huey". Details on Huey can be found at www.naroescapemotorsports.com. I drove and Nadine navigated. Since I had navigated before, I helped her with learning her tasks. Sharing my experiences greatly reduced her learning curve.

In 2006, we did great by finishing 11th overall out of 80+ cars. We had issues all week with shifting and Huey's engine was not really set up for needed low rpm torque, however we pushed through and had a blast. Given our positive run in 2006 we figured we'd do great in 2007. During the off-season, we fixed the shifting issues and installed a new engine with better low end pull. Considering these improvements to Huey and our team's experience we were looking forward to 2007. We thought, "What could go wrong?"

"LEARNING EXPERIENCES" BEGIN

First of all, don't ever say "What could go wrong." You know when you watch a movie and bad things happen to the lead character. Then they just keep

getting worse, and worse, and worse, and you think to yourself, “Yeah, right, nothing ever goes this bad for anyone”. Well, I’m here to tell you that things can get that bad.

A friend of ours, Delmar Kiser, offered to drive the truck and trailer holding 2 cars up to Halifax for us, where Nadine and I would meet him to bring it across the 15 hour ferry to Newfoundland (the other car was owned by Harold Seagle – a 1980 911 SC Targa). Only hours into his trip, the trailer blew a tire then the truck wouldn’t start because the batteries were dead. Not only dead, but they looked burnt and shorted out. Delmar called me and I jumped in my car and ran up the highway to get him a new batteries. We replaced both of them, and he was on his way. OK, no big deal, just a flat and some batteries. Unfortunately, the next day, in Harrisburg, PA, he had starting problems and found that the bad batteries had shorted out the starter. So he got that replaced and kept going.

Delmar had no issue all the way to Halifax, so we thought all was behind us. We met him and drove it to Sydney, NS and stayed the night, meeting up with

some old and new Targa competitors for dinner. Everything was getting better, and the good ole “Targa” feeling was starting to come back.

Friday morning we got in the truck to drive to the ferry. About 1 mile into the trip, the “service engine soon” light went on and the truck started to lose power. I stepped on the gas, and we slowed, then it picked up speed. All I wanted to do was get on the ferry a mere 0.5 miles away, however the truck died on the side of the highway.

Competitors Doug Mephram, Tony Kloosterman, and Sebastian Borugon stopped and we determined that the truck was not going to start. We called for a tow, and these guys took all of our stuff to the ferry in their trucks and trailers.

We got towed to the local Ford dealership, with the hopes that it was a minor problem and we could get on our way. We had an hour or so until we had to be at the ferry giving us a small amount of breathing room, but not much.

About 45 minutes later, it was determined that the fix was not easy or quick. It was the injector control module that had

to be replaced. We decided to unload the cars and drive them onto the ferry, leaving the truck and trailer in Nova Scotia. We first unloaded our 914, then Harold’s 911, which wouldn’t start. We tried and tried, but it wouldn’t turn over. The Ford mechanics came out to assist us with no resolve. I called Harold, who was flying into Newfoundland with his navigator Stan Pendergraft and our crew member Bill Dunster. Back and forth I went between each of them as to how to fix it. None of the suggestions worked. We called everyone we knew, nobody could figure it out. It wasn’t getting a spark and we had no idea why. Finally, after 30 minutes, one of the mechanics jumped a circuit to the coil and got it started. I jumped in the car, Nadine jumped in ours, and we raced to the ferry, only to see it leaving in the distance.

So, here we are in Nova Scotia, all our stuff (luggage included) was on the ferry to Newfoundland, and we weren’t.

Two hours later there was another ferry to Newfoundland, but it was headed to the opposite side of the island (Port aux Basques) which would make it a 10 hour drive from the ferry drop off to St



Bob and Nadine negotiating one of the Targa Newfoundland’s many curvy back roads.



John's, Newfoundland, our destination. The next ferry to Argentia (our original ferry drop off point) was not until Monday. To make the event we couldn't wait.

Keep in mind the time here: the Port aux Basques ferry leaves at 5pm, getting in at midnight (it's shorter than the Argentia ferry). Then we have a 10 hour drive ahead of us in 2 track cars that are in no way comfortable to drive for long periods of time. Well, we had no choice but to do it, and off we went.

Standing on the deck of the ferry, Nadine said to me "Well, at least we're heading in the right direction". I appreciated my wife's positive thinking.

Once off the ferry we started our driving across Newfoundland at 1am. Three hours into the drive, we realize we're going to need gas soon and realized that NOTHING is open. We stop and start wondering what's going to happen if we run out. Then, like an oasis in the desert, we find a station and fill both nearly empty cars up completely and venture out again.

The rest of the trip to St. Johns could be described as a Moose dodging game. In the dark, and in a small sports car, they look 10 feet tall. Moose accident deaths are more common than you would like to think in Newfoundland, and based on our trip so far, I was almost expecting to hit something. In addition to looking out for "Bullwinkles" we had rain and fog to contend with. Remember, I couldn't turn off Harold's car or we'd never get it

started again...but that's it. The rest of the trip was rather uneventful.

After a long drive we make to St. John's at around 11am on Saturday. We've been awake since 7am Friday morning and were looking forward to the rest prior to starting the Targa the next day. All passed through the event's tech inspection fine, however Harold's car still has starting issues, but our 914 "Huey" is running great. Bill and Rich-

ard Burpee of Mantis Sport adjust the ride height on Huey, but that's it. Everything is set for the great race.

THE TARGA COMPETITION

Sunday is a prologue day to do a couple runs to get acquainted with the car and the crew with each other. We do well, running fast and smooth. Good day all around.

Monday is the first day of real competition. Rain is threatening, but none in the morning. We head out to our first two stages and ace them easily. Huey is running great, Nadine is on the mark, and I am feeling very comfortable again. It appears that all our months work improving the car and watching countless hour of our 2006 footage to help us learn is going to pay off. Our outlook was quite bright.

We stop in Placentia for breakfast then make two runs to the lunch spot. It's starting to rain a bit, but not bad. We ace both stages, even after I skid into someone's driveway in which the car stalled. It wouldn't start for a few seconds, but it turns out we made the stage in good time anyway.



Targa Newfoundland spectators become photo journalists during the race. Through every neighborhood people come out of their houses to take photos.

2007 Targa Newfoundland

We didn't even realize what happened until we stopped and saw the hood buckled in front of us. We both climbed out of the car stunned.

So at this point, we're thinking "all the bad stuff is behind us....right?" Unfortunately, it only got worse.

We head out from lunch back the way we came. It's raining, and the road is very slick. I back down a notch or 2, and we're doing great.

Right near the end of the run, there's a wood bridge. There is nothing particularly challenging about this 20 feet long wood bridge over a stream. We come down the hill, point the car straight on the bridge and the unthinkable happens.

We severely spin. Unfortunately, I was going fast enough to not be able to save it and we head off the road. I have no idea what made us lose grip, but we found out afterward that this bridge was fairly new, and the chemical treatment in the wood was still seeping through making it like an oil slick.

For those of you that have spent years driving on the track you know: you don't try to jerk the car back on the road, you drive straight, settle the car down, and get back on the road under control.

However, this is not a race track. The road had a big dip down then up into a field, which launches us airborne; we land on the nose, flip over onto the tail, then land on the wheels again. Yes, you read that correctly, we flipped nose to tail. It happened so fast, we didn't even realize what happened until we stopped, and saw the hood buckled in front of us.

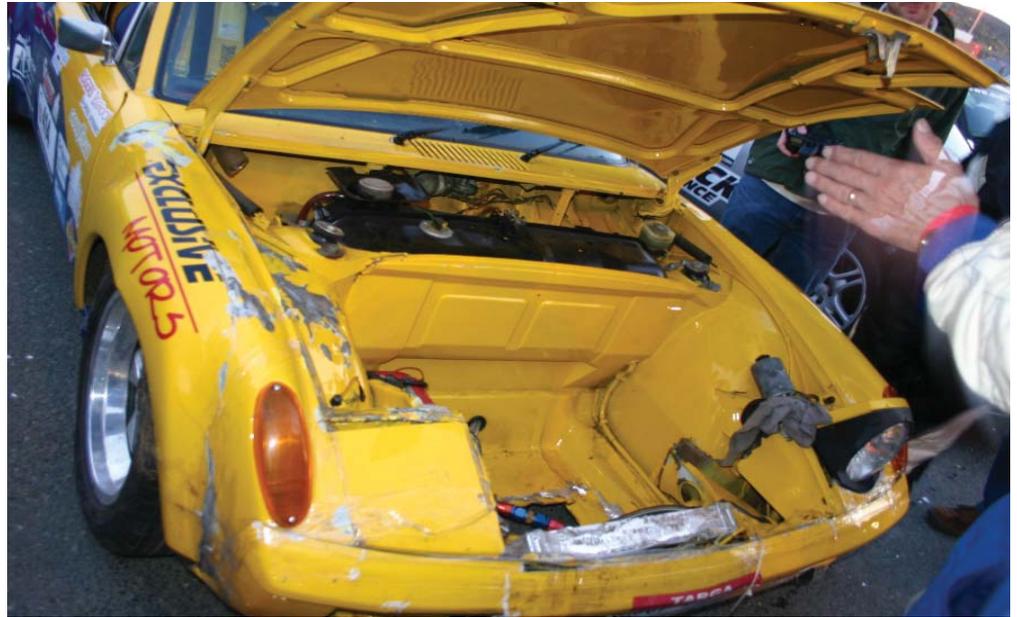
We both climbed out of the car stunned and quite upset, but not injured at all. As we sat there thinking of what just happened, another car came across



Ouch!! Unfortunately, Bob and Nadine were involved in a racing shunt that seriously damaged their Porsche 914 "Huey." Luckily, neither was injured. Despite the shunt, their spirits remained strong and they looked for ways to correct the damage.



Miracles can happen! The 914 “Huey” lived on to cross the finish line.



the bridge and spun off too, rolling over sideways. Then two more spun off into the woods.

Had an event marshal before the bridge not started waving people to slow down, there would have been much more carnage. As it was, five cars went off there; four others were close, and most of the rest tip-toed across due to the marshal's warning. Unfortunately, we had no such warning.

As we looked over our car, we realized our beloved little 914 Huey was totaled. Nadine and I are devastated. We both feel we've lost a member of the family since we've put so much time and effort (not to mention money) into getting this car exactly as we wanted it. Who's fault was it? Who knows. It was a racing accident and unfortunately, it happens.

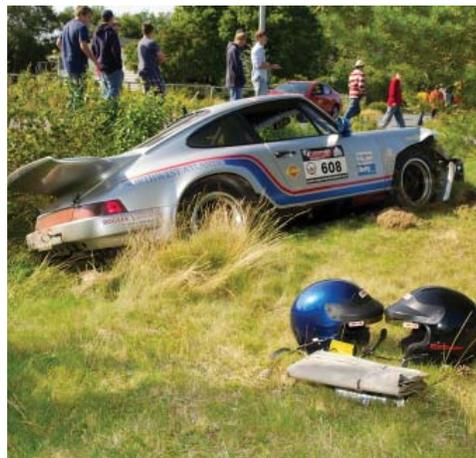
We then realize that we have a bit of a dilemma: Our truck and trailer are still in Nova Scotia. Since we left it, our plan was to run the week, then drive both cars on the following Sunday back to Port aux Basques, over the ferry, and load them up back on the truck. Unfortunately, that is no longer possible.

DAMAGED BUT NOT ENTIRELY OUT

On Tuesday morning we borrow a local's car and head out to Port aux Basque which is about a 10 hour trip. The dealer is kind enough to bring the now fixed truck and trailer to the ferry.



Top: A Targa running the Targa. Harold Seagle and Stan Pendergraft, who came up with the Savilles from North Carolina, finished the race in a 1980 911 Targa. Below: Like the Targa races of the 50's, the Targa Newfoundland is not very forgiving to mistakes.



Wednesday morning we rush over to the ferry early since it was suppose to be in at 7am. And we wait. And wait. And keep waiting until 9:30 when it finally arrives. We load up the loaner car, and head back to St. John's which is another 10 hours trek.

While we were traversing the desolate Newfoundland countryside, Bill Dunster took it upon himself to see what he could do about getting Huey running. Bill owns Autobahn Collision Center, so he knows a thing or two about body work. When we get back, Huey is running!! Not pretty, and not completely straight, but he runs again. We are absolutely amazed. He runs well enough for us to bring him across the ceremonial finish line to all the fanfare on Friday's event finale. People are shocked and amazed to see it, though most had no idea how bad the damage was.

As the weeks have passed since returning from Targa, we are still very saddened by the loss of a great car and the unfortunate circumstances that surrounded the entire week. While we not only lost a car, we lost the time spent with the competitors and friends we've met through the years. That's a big part of Targa: the camaraderie that develops throughout the entire competition. From the organizers to the volunteers to the competitors to the fans; everyone is there pulling for each other to do well and have fun. When you experience the Targa, it gets in your blood. It truly is a family that's hard to let go. Part of our high expectations for 2007 was not only finishing well, but hanging out with all our friends for evening socials and "stage stories". Targa is truly something you need to experience at least once. Accidents like ours are rare, so don't use our experience as a gauge

for the event. Put together a solid car that can take a beating on rough roads and that possess a good suspension with an engine with torque and you will do just fine. I still think a 914 is an excellent car to run with, although it appears that they don't like wet wooden bridges.

THE FUTURE

Will we go back? Maybe not in 2008 due to car issues, but we definitely will be back in the near future. Heck, where else can you buzz through a city and have everyone cheer you on! It is definitely one of the most amazing events we have ever been a part of, bar none. I do PCA Club Racing and both of us are PCA Certified Driving instructors so we do a lot of track time. The Targa is nothing like track events, it's much, much more.

Nadine and I learned a lot about ourselves during our not so forgiving 2007 Targa Newfoundland run. Some would think that through an adventure like this, our relationship would be a bit strained. On the contrary, we've realized that we can work through the worst of adversity and find solutions to make the best of a situation. During the week we joked a lot to keep our wits. My wife and I are a great team.

After the event, we realized that we might be trying to do too much right now, and need to "simplify" our lives a bit. I am currently the President of the Carolinas Region PCA and owner of Exclusive Motors, both of which are full time jobs. We've decided to focus on our other 914, which we call "Papa Smurf", for racing and Drivers Ed event for a while, then figure out what we're doing from there.

Bob Giannou, President of Targa Newfoundland, describes the Targa as a life changing experience. He could not be more correct. The needed "Can Do" attitude displayed by the Targa runner spreads to all areas of your life. You will always take something positive away from a Targa run. We did, even after having such a "challenging" week. We look forward to hopefully resurrecting our 914 "Huey" and doing another Targa Newfoundland run. **AA**



Rennsport III

Porsche Pride in Full Bloom

By: Kevin Sims
Photos By: Randy Stevens



The third Rennsport at Daytona International Speedway was more than a mere Porsche racing reunion, it proved to be a jaw-dropping extravaganza of Porsche racing machinery. Amongst the roar of historic Porsches being pushed to the limit was a pride that this event was not just about celebrating past glory. Porsche had won the 2007 American LeMans Series LMP2 engine/chassis championships a few months earlier and Porscheophiles were strutting with pride.

The Penske Porsche RS Spyders that won the championships were the most popular display at the event. Everyone just had to get their photographs by them and ask pit crewmen a question or two.



But that was not all.

Rennsport III proudly displayed a treasure trove of Porsche race cars. 917s, 908s, 935s, Carrera 6s, and a herd of other Zuffenhausen-built rennwagens graced the track and pit garages. Rennsport virgins walked about in pure astonishment, witnessing such significant Porsches racing overloaded the senses. Catching sight of “the” 917 used by Steve McQueen in the movie “LeMans” running beside one of David Piper’s green 917s and remembering the historical connection between them was a wondrous moment. Where else could one experience such Porsche nostalgia?

And it just wasn’t about the cars, it was about the drivers. Porsche drivers, past and present, in attendance was as equally impressive. There was Derek Bell, David Piper, Vic Elford, Hurley Haywood, Patrick Long, and countless others. Intimacy between drivers and event spectators quite simply made the event. Crowds circled the drivers as they reminisced over racing victories and near miss collisions – and fans vicariously lapped up every minute. Not a single Porscheophile went away disappointed. Where else could one experience such camaraderie with heroes?

Rennsport III

Unlike the typical high-brow concours or museum display, what's unique about Rennsport is how close you can get to the cars. Rather than a red-velvet rope mentality, attendees of Rennsport were amongst all 350 race cars during the action. Race teams frequently asked fans to help to push a car or hold a flashlight. Usually this is mundane, but we are talking about 917s and 962s. One bystander was asked to hold a 917 part while the pit crew performed other work.

Yeah, tell me that isn't cool.

The "lucky" guy could have bolted from the scene and placed the part on Ebay. The teams, however, weren't concerned about such nonsense. Rennsport III was a family affair and everyone shared in this once in a life time occasion.

PORSCHE 917S AT RENNSPORT III

917s stole the hearts of most. Porsche provided four examples from the Zuffenhausen museum. One was the 1971 Le-Mans winning car, 917-053, featuring a long-tail body, a magnesium frame and a 4.9 liter version of the air-cooled, flat 12 engine. The Martini-sponsored car completed 3,315.36 miles in 24 hours to claim victory. "Pink Pig", 917/20-001, was another museum car and is most famous for its French SERA body, combin-





ing both long and short tail aerodynamic elements. Its nick-name came from the butcher markings outlined on its body.

The 16-cylinder, Can-Am prototype, 917-027, proved lightening fast in testing, yet was never raced. Porsche had it at Rennsport III. The last museum 917, 917-042, was a Martini sponsored long-tail that raced at LeMans twice and succumbed to mechanical failure each time. Remaining 917s were from private collections and the highlights included the Gulf 917-022 car used by Steve McQueen in the LeMans movie, the "Hippie" painted 917-023 car that won LeMans in 1970 and the bright yellow twin-turbocharged 917/30-006 car from Porsche's Can-Am days. The event's collection of 22 917s was truly exceptional.

INTERVIEW: DEREK BELL

Derek Bell is a living racing legend. Beginning his career in '64, he raced in F2 and F3 before signing up with Ferrari to start his first F1 race at Monza driving a V6 "Dino". He continued to run in F1 with various teams until '74.

The driving team of Jacki Ickx and Derek Bell produced 3 Le Mans wins with a Mirage GR8 Ford-Cosworth in '75, a Porsche 936 in '81, and a Porsche 956 in '82. Later, Bell teamed up with Hans Stuck and Al Holbert in a Porsche 962C to claim another 2 LeMans victories in '86 and '87.

Bell yielded back to back Daytona 24 hour victories with Al Hobert and Al Unser Jr. in '86 and '87. He won the Daytona 24 once again in '89 with John Andretti and Bob Wollek. In all three triumphs, Bell piloted a Porsche 962C.

Hired as a consultant, Bell helped the Bentley team win Le Mans in 2003. We are pleased to have spent time with Derek Bell at Rennsport III to discuss his career.

>> What does it mean to be at Rennsport III amongst the historic cars and drivers?

Derek Bell: To me it's fantastic because this year's Rennsport is honoring the 917 and the 956/962 cars which was my whole career really. It's thanks to Porsche that I had a career to be quite honest. When

Rennsport III

I came out of F1, I wasn't really going anywhere. For me, F1 was surely disappointing. I believe I only scored one or two points in six years. After F1, I raced where I could. My career had peaked, or so I had thought. Then, by good fortune, Porsche picked me up in their sports car program and I won a "few" races with them. (Laughs) Racing for Porsche was my career's highlight. Prior to Porsche I had driven sports cars. At Spa I raced in a 512 Ferrari in 1970 after which time I was picked up by Mr. John Wyer to run a 917. We won our first race at the Buenos Aires 1000K. Being at Rennsport III brings it all back.

>> What's been your most memorable experience racing for Porsche?

That is a really hard question. I suppose the time I crashed. Well, I can't say that because I crashed twice. It's difficult to remove shunts from your mind. I most remember the reliability of the Porsches. We went into races knowing that a Porsche was going to win if the car didn't fail. It was up to the driver. The car was never a factor, because of their reliability and speed. The driver had to be quick to win. Until Porsche's dominance in the 70's, 80's and early 90's there had never been a manufacturer that was consistently reliable in sports car racing. Of course, Porsche's speed was important, but their reliability and swiftness to remedy issues was at the forefront of their ability to win. The Fords and Ferraris had strong years, but their time was limited. Once the 917 came into its own, Porsche ran at the top year after year with every car they brought. Reliability gave them that edge. Drivers had the confidence to push a Porsche because you didn't need to be concerned with what could go wrong. Porsche brought to sports car racing the absolute need to be consistent and reliable.

INTERVIEW: DAVID PIPER

David Piper is no ordinary race driver. Piper's role in the 917's history is vital. He served double duty as a racing and development driver for Porsche. In addition, he owned and raced two 917s internationally. He still owns his 917s and



they were at Rennsport III. Painted in green, the David Piper cars were parked toward the front of the Group 5 garage.

While filming the “LeMans” movie in 1970, Piper crashed a 917 losing part of a leg. With enormous courage and determination, he continued racing and became vintage racing’s chief founder in Europe. We were pleased to talk with him at Rennsport III about the success of vintage racing.

>> What does it mean to be at Rennsport III amongst the historic cars and drivers?

David Piper: The main joy is that the Group 5 cars are having a second lease on life. When we finished racing them they weren’t worth anything at all. In England, importing them was difficult because of the high duty. I keep my 917s on the European continent. Once England joined the common market it became affordable to import them, so I brought mine in. Unfortunately, you couldn’t race them anywhere. I started organizing vintage races simply to keep them going. From such humble beginnings, Europe’s vintage racing scene blossomed into what it is today. Vintage racing is the perfect sport. The women aren’t crazy about it, but it gives us the time to feel like young men again.

>> How did you feel that there would be a market for vintage racing?

Vintage racing mushroomed in more recent years. In the beginning there wasn’t much enthusiasm for it at all. People involved in the early years were racing them years ago. They did it because they loved it. People doing polo or yachting, which are very expensive, have recently jumped on the bandwagon making the sport expensive for everyone. The Group C cars were fetching a couple of hundred thousand dollars just a few years ago. Today they’ve climbed to prices 2 or 3 times that value. The cars are appreciating assets, so people don’t mind spending money on them. Unless there is a world-wide financial collapse or they are crashed, people will not lose money on them. Even if they are crashed, their high values make them worth restoring

GMUND RACE GROUP

2.5 liter and under, including 356, RSK, 550 Spyder, RS60, RS61, 911, 914 etc.

Top 10 Standing

Pos	Car#	Driver	Yr	Model	Best Time
1	29	Josh Vargo	72	911ST	02:03.2
2	58	Hurley Haywood	70	914 GTR	02:03.2
3	59	Frank Beck	72	914-6	02:04.4
4	81	Peter Kitchak	71	911S	02:08.8
5	44	James McCormick	70	911ST	02:08.7
6	10	Mayo Smith	72	911	02:10.6
7	226	Juan Lopez-Santini	69	911S	02:10.9
8	57	John DeFord	73	914-6	02:11.3
9	24	Tim Vargo	66	911	02:11.7
10	231	David Bland	69	911	02:11.3

EIFEL RACE GROUP

911 Group. All non-turbo cars. plus front engined Porsches

Top 10 Standing

Pos	Car#	Driver	Yr	Model	Best Time
1	0	Eric Lux	75	911RSR	01:57.9
2	72	Christopher Musante	72	911	02:00.6
3	28	Jake Vargo	73	911IROC	02:00.4
4	135	Roger Johnson	74	911	02:01.2
5	19	Catesby Jones	73	911IROC	02:04.1
6	156	John Brice	72	911RSR	02:02.7
7	551	Ivan Avzola	86	951	02:01.5
8	7	John Hawkes	87	951	02:05.5
9	17	Bill Keith	73	911RSR	02:05.9
10	8	James Devenport	73	SP30	02:05.3

to regain your money. All one needs is a chassis number. What other sport pays for itself.

>> How does the Rennsport event fit into the vintage racing scene?

Events like Rennsport III help broaden

the appeal of vintage racing to a larger market and give people a chance to drive their cars. I can’t image a better place than Daytona International Raceway to host such an event. I remember when they first started building it. I used to visit the teams that first tested here. I was

given rides in the stock cars. Wanting to be polite, I gave them Cuban Cigars from the UK to thank them for the rides. They loved them. I was once stopped at JFK and they took my Cubans away from me. The Daytona stock car boys were quite disappointed.

I used to race at Daytona and Sebring every year. I would spend about half my time as a factory driver and the rest driving my own 917s. I did about 30 international races in a year. I always made sure to race in America because of the adventure. The Can-Am series was the most fun because they had the least amount of rules than any racing series in the world. Teams could really use their imagination to gain an advantage. Rennsport III allows Porsche racers to get together and relive the old days of racing.

>> Where does one acquire parts for these cars?

While sometimes one has to make them from the ground up. Parts can be found depending on the model. Years ago in America, if a guy was racing a Ferrari and an engine blew; they simply put a Chevy engine in it. They didn't think twice about it because of the cost of rebuilding the Ferrari engine. Today the cars are so valuable that people spend the money to do it right and keep the car as original as possible. If a part is not available, then they just remanufacture it. Modern technology has made it far less expensive to custom manufacture parts. In some cases the remanufactured part is better quality. There are companies that specialize in such racing parts. The work they do is quite unbelievable. If we only had access to these shops back in the old racing days. **AA**

CONTINENTAL RACE GROUP

Porsche Cup cars, GT3 etc 1989 and up 911 based cars

Top 10 Standing

Pos	Car#	Driver	Yr	Model	Best Time
1	1	Leh Keen	04	996	01:48.7
2	87	Christian Zugel	07	997GT3	01:53.0
3	81	Steve Johnson	07	997GT3	01:53.8
4	133	Charles Scardina	07	GT3 Cup	01:53.3
5	22	Carlos deQuesada	06	997	01:55.4
6	29	Jake Vargo	04	GT3	01:56.9
7	199	Nick Cramer	06	997GT3	01:57.8
8	99	Mac McGehee	06	GT3	01:58.2
9	26	J. Ferrano/R. Matos	07	997GT3	01:58.0
10	752	Chuck Grantham	04	996	02:01.2

WEISSACH RACE GROUP

Plastic-bodied Porsches and Prototypes 906,907,908,910,917.

Top 10 Standing

Pos	Car#	Driver	Yr	Model	Best Time
1	48	Jim Torres	72	917	02:01.1
2	4	Phil Diagrepoint	71	908/03	02:00.8
3	21	Chris MacAllister	69	917K	02:03.6
4	26	Jean Guittard	70	917	02:05.7
5	41	Joe Buzzetta	69	908 Spyder	02:05.9
6	6	Cameron Healy	68	908	02:05.8
7	60	Daniel Boeschen	66	Carerra 6	02:18.7





MULSANNE RACE GROUP

956/962 plus 934/935s

Top 10 Standing

Pos	Car#	Driver	Yr	Model	Best Time
1	68	Patrick Long	88	962-HR7	01:43.5
2	10	Mark Hotchkis	86	962-F01	01:43.9
3	16bwo	Lloyd Hawkins	90	962C-160	01:42.9
4	16ab	Ray Hartman	89	962-CK6	01:47.8
5	16w	Carlos deQuesada	92	962-148	01:48.5
6	17	B. Hawe/Derek Bell	85	962-AR1	01:50.5
7	99	Gunnar Jeannette	86	962-123	01:50.2
8	62	Stew Tetreault	77	935	01:52.3
9	16g	William Fondriest	86	962-114	01:51.3
10	11	John Brice	86	962	01:54.1



