

# TORQUE<sup>OF</sup> THE TOWN

SUMMER 2014

The Voice of the Houston Chapter BMW Car Club of America



join us on  
facebook

Original BMW Parts

[www.bmwusa.com](http://www.bmwusa.com)



The Ultimate Driving Machine®



## ORIGINAL BMW PARTS. A MASTERPIECE OF FORM AND FUNCTION.

Ensuring that every BMW continues to live up to its title as the Ultimate Driving Machine®, requires none other than Original BMW Parts. Each part is precisely engineered by BMW for a perfect fit and finish and offers a two-year unlimited mileage warranty.

If you are under the impression that this level of engineering mastery comes with a big price tag – think again. Introducing BMW Value Line, a collection of bundled parts and service kits designed for earlier BMW models and offered at special savings.

BMW of Houston North proudly offers the Houston Chapter BMW CCA a 15% discount on all parts purchases.

### ORIGINAL BMW PARTS.

**BMW EfficientDynamics**  
Less consumption. More driving pleasure.

**BMW** OF HOUSTON

N O R T H

I-45 North @ FM 1960 • [BMWofHoustonNorth.com](http://BMWofHoustonNorth.com)

**281-874-1550**

©2011 BMW of North America, LLC. The BMW name and logo are registered trademarks. All rights reserved.



## CONTENTS

4



### Driver's Seat

Dennis Nowak

Selecting a new Social Events Chairperson, New threads and other news from the front lines.

6



### What Exactly is Autocross

Chris Stokes

All you wanted to know about Autocross  
But were too embarrassed to ask.

8



### BMW i3 comes to town

Jim Robinson

A green monster and another kind of green machine.

12



### Tech Tips

Jeff Otten

A few tips and discussion about brakes and fluids f  
or street and track.

18



### Dam Broke

Dennis Nowak

Metropolitan Collision & Service puts things right for  
Dennis' vintage 1975 BMW 3.0csi.

20



### Texas Trifecta 2014

Blake LaGrone

The second annual event held at The Circuit Of The  
Americas in Austin.

22



### Editor's Corner

Jim Robinson

The O'Reilly Auto Parts NHRA Spring Nationals

## ON THE COVER:

**Autocross:  
Squealing Tires  
and Torturing Cones**



Houston Chapter  
BMW Car Club of America  
Post Office Box 56763  
Houston, TX 77256-6763  
www.houston-bmwcca.com

Dennis Nowak  
President  
281-731-7164  
president@houston-bmwcca.com

Blake LaGrone  
Vice-President  
281-743-1029  
vice-president@houston-bmwcca.com

Sarah Nowak  
Treasurer  
281-468-3588  
treasurer@houston-bmwcca.com

Pam Johnson  
Secretary  
713-557-1541  
secretary@houston-bmwcca.com

Jim Moffitt  
Membership Chairperson  
membership@houston-bmwcca.com

Vacant  
Social Events Chairperson  
socialevents@houston-bmwcca.com

Chris Stokes  
Autocross Chairperson  
autocross-coordinators@houston-bmwcca.com

Jeff Thomson  
Webmaster  
webmaster@houston-bmwcca.com

Jim Robinson  
Newsletter Editor  
newsletter@houston-bmwcca.com

Kristen Reyes  
Social Media Coordinator  
socialmedia@houston-bmwcca.com

Donovan L. Brown  
Driving Events Coordinator  
drivingevents@houston-bmwcca.com

Jeff Otten  
Technical Advisor  
techadvisor@houston-bmwcca.com

South Central Regional VP  
Dan Baker - 832-298-1984  
southcentralrvp@bmwcca.org

Past Presidents  
David Dalton • Vikki Finley • Dan Baker  
Jeff Bailey • James Salazar

Internet Services courtesy of  
OpLink  
www.oplink.net  
281-445-9800

Printing Services  
Specialty Bindery & Printing  
www.sbandp.com  
713-869-0594



**Dennis Nowak**  
President - Houston Chapter



Leadership roles in the club can be rewarding when everything functions well. When they don't, it's the Board's responsibility to find a solution to the problem. One nagging problem we are struggling with is a difficulty to plan and host social events. Why? Because we are again without a Social Events Coordinator. We had a member volunteer to take on the role, however, he couldn't dedicate enough of his time outside his work duties to perform well as SEC. The Board can't do it all, we have enough on our plate and we need your help. The solution is for another member(s) (we have over 1300 in our club) to step up to take on the role, after all, we all want more events and this is your club. Help us to help you by volunteering a little of your time. We have past event information, driving routes and ideas, we just need someone to help implement them. If you would like to help out with social events, please email me and I will get you started. [president@houston-bmwcca.com](mailto:president@houston-bmwcca.com)  
On May 17th we held another successful Teen Street Survival School. A huge THANK YOU goes out to all the instructors and support staff who make these TSS schools happen. You ROCK! All of these folks volunteer their time and effort to help make young drivers better behind the wheel, which in turn helps all of us. We

always need folks who can volunteer a little of their time for these schools, so if you are interested in helping out these kids, email me and I will put you in touch with the TSS coordinators.

In the last issue of the Torque I mentioned working with an online store company that can embroider our chapter logo onto clothing items. Five-Star Printwear is an owner operated, small business, in Phoenix Arizona, that has also set up the online store for the RoadRunner Chapter. Some of the reasons we chose to work with Five-Star is that there are no contracts, no set-up fees, design fees, we do not have to buy or keep any inventory on hand and there is no obligations to buy. It cost us nothing to have this store setup. The downside is we do not make any money off the items sold. They do have a return policy, you can pay with credit card or PayPal and shipping is included in the price. The store is online line now, go check it out!

<http://houstonbmwcca.tictail.com/>

At the Chapter Congress in Dallas on March 14-16th a presentation was given by Larry Koch, former BMW NA ///M Brand Manager and active club member.

His presentation was to brief us on the plan to help rebuild the relationship between the chapters and dealerships. His presentation listed some ideas as to why a good relationship with dealers would be beneficial to both parties. Something I happen to agree with. I don't see this as a simple process, but one necessary to mend fences, which will take some doing on both sides. Some of us will be meeting with dealership management soon to initiate the process. Also, in the very near future, I will be asking some of you to act as liaisons to the dealerships to help with communications. By the time this issue gets into your hands, some of you will have just returned from O'Fest in Colorado. I wish I could have gone with you this year, since listening to all the stories from last year's attendees, it will be epic this year. Can't wait to hear about the latest Road Monkey mayhem and mischievous happenstances. It will be hard to beat the aluminum foil stories from last year. Remember I asked you to be my navigator. Without you giving me directions and feedback I can't take us where we need to go. This is your club, get active in it! I hope to find you at the events, you can find me.....

**In the driver's seat!**

### Stay Informed!! - eBlast Signup

Once a month the Chapter emails an eBlast to all members who have indicated that they want to be kept informed about Chapter activities and events, as well as news and information involving the Chapter.

If you wish to receive this information and are not already signed up you may do so on the website at [www.houston-bmwcca.com](http://www.houston-bmwcca.com).

The eBlast request is located at the lower left on the front page.



**COLLISION  
PLUS INC.**



**Quality Services:**

- Exotic/ Highline Customizations
- Auto paint & body repair
- Framework
- Auto glass
- Window tint
- Auto detailing

**Auto Accessories:**

- Alarms
- Stereos
- Body Kits, etc.

Collision Plus Inc.  
7628 Bellaire Blvd.  
Houston, TX 77036  
713.988.5489  
(fax) 713.988.6451

Collision Plus II  
600 Hwy. 6 South  
Houston, TX 77079  
281.496.5489  
281.496.6451 (fax)

[www.collisionplusinc.com](http://www.collisionplusinc.com)

# What Exactly Is An Autocross

by Chris Stokes



Even though we tend to abbreviate using AX, no, this is not a Bavarian styled lumber jack event. Autocrosses are low-speed timed driving skill events. They reward car control and skill, and most importantly, are a lot of fun! You don't need to be Mario Andretti and have an M3 Lightweight to do well. They consist of timed solo (i.e., you are alone on the track) laps of a twisty course laid out using traffic cones. The objective is to drive around the course without hitting any cones or missing gates (just like the gates in slalom skiing). The main attraction of Autocrossing is that it allows drivers to compete in a safe environment. Not only are the speeds low (typically less than 60 miles per hour at the fastest point in a lap) but also the course is laid out such that the only obstacles are soft traffic cones.

Our Autocross events typical occur on the 3rd Sunday of each month, with exception of those hot summer months (July & August). We don't like to melt on the spot so we take a short break from getting cooked.

## Our typical timeline is as follows:

- 08:30 AM – Participants Enter the Site
- 08:45 AM – Registration/Check-In Open
- 09:15 AM – Course Open for Walking
- 09:45 AM – Registration
- 09:50 AM – Event Safety Talk
- 10:00 AM – Heat 1
- 12:00 PM – Transition Break
- 12:30 PM – Heat 2
- 02:30 PM – End of Event

Event participants love to take videos from various angles during their runs and you can find many examples on YouTube.com or Vimeo.com. Just search for Houston BMW Autocross and you'll find lots of interesting videos. Don't let the videos influence bad habits.

You'll be surprised how fast slow can be.

This is my first time Autocrossing. What should I expect?

**1. Arrive on time.** If you haven't completed the on-site portion of registration (signing waivers) you will not participate in the event even if you have paid. Registration closes about 9:15ish, so you really want to arrive just AFTER 8:30am.

**2. Inspect your car.** Before the event make sure your car doesn't have any major leaks, the battery is secured, you have tread on your tires, and that your brakes are working properly. Also, put an extra 5-10 pounds of air in your tires and bring a tire gauge with you to the event. Make sure you have at least a half tank of gas. You don't want to be the one to stop an event due to being out of fuel on the course.

**3. Remove loose items from your car.** You don't want anything loose moving around while you are in the car. So, before you leave home, take a few minutes to leave your loose items at home. If you do end up at the event with loose items, they can go in a bag or pile (garage door opener, water, snacks, water, sunscreen, etc.). Your subwoofers/amps, pile of clothes, child car seats, drum set... can be left back your garage. The driver's side floor mat has to come out, and you can either do it at the event or prior. I generally just leave it at home.

**4. Arrive refreshed.** Get plenty of rest, sleep, and food the night before. You want to be completely aware of what is going on during the event. Also, have a good breakfast.

**5. Stuff to bring.** Water, snack food, hat, chair, sun screen, printed numbers and painters tape (either make your numbers from painters tape, or print out on regular paper and tape to car; if printing it should

fill up a 8.5X11 sheet of paper so that it is easy to read during the event). Bring a helmet if you own one, and make sure it complies with the current helmet requirements listed on our site. We do have a limited amount of loaner helmets available.

**6. Event schedule.** The gates open at 8:30, people come in, park their cars and unload their stuff and prepare the car to be tech inspected (everything out of car, hood and trunk open, numbers on the side of the car). Once the car is ready to be inspected, go sign in (look for a line of people forming). At SIGN-in you will sign waivers, get a copy of the course map, and your work/run group assignments. Announcements will be made before sign in closes, and when the course is ready for walk through. Walk the course (several times if time allows) to get an idea of where you are supposed to go when you drive it. There will also be a rookie walk through where an experienced person will give ideas on where you should be (and looking) at each part of the course. There will be a safety meeting to go over rules, penalties, and general information.

We tend to break up into TWO run/work groups or heats. After the safety meeting, Run Group 1 people will go to their cars and Work group 1 people will go to their assignments (generally first time drivers work corners (picking up and replacing fallen cones, there are also jobs available for drivers with limited mobility). After the first heat is over, we switch places with those who worked group/heat 1 now going to drive and those who drove group/heat 1 going to their work assignment. We have plenty of experienced individuals that come out and they are extremely friendly and always helpful to new Autocrossers.

When it's your turn to drive, you will move your car into grid, which is a parking lot with other cars in the same run group as you. The grid worker will help get you into place and direct you on when to drive to the starting area. As they signal to move your car to the start box, put your flashers on and an instructor will come ride along with you. Don't feel pressure to push it on your first run.

My recommendation is to also get some



BMW Classes (Use Form Above)	
Class	Points
G	80 and up
F	70 to 79
E	60 to 69
D	50 to 59
C	40 to 49
B	25 to 39
A	0 to 24
Non-BMW Classes	
Class	Car
X1	8 cylinders and up, plus Turbocharged cars
X2	6 Cylinders and normally aspirated rotaries
X3	4 cylinders or less
X4	Prepared Autocross cars

Houston Police Academy - 17000 Aldine Westfield Rd, Houston, TX 77073

Corner of Rankin Rd & Aldine-Westfield South of FM 1960, East of I-45 (North Houston)

When you see the "Restricted Area" sign, do not pay attention to this, just drive on into the complex and drive to the end of the driveway, take a left and you will see us! (But stop before you drive into the SWAT training area!)

### The Best Way to Get Started

The best way to get introduced is to just jump in with both feet. Coming out and watching is alright to do, but regret of not signing up sets in very quickly. I

like to say "watching Autocross is like watching Golf, it's a lot more fun being out there playing". The Autocross committee hosted a Women's Experience to autocross in February 2014. We did this to encourage more female participa-



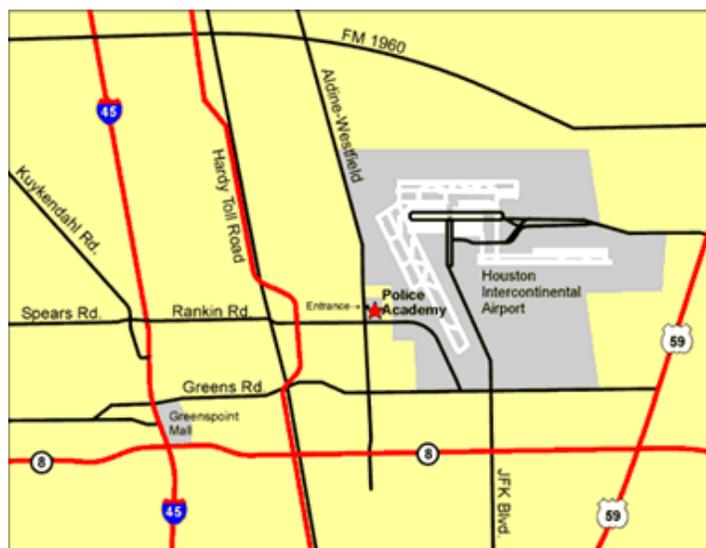
ing for the new experience drivers to have fun and be safe. We had a lot of feedback instructing us to host another one of these events in the Fall. Keep an eye on our Twitter, Facebook, and/or Website for upcoming driving events. Who knows, November seems like a good time to host another "new experience" event.

A big thanks goes out to all the previous Autocross Chairs and Committee Members for documenting much of this information on our website. I've aggregated it all together here with the intent of gathering more membership interest in the sport.

In the words of Ricky Bobby, if you "wanna go fast" come join us for any of the following Autocross Events in 2014:

- Sep 21
- Oct 19
- Nov 16
- Dec 14

Information on how to register maybe found at the chapter website <http://www.houston-bmwcca.com/> under Autocross. I hope to see you out there!



tion and to allow the spouses of our male drivers to come out and see what happens on a Sunday afternoon. The response of attendance was overwhelming. We had James Weaver come out with his Espresso Rescue coffee truck to help get everyone caffeinated. (<https://www.facebook.com/EspressoRescue>)

Our seasoned drivers took to being our instructors and course workers, allow-



ride-a-longs with instructors in order to see the course at speed. Pay attention to how they go through the course, and where they brake and accelerate. Times will also be announced during the event and given to the driver after each run.

Each cone you hit will add a 2 second penalty to your time, so come close, but don't hit the cones.

Each group will probably get around 6 runs through the course. There are usually a total of 2 run groups. The event generally wraps up no later than 3:30PM (most of the time), with final results posted on the website late that evening. Once the event is over, hydrate and go home and rest. You'll probably be very tired, but have a new respect for your car.

### How do you Classify and Group Cars?

The autocross committee of the Houston BMWCCA utilizes a point system to class vehicles into one of seven BMW classes (A, B, C, D, E, F, G) or one of four non-BMW classes (X1, X2, X3, X4). This classification system has been adapted from those in use by other BMWCCA chapters around the country. Points are assigned based upon (1) the inherent performance characteristics of individual BMW models and (2) the modifications you have performed on your vehicle. If you are not driving a BMW, we have an additional set of classes to fit you in.

### Where is the Autocross Event Hosted?



to the car. I Many people try to draw comparison of the i3 to the Fiat 500, although the Fiat isn't electric, they are similar in size. In person the i3 looks bigger than those depictions.

Length 157 inches (13 feet)  
 Height 63 inches (5.25 feet)  
 Width 70 inches (5.8 feet)

The i3 is constructed at the Leipzig plant and ergonomically its typical BMW. All the controls are where they should be. The radio and A/C are familiar, the iDrive screen, controller and associated buttons are where they belong. The seats are comfortable and aesthetically designed. There's plenty of leg room, being an electric car, there's no hump in floor.

Ian Robertson, BMW board member

What do I know about Green Machines? The only green machine I can recall is The Green Monster, the jet powered car from the 60's that held the world land speed record for a short time.

Art Arfons built and drove a variety of drag racers in his day and then, with little technical training, he bought a military surplus General Electric J79 jet engine taken from an old F-104 Starfighter. He built a car around it, strapped himself in it and went streaking across the salt on November 7, 1965, setting the land-speed record with an average speed of 576.553 miles per hour screaming down the Salt Flats of Bonneville in Utah.



for a while and now electric cars are making great strides; it looks like we're moving along through adolescence and into early adulthood.

### Enter the BMW i3

After reading about these various examples of electric cars; Teslas and Fiskers, are readily seen around Houston. We've waited for BMW's example to hit the streets.

I've been reading about and seeing the pictures about the i3 BMW and it has piqued my interest. Roundel has had a few dutiful send ups about the i3. Well, now they have arrived here in Houston. I went to [Advantage BMW Midtown](#) for a closer look. I was favorably impressed. Now, I'm the kind of car guy that likes the fast and exotic cars. My dream car is the V-10 M5. Well, what I'd really like is a normally aspirated V-12 in a five series but BMW doesn't offer a 560i.

To start with, the pictures don't do justice



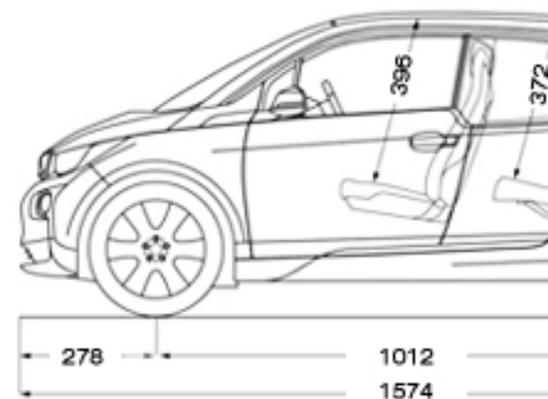
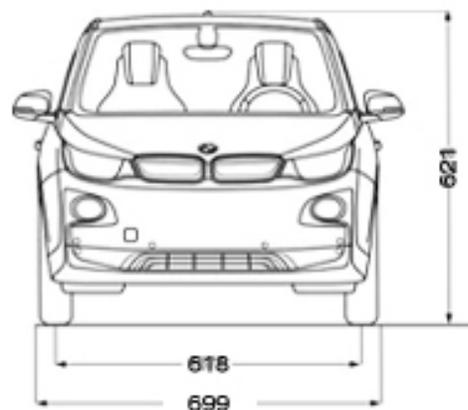
for sales and marketing of vehicles states that 80 percent of i3 purchasers have never owned a BMW before.

Also, it's been reported that Tesla CEO Elon Musk is in discussion with BMW spokesman Kenn Sparks concerning high-speed charging and potential ways to collaborate on the Supercharging network.

"Both companies are strongly committed to the success of electro-mobility

Okay, so much for perspective. We've had a King Hell of a good time with the internal combustion engine. But these days with the ice floes melting, sea levels rising and polar bears embarrassing themselves for a Coke we've taken the notion that maybe we ought to have a little more respect for Mother Earth. Maybe it's time to start looking for other ways to propel ourselves kicking and screaming further into the twenty-first century.

Various carmakers have experimented



and discussed how to further strengthen the development of electro-mobility on an international level,” Sparks says.

At a typical starting price of \$41,350 MSRP the i3 is well appointed. The four seats are comfortable and the design elements of the interior are pure BMW. There’s no drive train hump in the floor plate. The car is made of carbon fiber and the exterior looks like it means business. Advantage BMW Midtown graciously let me have the keys to the car and although I didn’t drive it I was able to turn it on and look at the system displays and such. Once again what I saw was superb BMW innovation and craftsmanship. Taking information gleaned from the website I discovered several facts about the car.

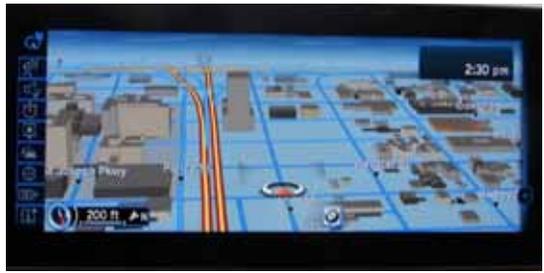


features of your route. That should get you to the Woodlands and back from downtown but maybe not in Houston rush hour. At least not the way I and most Houstonians drive.

The ECO PRO mode operates with an adapted accelerator pedal that demands less power yielding a possible distance traveled increase up to 12%.

ECO PRO+ mode, is designed for range, the maximum speed is reduced to the recommended 55 mph, while energy consumers—such as heating and air conditioning—are switched to their energy-saving mode. Thus, when compared to the COMFORT mode, the possible action radius is increased by up to 24%. Just stay out of the left lane or those 63 AMG’s will be breathing down the back of your neck.

The electric motor of the BMW i3 was designed for instant power, delivering 170 hp with a torque of 184 lb-ft. Typical for electric motors, full torque is immediately available from a standstill and does not need to be built up first via the engine speed, as is the case with internal combustion engines. This gives the BMW i3 particularly high agility in various situations and impressive acceleration values: the BMW i3 accelerates from 0 to 35 mph in under 4 seconds and to 60 mph in approximately 7 seconds (7.8



The iDrive display features BMW Navigation Business system in conjunction with iDrive Controller and 6.5-inch high-resolution screen provides maps and 8 programmable memory buttons.

The success of the BMW i prove that true sustainability is achievable. It also demonstrates BMW i is dedicated to changing the future of mobility.



As far as driving dynamics, the standard yet sporty COMFORT mode the BMW i3 provides a range of 70 to 110 electric miles on a single charge, depending on driving style, traffic conditions and the topographical

seconds with Range Extender). Top speed is 93 MPH. But what’s even more impressive is the nearly silent driving experience. CHARGING TIMES 80% 20 minutes at 50kw DC fast Charge 100% 3 hours with level 2 rated 240volts @ 32 Amps

**ADVERTISERS INDEX**

BAVARIAN AUTOSPORT .....	18
BAVARIAN MACHINE .....	19
BIKESPORT .....	9
BIMMER WORKSHOP .....	17
BMW OF HOUSTON NORTH .....	2
COLLISION PLUS INC. ....	5
GULF COAST AUTO SHIELD .....	11
METROPOLITAN COLLISION & SERVICE ---	23
MOMENTUM BMW SOUTHWEST .....	24
MOMENTUM BMW WEST .....	11
NORTH HOUSTON BEEMER .....	13
OPLINK.NET .....	19
PRO AM PARTS & ACCESSORIES .....	11
TEXAS-GERMAN AUTOHAUS, L. P. ....	10



**Quality Bicycles and Accessories Since 1979**  
**Trek - Cannondale - Litespeed and more**  
 2909 Joanel St. Houston 77027

713.850.0250 - www.bikesport.com - 800.472.6830

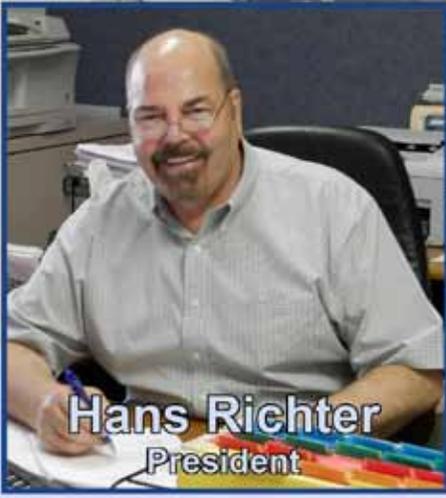


# Texas-German Autohaus, L. P.

3417 Edloe Street  
Houston, Texas 77027  
(713) 850-8282  
www.t-g-a.com



**Texas-German Autohaus**  
Service  
Mercedes and BMW  
Automobiles  
850-8282



**Hans Richter**  
President



**TGA** specializes in the repair and service of Mercedes-Benz, BMW and Porsche automobiles. We have served the Houston European car owner since 1994. Please come for a visit and find out why more than 5700 customers are giving **TGA** a 97% customer satisfaction rating!

**“We speak your car’s language.”**

Hours: Monday - Friday: 7:30am - 6:00pm  
Saturday: 9:00am - noon (Consultation Only)



### Member Rewards

Rebates Up to \$1,500 BMW CCA members in good standing may be eligible for substantial rebates on the purchase or lease of a new or Certified Pre-Owned BMW from any authorized U.S. BMW Center. Rebates currently range from \$250 to \$1,500 depending on the model.

### Roundel Magazine

Declared one of the finest car club magazines in the world by Car and Driver, each monthly issue has 140+ pages of articles, reviews, photography, and classifieds dedicated to all things BMW.



### 67 Local Chapters

BMW CCA's local chapters provide a range of social, technical, and driving events. They're your gateway to many of the club's driving schools, rallies, and autocrosses. Many events are geared toward the novice mechanic or driving event participant.

**BMW Car Club of America Houston Chapter**




### MEMBER DISCOUNTS

Members receive special discounts on a wide variety of goods and services, ranging from car care to travel and more!



The Houston Chapter, is more than just a club for BMW enthusiasts. We have a diversified group of over 1,300 members participating in a wide variety of social activities. These events include:

- Dinners
- Driving Events Monthly Coffee
- Meetings
- Annual weekend getaway in Fredricksburg
- Events at the Circuit of the Americas F1 track in Austin
- Monthly Autocross at the Houston Police Academy

**JOIN US**  
[www.houston-bmwcca.com](http://www.houston-bmwcca.com)

# Gulf Coast Auto Shield

Excellence In Vehicle Exterior  
Appearance & Protection

Featuring  
Opti-Coat Pro Ceramic  
Clear Coat &  
Clear Bra Installation

- ✦ AlloyGator Wheel Protection
- ✦ Headlight Restoration
- ✦ Paint Chip Repair
- ✦ Swirl Mark Removal



**832-264-0670**

**gcautoshield.com**

*Advertise in TORQUE OF THE TOWN!*  
Contact: [newsletter@houston-bmwcca.com](mailto:newsletter@houston-bmwcca.com)  
for rates and availability.

**ProAm Parts & Accessories**  
6125 Richmond Ave.  
Houston, TX 77057  
713-781-7755 800-847-5712  
[www.proamauto.com](http://www.proamauto.com)

Now for BMWCCA members, ProAm's "Spend \$100, Get \$100" Contingency Award Program. Sign Up & Details @ [proamauto.com](http://proamauto.com)

We offer:

- DE Car preparation & Corner Balancing
- Suspension & Brake Upgrades
- Wheel & Tire packages - Mounting & Balancing
- Routine Maintenance - Full Synthetic Oil Changes
- Complete Detailing Service & Headlight Restoration

ProAm is now your source for APEX wheels for BMW's & Vorshlag suspension parts

## Momentum BMW West

Authorized Dealer

Authorized Dealership of BMW N.A.

**Address**  
15865 Katy Freeway  
Houston, TX 77094

**Main**  
832.772.9100

**Fax**  
832.772.9190

**Direct**  
832.772.9019

**e-mail**  
[juan.maldonado@bmwwest.com](mailto:juan.maldonado@bmwwest.com)

**website**  
[www.bmwwest.com](http://www.bmwwest.com)

**Momentum BMW West**  
*a Sonic Automotive Dealership*

**Juan Maldonado**  
Service Advisor

---

Authorized Dealership of BMW N.A.

**Address**  
15865 Katy Freeway  
Houston, TX 77094

**Main**  
832.772.9152

**Direct**  
713.907.2396

**Fax**  
832.772.9190

**e-mail**  
[john.crispino@bmwwest.com](mailto:john.crispino@bmwwest.com)

**website**  
[www.bmwwest.com](http://www.bmwwest.com)

**Momentum BMW West**  
*a Sonic Automotive Dealership*

**John Crispino**  
Parts Specialist



## Considering New Brake Pads?

Eventually the brakes and your car will wear out. Most people, me included, don't like the black dust from BMW factory pads. Over the years of BMW ownership I have tried a number of different brands of pads on our BMW's.

It's important to realize that brake pads and even brake sizes are a compromise. BMW typically does a good job of sizing the brakes for a particular vehicle and performance level. However, their default idea of what is appropriate for a given model may not suit the operation that your car sees.

One thing to be aware is the market for brake pads is continually changing due to company buyouts, combinations and environmental restrictions on elements that are used in the pad material. The pad purchased a few years ago may have been changed when it is need again.

Principal replacement parts in the brake system are fluid, pads, and rotors. The most likely need for replacement is the order listed.

Note that BMW rotors are consumable, and are only thick enough for one use and should not be turned or machined down. The typical allowance for wear is 1.6mm (.063 in). Divide this by two and it's only .8mm or (.031 in) per side.

The reasons for not machining be-

low this number are:

- Balance of rotor will be lost unless the rotor is also properly rebalanced
- Thickness lost from rotor will make the rotor more prone to warping and potentially cracking.
- Most automotive

shops will measure the rotor and compare to the stamped minimum on the rotor (federal requirement in US). Unless their measurement is 1/64" (.016 in or .4mm) per side greater than their allowance for machining, they will not machine it. Essentially if you have .2mm wear, most shops will not re-machine them due to potential liability.

Why does BMW make the rotor so thin? Performance is improved with less weight and the likelihood that local machining may be less than perfect, and without proper balancing of the rotor. BMW basically decided that the rotor is just as consumable as the brake pads.

In my experience BMW factory pads consume rotors at almost the same rate, with rotors lasting slightly longer than the pads. Aftermarket pads can double or triple rotor life depending on the pad. Brake fluid is often forgotten; however BMW recommends a complete flush on a two (2) year interval. I suggest if you are doing any type competitive driving (autocross or track days) then at least once per year is prudent.

Why must brake fluid be replaced?

- Fluid absorbs water which reduces the boiling point as soon as the seal is broken on the container
- Fluid becomes contaminated with corrosion products in the

brake system.

- The brake fluid was overheated due to track day or other excessive braking such as driving a long down hill with the brakes on instead of down shifting.

Contaminated brake fluid makes the fluid more susceptible to brake fade. A common belief is that brake fluid should only be used from a sealed metal can. Motul, which makes some well regarded brake fluids says this is not the case with their fluid as the plastic bottles are specially treated on the inside to prevent moisture entering the fluid. ATE fluid is typically in a metal can. This is a popular fluid with BMW owners as it has a higher boiling point than the DOT 4 minimum and is made by the company that makes many of BMW's OEM calipers.

Brake pad options:

Factory OEM BMW and in general German car brake pads make a lot of dust. Years ago I had the opportunity to take trips around Germany and drive the Autobahn on a number of occasions.

When cruising at 105mph in the fast lane and having to stop quickly, it really gives you an appreciation for good brakes. One of the first observations I made while driving on the autobahn, was that fast lane seemed to be dominated by BMW's, Mercedes, and the odd Porsche, usually coming up from behind. So what causes the black dust? It is primarily the brake pad material.



# NORTH HOUSTON BEEMER

22820 I-45 North, Ste 1-A Spring, TX 77373  
(exit Spring Steubner West Road)

North Houston Beemer is family owned by a 13 year BMW Dealership Master Technician and Team Leader. The BMW Step Program is a prestigious training program available only to top performing graduates of the country's best automotive technical schools. This ensures the highest quality BMW Service Technicians. North Houston Beemer has three BMW Master Technicians who have completed the BMW Step Program, one has 7 years of experience and was a team leader, one has 4 years of experience, and they all have worked at a BMW dealer before working at North Houston Beemer.

We specialize exclusively in BMW and MINI Coopers. We are not affiliated with any other shops.

PHONE: 281-288-8200 | FAX: 281-288-2804



**NHBEEMER.COM**

**Attention BMW & MINI Cooper Owners!**  
**We Have Your Costly Dealer Alternative!**

Monday-Friday 8am - 5pm Saturday 9am-2pm Call or email for an appointment



Dealer prices have risen but we are 30% less with the same training!

## TRUSTED SERVICE

Did you know if your wheels are out of alignment, it will cause an increase in fuel consumption? Let us save you money by providing a FREE Alignment Check in a matter of minutes!

Window tinting, glass repair and replacement, and wheel repair.

Discounted car rental and free shuttle 30 mile radius. Free WIFI!

Put your trust in our up to date dealer factory training!

## PERFORMANCE KITS

We do factory accessories such as iPod kits, alarms, cd changers, bike racks, wheels, body kits, x5 running boards, and trailer hitches!

BMW DINAN Performance kits - all vehicle models. MINI John Cooper Works and other performance kits.

We are an Active Autowerke dealer and do all performance including supercharger, suspension, body kits, wheels, brakes, and software.

We accept certain warranties.

## VALUABLE COUPONS

**WE WILL MATCH:**  
ANY BMW DEALERSHIP OR ANY BMW INDEPENDENT SHOP COUPON!

**\$75 OFF**  
YOUR TOTAL BILL OF \$600 OR MORE

**TWO PHASE FUEL INJECTION CLEANING SERVICE**  
ONLY \$199.99

**\$25 OFF**  
YOUR TOTAL BILL OF \$300 OR MORE






Seconds away from Hardy Toll Road and minutes away from Woodlands Park and Ride  
North Houston Beemer | 22820 I-45 North Ste 1-A Spring, TX 77373 | T- 281-288-8200 | E- nhbeemer@gmail.com | W- nhbeemer.com

Typical characteristics of a BMW OEM pad are:

- Strong cold bite
- Good stopping distance
- Good high speed stopping distance
- Fair to good heat resistance

Downsides however to OEM pads;

- Too much cold bite
- Poor modulation of brake pressure – either on or off
- Fair heat resistance
- Serious dust (black) after only about a week of typical commuting
- Brake dust can damage wheel finish

From the above list, it should be clear there is room for aftermarket alternatives. Remember that all brake pads are a compromise, and as the performance is increased in one area it is likely that downsides in other areas are increased. The key then is to understand what features can benefit your driving style and requirements.

I have tried many brake pads brands on our family vehicles. In most cases we were satisfied with the OEM brake power and feel, but did not like the dust. Now I prefer a little different mix of properties, and put more emphasis on maximum braking torque for use in autocross or DE events. The brands I have tried and continue to use are Hawk, Stop Tech, and Akebono. Table 1 gives a relative rating based on my experience.

For low dust as a primary concern, while still maintaining a similar to stock feel, Akebono is a good choice. The Euro version is a ceramic based pad, that surprising works very well on 5 and 7 series (read heavy) cars. Fit and finish is very good.

Very easy on rotors, mate these to a new set of rotors and you may never have to buy another set of rotors. If the budget is tight, try the Centric Ceramic pads as an alternative. I suggest this at the recommendation of Zeckhausen Racing (have not tried them myself).

For lower dust than factory pads, with a little less cold bite, but good modulation, try Hawk HPS. The Hawk HPS is marketed as a Street Performance pad, and Hawk claims increased braking. Do not expect increased braking over factory pads, however brake modulation should be better. These are marketed a good choice for autocross, they are OK, but don't have the maximum braking torque that I want. Upside is very low wear on the rotors, dust is more brown than black, and not as noticeable. A fair amount does build up after three to four weeks though. If you are doing track driving, then stay away as they are reported to fall off a cliff if overheated, leaving very little braking. For street, they are fine. I currently run these on our X5.

Stop Tech was a specialty brake supplier who has been bought out by Centric, a larger company that manufactures in China mostly. Stop Tech used to supply the Axxis Ultimate compound as their standard "street" pad. Stop Tech now manufactures their own compound which is provided with their big brake kits and also sized for OEM replacements. Expect the Street Performance pad to be a higher coefficient of friction than the Hawk HPS. Also expect more dust and more rotor wear. I run them on our Z3 right now and put them on my 5 series. Wheels need a wash after about 2 weeks, and the dust is black. I like the

cold bite level, less than stock, but more than HPS. Maximum braking is better than a ceramic pad or the Hawk HPS. The price point is very good for these, with lots of online discounts, and many sets on ebay as well. They reportedly have good high temperature characteristics, so for track use are a better choice than the previous pads.

The Hawk HP+ is a great pad for autocross. Truly great braking torque, even with a fairly cold pad. Lots of dark dust. Needs a wash after only a day or so, Dust worse than stock. Also reportedly to fall off a cliff if overheated, so be careful if you use these for track use (again a recommendation from Zeckhausen). For street use they squeal at low pressures, to the point of being embarrassing at a red light. No unusual noise under hard braking.

For to and from event street driving, this is a great pad for a dedicated autocross car.

If you are doing track events with your street car, the brake pads will be a compromise unless you change to dedicated track pads. This is one reason to install a big brake kit, as the pads can be quickly changed out. That way you can run a ceramic pad for clean wheels on the street, and switch to high friction, high temperature, pad for track days. Unfortunately there is not pad made that fully meets both scenarios.

Remember when replacing brake pads to use a brake pad lubricant or antiseize (small amount) on the back of the brake pads. Hawk and Akebono typically provide a package with new pads. Also lubricate the guide pins with a brake lube. Brake lube is available at any auto parts store (StaLube or Permatex work well). Use a small amount at the contact points but do not allow any on the pads or rotor. Lubricant will minimize noise and allow the pad to self align. Clean the rotor with brake cleaner, unless you have rotors coated with a break in coating. Usually rotors are coated with wax/oil rust preventative, which must be removed. The typical recommendation is to use hot soapy water to remove all trace of cutting oil, particles, and rust preventative. I always just use brake cleaner though, for me it's less messy, and do several times with Scott white paper shop towels, until the towel stays clean. For new rotors, if purchased at the dealer, the hat will be painted. Aftermarket rotors, even if the same brand, typically are not, unless they have the Zeomet type break in coating (ATE and Zimmermann rotors may have this).

I usually paint mine with rotor/caliper paint, by masking and painting with two coats of paint. Makes the rotors look better behind your wheels.

ATE calipers have rubber guides for the pins. These guides allow the caliper to float to improve the operation. While usually these guides can be reused, if your car is getting older, or you do track events, consider replacing them. I suggest every two (2) years if you do track events, and at least every 100k miles for street cars.

Also the main caliper seal is rubber and degrades over time. While it is a lot more work to replace, this seal performs a vital function to help unload the brake pads from the rotor when the brakes are released, reducing drag and improving gas mileage.

For my cars usually this seal is changed about 100k, or 10 year interval, or when I decide to paint the calipers to improve appearance.

When selecting a new set of pads consider the features that are most important for the use of your car. Also give consideration to whether new rotors are needed. However, If you have a new BMW, I suggest trying to get new rotors before your 50,000 mile warranty expires. Vendors that may help you decide are Tire Rack, Zeckhausen Racing, and Bimmerworld.

### Jeff Otten



Figure 1 Donovan makes good use of strong E36 M3 brakes with HP+ pads on his AX car

Table 1 Relative Pad Ratings

Brake Pad Brands	Suggested Use	Low Dust Level	Noise	Cold Bite	Brake modulation	Max. Braking	Rotor wear	Best Price
Akebono Euro	Street	5	5	3	4	2	5	4
Hawk HPS	Street	4	4	3	4	3	5	3
Hawk SUV Ceramic	Street	4	5	3			5	3
Hawk HP+	AX driving events	1	1	5	5	5	2	2
Stop Tech Street Perf.	Street, driving events	3	4	4	5	4	3	5
Performance Friction Z	Street, driving events	4	4	2	3	2	5	2
OEM BMW	Street	2	4	5	3	4	2	2
Centric ceramic	Street							5
Old Repco (Axxis) Deluxe	Street	5	4	2	2	1	4	5



# Houston BMW CCA Points System



Activity	Points
Return Survey Form	50
Attend a meeting or event (coffees, socials, autocross and annual dinner)	30
Organize a monthly event (social/technical etc.)	100
Assist with a monthly event (social/technical etc.)	50
Recruit a new member (must be credited by BMW CCA)	30
Original photo(s) published in the "Torque of the Town"	10 (30 pts max per issue)
Original photo(s) published on the web site	10 (30 pts max per subject)
Original Tech Tip published in the "Torque of the Town"	15
Original Article published in the "Torque"	100 (500 words or more)
Original Article published in the "Torque"	50 (less than 500 words)
Recruitment of a commercial ad for the "Torque". Ex: full page ad for one year (\$500) = 100 points. (Advertising rates available in the website)	20% of ad cost



## Ready to win some great prizes?

All you have to do is participate!

That's right!

Just by attending events, you earn points, which can earn you valuable prizes.

Here's how the new point system will work for 2014:

- When you attend an event, make sure to sign the sign-in sheet with the requested information.
- If you sign up a new member, make sure we know about it.

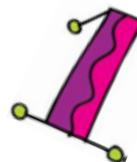
At the end of the year, points are added up and the top three winners will be announced at the Annual Meeting.

**1st Place Prize: \$150, 2nd Place: \$100 & 3rd Place: \$50 Cash!**

So come on out to our events, have a great time, and on top of it all add points just for being there!

If you want to go that extra mile (we are Bimmerheads after all!) chair or help chair an event.

See you at our next event!



# THE ULTIMATE BMW SERVICE EXPERIENCE

SERVING HOUSTON SINCE 2002

**11** years of  
Service

- /// FACTORY-TRAINED TECHNICIANS
- /// ONLY GENUINE BMW PARTS
- /// HONOR MOST EXTENDED WARRANTIES
- /// COMPLIMENTARY SHUTTLE
- /// FREE CAR WASH AFTER SERVICE
- /// BMW CCA MEMBERS RECEIVE 10% DISCOUNT  
ON ALL REPAIRS



*Celebrating 11 Years  
of Exceptional Service!*

**/// BIMMER WORKSHOP**

**3421 FM 1960 WEST ❖ HUMBLE, TX 77338**  
**[www.bimmerworkshop.com](http://www.bimmerworkshop.com) ❖ 281-233-0111**



**Tony and Kathy receive their official Road Monkey T shirts at the Cedar Creek Bar & Grill coffee meeting.**

# Free BMW tech help.

Have a technical question about your BMW or MINI? Our free tech blog – **blog.BavAuto.com** – has a searchable database containing hundreds of tech Q&As, do-it-yourself articles and videos.



www.BavAuto.com • 800.535.2002

Check it out at [blog.BavAuto.com](http://blog.BavAuto.com)...

## Broken Air Dam Dennis Nowak

Earlier this year I was enjoying a nice drive in my vintage 1975 BMW 3.0csi. It was one of those drives that just couldn't get any better, then \$\*##! I pulled a dumb move and broke the front air dam, split it in two places. Yes it was an original CSL thin fiberglass piece that is expensive to repair. I opted to purchase a reproduction from Coupe Guy who has it made from the original molds except his is thicker. Once I received the new air damn I needed to have it painted. Now, if you are like me you are not going to take it to just anybody to paint it. You want someone who knows what they are doing. Just so happens I attended a coffee meet at Metropolitan Collision last year. While there, I spoke to Andy Holder, the owner, and his staff about how they do business. They explained repair procedures as we toured the facility and what I was most impressed with was the quality of their repairs. Plus, how many repair shops do you of that have dedicated curing rooms that bake the paint on?

I took my new air dam and dropped it off along with my car, leaving it with the guys at Metropolitan Collision to do their magic. They fixed the imperfections on the new air dam, primed, painted and then installed it on the car. The Taiga Green paint matches the rest of the car perfectly. And the total cost came in



under their original estimate. I am a happy customer! So if you are a picky customer that cares about your car and are looking for a reputable business that will give you the quality you demand, give these guys a call:

**Metropolitan Collision**  
832-618-1700  
see their ad in this issue.

# Work.



# Play!

**Some BMWs take people to work. Some people take their BMWs to play! Bavarian Machine Specialties is the shop that understands both.**

Since 1980, BMW owners in the Houston area have been bringing their cars to Bavarian Machine Specialties for routine maintenance, performance modifications, and extended warranty work, or they just want a faster track time... Bavarian Machine Specialties delivers.

Come find out what others already know... "Experience Matters."

*Bavarian Machine Specialties ♦ 3117 D'Amico Street ♦ Houston, TX 77019 ♦ (713)524-8365*



[www.bavarianmachine.com](http://www.bavarianmachine.com)

**oplink.net**  
**Premium Internet Services**

Serving Houston since 1999!

- **High-Speed DSL Internet**
- **Server Colocation**
- **Web Site Hosting**
- **IT/Network Consultation**

**Visit Our Website Or Call Today**

<http://www.oplink.net>  
**281-445-9800**

Oplink.net is a proud sponsor of Houston BMW CCA

# THE TEXAS TRIFECTA



After last year's event I couldn't wait for another chance to drive this amazing track. I have a new weapon in my arsenal now and it needed a little TLC to get it ready for this years fun. I bought a 1999 M3 coupe, Cosmos Black and black Vader interior. I bought this from one of our good sponsors...Alain at Bimmer Workshop and I am very happy with the purchase. The previous owner had already done many of the modifications that I would have done anyway. As most of you know, I do have a penchant for Super-charged cars and this one has a fine kit on it from a good tuner, Active Autowerkes. The car ran great on the trip from Houston to Austin and I am really looking forward to seeing how it behaves on the track.

and child for a good dinner. Back to the hotel for some much needed rest, early day on the Track tomorrow! Friday dawns misty and cool but no rain forecast so that's good. My car likes the cool weather, makes the blower purr..... into the COTA paddock with the rest of the Houston folks.



talk to and gave me some good tips about this track. Off we go for our first laps. I take it pretty slow for this first time around, I want to try and get a good mental picture of the track before I start pushing my car. I am still learning how this car behaves so this will be a big test for it. We complete our laps and head back to the pits and another classroom session. I was happy with the cars performance and ready for more!



Chris Stokes got some pictures of the other Houston folks that were at the Trifecta, everyone had a big smile on their face!



Nice Weiss M3 Gerald!



Araj is ready...



So is Jim....



I left Houston on Thursday as I had signed up to drive the track on Friday, and AutoX on Saturday then returning home on Sunday. The drive up was uneventful, got checked into my Hotel and headed for the track. I met up with Chris and his wife Leann and Albert and his wife Meredith



Leann and Chris both looked happy to be here. That's one thing that I really appreciate about these events, there's just a great sense of FUN about it all!

John and his gorgeous E30 M3 were there, unfortunately the car had some tuning issues and wasn't able to finish the day.



Soon its off to the drivers meeting and we get some inside information about the track and its tricks, as well as some good info about why it is REALLY recommended that we not take out any of the barriers around the track. Lets just say it would be a very costly mistake. Back to the paddock to finish prepping the car and soon it was time to drive. I was really happy with my instructor, he was easy to



Vicky too!

After lunch I went out for my second session. I was having problems finding a visual cue as to when to turn in to the Esses...If you wait til you can see the turns, its too late! My instructor kept telling me to look for the bridge coming over the horizon. There are lots of bridges out there and it wasn't until I rode with him that I finally saw the one he was talking about. It is Wayyyyyy off in the distance, but he was right, if you turn in just as that bridge comes up on the horizon, you are in perfect shape for the upcoming S turns. I know it's too late if you wait til you see the S turns to turn in because I made that mistake. My car let me know that it was too late! I swapped ends, did one 360 got both feet in about a third of the way around and by the time I came to a full 360 my speed had bled off, I was facing down the track, a quick look in the rear-view for traffic, and a shift into second, pop the clutch and we continue down the track. Not the way I would recommend entering this set of turns! Lesson learned! The Club racers were out in force, it was fun to watch them duel it out on this colorful track.

My last set of runs in the afternoon were such a blast. I was turning into the Esses correctly and thanks to my instructor doing it without spinning the car. I had to be careful at turn 20 at the end of the day. I was getting comfortable with carrying a lot more speed into this turn and getting down into 2nd for the punch out of it. I got a little greedy once got on the throttle too quickly and ended up drifting the corner. Fortunately I didn't lift off the throttle so the M3 just drove a nice little slide back to the center of the track. Again my instructor told me what I needed, just a little patience on the throttle coming out of that turn, it really is quicker than a drift. Not as much fun, but quicker!

For those not driving this day, there was plenty to do around the track. Val, Dan and Leann found a great place to watch the Club racers.



They even got to take a look into COTA control. It's an amazing room with monitors that cover every inch of the track.



Just like last year I came to the end of that day wishing I had signed up for another DE day. It was over too quickly and just as I and my car were getting used to this wonderful track. Ahhhh well, I look forward to tomorrow's AutoX. I had the AX the next day to still look forward to. Roger Johnson, Ricardo Barnes, Chris Stokes, and



Jeff Conley did a great job setting up a challenging course and running a smooth event. That in his Frankenfur E30 about to tear up the track.

This was a fun and challenging course. I got lost about 2/3 of the way through twice. I said enough of that, got an instructor to ride with me and saw the turn I kept missing. Its amazing how when you miss a turn and look out at the track all you can see is a sea of orange cones that make no sense at all. Not so if you make the turn properly, then you can see the next gate and the whole thing looks easy. I was getting better each run but those two lost runs cost me. Dinner that night was at "Flying Monkey" pizza appropriately! Good pizza and good folks to eat it with.



So ends another great experience in Austin Texas and Circuit of the Americas racetrack.....

### Looking forward to COTA 2015!

# Editor's Corner

Jim Robinson



## The O'Reilly Auto Parts NHRA Spring Nationals

Oh Lord, what a spectacle. I am amazed by the cars these days. I went to a race when I was a kid and was amazed with those cars when they only went half as fast as today. The legends of the drag strip, Big Daddy Don Garlitts, Don "the Snake" Prudhomme, Shirley Muldowney to name a few were my heroes. John Force red lighted in the first round yesterday. I remember the battles with him and Al

interesting in that many of them drove cars similar to those legends of yesteryear. Barracudas, Mustangs and Corvettes, Camaros and other modified automotive creatures went down the track with their front wheels in the air. And I still don't know what to make of those crazy individuals on



throttle produce a series of violent explosions when each piston fires from the headers to move the air all around and through you. It's a truly incredibly exhilarating experience. I can only imagine what it's like for the drivers of these cars.

The crowd of Nitro Freaks were wearing their colors; their favorite drag racing T-shirts and others a little more upscale with their race team duds. Harley-Davidson shirts too. Tattoos were peeking out of clothing everywhere.

But I only saw four BMW's in the parking lot. A 650i an older 740i and a 335i and of course my 528i. I think the others must have been wearing shades.

Hofmann. I always liked Al better but he didn't have the backing to make speed as John did. But he still won some races like David slaying the giant.

their tricked out motorcycles? They go down the track on the rear wheel alone for about half way.

The cars these days are so incredibly fast and the noise made by the Top Fuel and Funny cars is astounding. But it's not the volume, it's the sound pressure. As the cars go by, at speeds over three hundred mph the sound pressure vibrates your whole body seemingly turning insides to jelly. It's as if all your body's blood and water



Antron Brown, driving the Matco Tools car won Top Fuel with a 3.793 pass at 317.72 over Khalid alBalooshi. Robert Hight driving the Automobile Club of Southern California Ford won Funny Car he ran a 4.055 at 314.90 to defeat Jack Beckman. And Erika Enders-Stevens won Pro Stock in her Elite Motorsports Camaro with a hole shot 6.594



# BACK TO YOU LOOKING LIKE NEW

Metropolitan Collision & Service provides complete collision repair on all makes and models, foreign and domestic. They specialize in the repair of luxury automobiles such as Audi, BMW, Mercedes Benz, Porsche, VW, Lexus, Land Rover, Infinity as well as the more expensive SUVs. Metropolitan gets the collision repair job done right whether it is cosmetic, structural or mechanical and proudly warrants their work for the lifetime of the vehicle. Conveniently located minutes from downtown in the Heights, Metropolitan is easily accessible from any part of the greater Houston area.

With over 80 years of success in the Houston market, Metropolitan Collision is road tested and highly rated by thousands of satisfied customers.

The more you invest in a vehicle, the more important it is to deal with the best in collision repair...you can put your trust in Metropolitan Collision & Service.



**METROPOLITAN**  
COLLISION & SERVICE

818 West 16th Street Houston, TX 77008 P 832.618.1700 F 832.618.1705

[Metropolitancollision.com](http://Metropolitancollision.com)

# TORQUE OF THE TOWN

*2011 Center of Excellence Award Winner*



**We Bleed BMW** **blue.**  
**MOMENTUM BMW**  
**SOUTHWEST**



10002 SW FWY, Houston, TX 77074 • Tel: 713-596-3100 • [www.momentumbmw.net](http://www.momentumbmw.net)

