# The Heat Exchanger c/o Philip Audibert, Editor 9116 Open Gate Rd. Gordonsville, VA 22942 Shenandoah Region



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Cover photo by Bill Sanders



#### Treasurer's Report......by Gay Jewett

	<u> </u>	•		
Date	Category	Income	Expense	Balance
9/20	Balance			5917.12
10/8	Print HE		338.72	
10/8	Dom Mktg-mail HE		81.74	
10/25	Ad for HE	180.00		
10/25	Autocross net	66.24		
	Totals	246.24	420.46	
10/25	Balance			5742.90

**Das Market**– 1998 Boxster, triple black, 49,199 miles, 18" wheels w/Pirelli Zero tires, windscreen. \$26K OBO 434-974-9467 Dale Dickerson.

**Das Market-** 1991 Carrera 2 Cab, white/blue, 46K miles \$33,911, 1975 911 \$ Coupe, silver, 58K miles, \$13,911, and two 1959 model 218 tractors, \$16,218 (restored) & \$6,218 (operational) – 804-448-3448 Herb Distefano

#### We believe.....

Shenandoah Region, PCA is a non-profit organization dedicated to the enjoyment of the Porsche automobile.

The region's newsletter, "The Heat Exchanger," is published nine times per year (no Dec., Feb., or Aug. issues) with a production **deadline of the 26th of the month prior to publication.** The information in this newsletter is solicited from the membership of this region and other newsletters and may or may not be consistent with the beliefs or ideals of the Editor.

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**Literary submissions** are welcome and expected. Please e-mail submissions to PHLODBEAR@AOL.COM, prior to the 26th of the month. Publication of those submissions will be in the next available issue, based on space, timeliness, and appropriateness. A special thanks to all those who contribute and advertise in "The Heat Exchanger!"

**Advertising rates:** \$50/month-full page, \$30/month-half page, \$20/month- quarter page and \$15/month- business card. If you purchase ad space for a year (nine issues), you will receive one month free! All ads need to be sent to the newsletter editor and must be reproducible.

**Das Market ads** for new and used Porsches and Porsche parts must be sent to the newsletter editor by the 26th of the month previous to publication. These classifieds are free of charge for Shenandoah Region PCA members and all Das Market ads will be purged after running. All others who want to run a classified ad in Das Market will be charged \$1.00/line.

## 2 4 3

#### Calendar of Events.....

- Nov. 18- Social/Meeting, Crown Porsche, Charlottesville, 7
   PM. Rt. 250 East, Pantops
- Nov. 19-21- G & W's Fall Fling, VIR, Danville. See Ad Page 14
- Dec. 5- Annual Christmas party, Bryce & Gay Jewett's house,
   5 PM. Directions on Page 4.
- Jan. 20- Social/Meeting to set calendar of events for 2005,
   CDOC, Preston Ave., Charlottesville, 7 PM.

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#### President's Letter Track Antics and Holidays on the Horizon

all is here, the leaves are turning and the area is alive with color and activities. Nothing different for the Shenandoah Region; heck, we even had two different events on the same day last month. I have to apologize to Chad and those of you who had to choose between the two.

Our last autocross was fun and we had some interesting things happen. President, Rick Ebinger Diane Earman cleaned up the ladies class,



Howie drove the wheels off of everything, and Erik and I battled it out in the early class. Scott Mandell brought out his very, very nice black GT3. When Scott and his wife spend a little quality time with that car, we will all have our hands full. Look at the results for the autocross to see why. Anyone want to buy a turbo 914, slightly used, and lend me 100K? Thanks Scott.

Euroclassics had their annual Columbus Day event at VIR. The weather was perfect and the day went very well. Again, we had a lot of "first time" drivers and very little problems throughout the day. Our membership chair Mel Brannan would probably discount the comment I just made, but in my defense it was a good pass and a controlled spin in the brake zone. Thought I wouldn't mention it, didn't you, Mel.

Mark Cooke and staff put on once again a great event and special thanks to CDOC and G&W for support and Alex Smith for bringing it all together. Mark your calendars for next year; this is a really good event. G&W's fall fling is coming up the weekend before Thanksgiving. This is also a really good event and each year brings great drivers, cars, and stories for Cole, Price and company. See you there.

The next social event is at Crown Porsche this month, and it will be the last social meeting before our Christmas party and the beginning of the holiday season. At the party Dec. 5, we will have some awards, a change in officers... some of them... and set up planning for next year. We always have good food, lots of fun, and a story or two that always makes everyone smile. Come out and watch Alex get on Bryce again, and this year it should be good because they are now family! Watch out Bryce!!!!

Lastly, I'd like to thank everyone for a really great year, the web site will post more information on season points standings, event results, and I'd like to see more pictures submitted to the page. We have made some gains with the site, and I'm sure we can upgrade this. Have a great November, enjoy the fall and see you at the planned fun. -Rick

(Tech-Tactics, Continued from page 17)

up using, stick with it all day, for every session, to keep the data consistent and reliable.

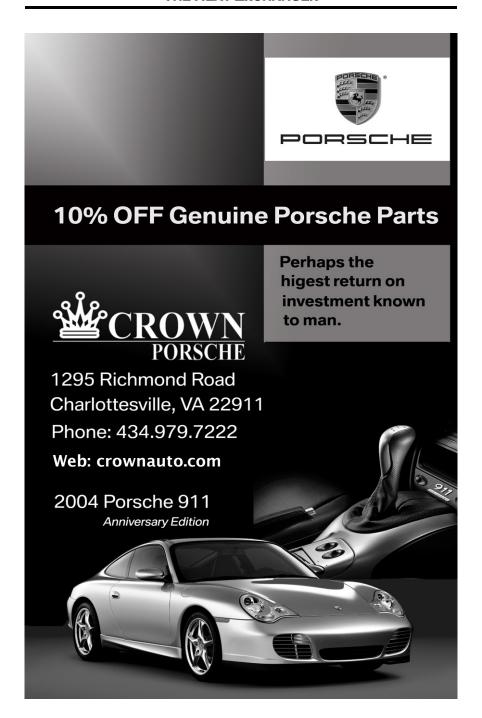
As for the actual note taking, you can buy some very intricate data sheets to fill in the blanks like the pros do. Until then, just use a notebook and record the following data: date, time, event, driver, car, car number, session number, ambient temperature and track surface temperature. Then draw a big cross with an arrow at the top of the vertical line to indicate front of the car. The temperatures should be written in the same orientation as you find the tires on the car. Starting with the left front tire using the upper left quadrant, fill in the temps for the outside, center and inside from left to right. For the pressures, indicate the cold and hot psi with a "C" or an "H" in each quadrant. If you have the data, make note of the current camber, caster and toe of each corner. If this is a car with a highly tuned suspension, you could also note the spring rates, adjustable damper setting, adjustable anti-sway bar setting, and the weights for each corner.

For those without the luxury of a helper to record the temp data, the tire probe pyrometer with memory feature is for you. Just poke the probe and push "read" for each area on the tire and the unit will record the temps for each tire and then record them all for that session. These units usually have a ten session memory. On these units you will need to always start with the right front tire because they are set for oval racing going counter clockwise.

After many sessions of trial and error, when the car comes in after a fast session and even tire temps, this is the moment for your air pressure gauge to shine. Check all the tires for the "hot" pressures. This is now the target pressure you're going to try to hit from here on. After two or three hours in the shade, check them again. This will be the "cold" pressure to start with from here on. It's completely normal and likely that all four tires will be a different pressure. That's fine. If that's what it took to get even temps, so be it. It's also likely that the camber will be asymmetrical. You should note in you records whether the track was going clockwise or counterclockwise because you'll need to set up the car just the opposite for track days going the other way. Generally you will start with the outside tires one or two psi less than the inside tires. For instance, if the track is going clockwise, start the left tires with a slightly lower pressure than the right tires. After the session, they will be about the same pressure. Because of this, you'll need to get the tires up to temperature and pressure for the first two or three laps before driving at 10/10ths.

All this may sound like a lot of work and many will have the reaction, "I'm just out here to have fun and I'm not that serious." I understand this view, but consider this. Would you rather be burning through expensive tires in a car that's hard to handle and getting middle-of-the-pack lap times? Or, would you rather do the homework once, to enjoy your car more by getting better lap times in a car that's easier to drive, and save your tires at the same time?

by Dan Nahas, CDOC Sales Consultant

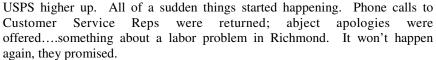


#### From the Editor's Desk

#### The beat goes on....

ell, the October *Heat Exchanger* landed in the Richmond area around the middle of the month. Herb Distefano got his on the 13th...Mel Brannan, the 18th. So, I guess that's an improvement...NOT.

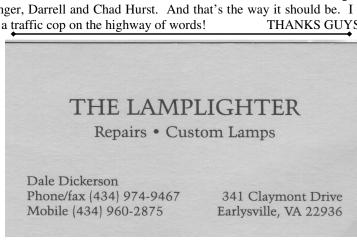
But there is hope. Ross Hunter, of Dominion Marketing, who bulk mails the *Heat Exchanger* every month, Editor, Phil Audibert had an interesting conversation with a



We'll see. Apparently we are not alone. Margie Becker is the Editor of the *Mountain Messenger*, the Pocono Region PCA newsletter. She tells me she had the same problem and had to resort to first class hand stamping the 250+ issues she mails to her members every month! I'm sorry, but I can't go that far.

In other news, take a look at this issue and tell me what you see. I'll give you a hint. My name does not appear as a byline on any articles other than the one you're reading right now. In other words, every article and photo in this issue came as a contribution from you the members. We've got great pieces and photos from Bill Sanders, Jim Condon, Chess Earman, Colin Dougherty, Rick Ebinger, Darrell and Chad Hurst. And that's the way it should be. I should be just a traffic cop on the highway of words!

THANKS GUYS!



THE HEAT EXCHANGER THE HEAT EXCHANGER



### "All I want for Christmas ......"

Bryce Jewett has visions of new 911's dancing in his head at Euroclassics in Richmond. Bryce and his wife, Gay will host this year's Shenandoah Region PCA Christmas Party, at 5 PM Dec. 5th at their home. Directions are below. Save them...there is no December Heat Exchanger.

#### DIRECTIONS TO THE CHRISTMAS PARTY DEC. 5

(if you get lost, call 804-708-0007)

From Interstate 64 just West of Richmond take the Gaskins Rd. Exit 180A FROM THE GASKINS ROAD EXIT – Exit onto Gaskins Road traveling south. Continue for approximately four miles to the intersection of Gaskins and River Roads. (Eighth Stoplight) Turn right onto River Road (heading west). Go approximately one mile. Turn left into Randolph Square at the brick columns. (first left after you cross Tuckahoe Creek) Practice your driving skills on our Porsche friendly entrance road. At the stop sign (circle with gazebo in front of you) turn right. Take another immediate right (50 ft.) onto the first road intersecting the circle; go to the stop sign. (100 ft.) At the stop sign turn left onto West Square Drive. Go one block and turn left onto West Square Court. Fifth house on the right - #143. It is a white house straight ahead when you make the turn onto West Square court.



(Tech-Tactics, Continued from page 15)

ping and the car becoming easer to drive. Also, now that you're using the tires evenly, they will last longer. The cost of the tire probe pyrometer will quickly pay for itself by extending your tire budget.

One important thing to keep in mind is how many left-hand corners and right-hand corners there are on the track. If the majority of the turns are to one side, expect the tires on the outside of these turns to run hotter. Also, if the last few corners before the pits are all to the same side, expect a spike in temperatures on the outer edge of those outside tires. This doesn't necessarily mean you need more negative camber on that side; remember to look at the track layout as a whole before making more adjustments.

For recording the temps quickly and accurately with the basic (non memory) unit that reads one temp at a time, you'll need an assistant. The most likely candidate for this task will be the driver. As soon as they come to a stop on pit lane, not in the paddock, have them turn the front wheels to full lock to give you easy access to the full tread face (this should be done right after a hot lap, take the cool down lap after the temps are taken). Start with the tire most likely to be the hottest. On a clockwise track this will be the left front. If the car or the driver has a tendency to over-steer, however, the hottest tire will likely be the left rear. Each time, for consistency, call out the temps in this order: outside first, center second, inside last. The second tire measured should be the tire most likely to be the second hottest and so on. Whatever order you end

(Continued on page 19)





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(VIR Columbus Day, Continued from page 7)

and one after. Each group had two runs per session, for a total of four track sessions, each about 30 minutes. I ran a total of 139 miles on the track in those sessions.

Mel Brannan and Dean De Trou have really put their VIR membership to good use. They both ran well in the white group, clicking off good consistent times. Dean's white 944 Turbo is a clean, sharp track car that runs strong. Mel's 964 C4 has over 150,000 miles on it and now sports large numerals on the doors. Mel spent the first couple of runs just trying to breakin some new Pagid Orange brake pads he had just put on.

Matt Einstein's new yellow GT-3 (he traded-in his silver one) ran really well until a transmission shifter cable slipped off. Some time spent in the pits fixed that, and he was back on the track.

Alex Smith drove his dark green 993 Carrera S hard the whole day. What a great looking car and one that really handles well. His spin coming out of Turn Three even caught him by surprise.

Bryce Jewett's cabernet 993 Carrera also ran well in the red group. He was on the track at the same time I was, but we didn't have the chance to tangle.

Yours truly had some good runs in the ten-year-old 928 GTS. One run with a 993 C4, Emmett Richardson's blue 911and another with a Boxster S were very thrilling. Just trying to keep some cars from passing or staying right on someone's bumper really is exciting. It's just hard on brake pads and tires. Slowing down from 125mph on the back and front straights really takes their toll on the brake pads. The ABS brakes helped when I got too deep into the turns.

All in all it was a memorable day!

-Bill Sanders

(Autocross lures Wife, Continued from page 13)

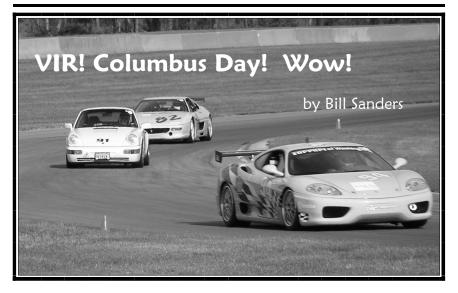
off valve was disconnected, creating a major vacuum leak.

Well, she won the ladies class that day, and coincidentally won her class for the whole year.\*\* Since Howie, Diane and I had each won a class for the year, we came home to celebrate. Howie and I are backslapping and critiquing the event, and Diane chirps in talking apexes and boost and general guy stuff, and I'm like Whoa! Racer Chic!!

I would like to throw in some major kudos to Eric and Rick for being the driving force behind this club having autocrosses. I know a lot of time goes into preparation and setting up the course. Eric has to spend the majority of the event with his head buried in a laptop to keep track of everything going on. It's sad that only about 10% of the club members come out to autocross their cars. But that's also good because it enables folks like us to win events! I think some don't come out because they figure the people that race are gear-heads or competition freaks. Some of them are. Take my wife for example!!

\*\*Thank you Susie Audibert for having a conflict of interest and not being able to autocross for this event!

-Chess Earman



Mel Brannan is the tasty filling in a Ferrari sandwich at Turn 2 at VIR Columbus Day. You know Mel has been bitten by the VIR bug when he puts a number on the side of his car and changes his e-mail address to MadMelRacing@Earthlink.net!

Photo by Bill Sanders

ow, what a great day! Thanks to Mark Cooke and his gang from Euroclassics and to Alex, Rick and Eric from our region. They all worked very hard to make this day turn out so well.

I worked all day Saturday and half of Sunday so I could play hooky from the office with a clear conscience on Monday....drove from Charlottesville to VIR in about 2 ¼ hours, and did not get a ticket on the way. Others cannot say the same thing!

At Mel Brannan's suggestion, I called Sandy at VIR and was able to book a room at the new VIR Lodge, overlooking the racetrack at turns 5 and 6, just before the Esses. The rooms at the Lodge are great...Jacuzzi tubs, 36 inch TV's and cable.

Mel, Dean De Trou and I went into Danville for dinner at Outback Sunday and ate too much. Monday morning dawned clear and crisp, with just a bit of ground fog. There's nothing like a cool fall morning in Virginia.

The tech inspections went smoothly. Yours truly had the only 928. There were a couple of new 997's and GT-3's, many 996's (including a few turbo's), 993's, 986's, 964's, 944's (and turbos), plus a few older 911's and Rick's trusty 914. Euroclassics had several cars on hand, even a 996 C4 Cabriolet for the pace car. A few race-prepared GT-3 Cup cars were also in attendance, along with a pair of yellow Ferrari's and a Camaro Z-28. A couple of Boxster's, including Ben Brigg's, had roll-bars fitted, as required by VIR

(Continued on page 7)

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#### Tech-Tactics......It's All About the Temps



T-T Editor, Colin Dougherty

ave you ever noticed a crew member jump over the pit lane wall and instantly crouch around the tires after their car comes in from a few laps on the track? Sometimes they'll do this a few times in a session. You'd think these folks are a little crazy about the tire pressures or brake dust. The truth is, most of the time, they're checking the tire temperatures.

The tires' temperatures are by far the best indicator of the cars' setup working better or worse than the last time out on the track. This is why it's more important to use a pyrometer rather than an air pressure gauge as your primary tuning tool.

Now don't go throwing the air gauge out just yet, you'll need it later.

There are currently several types of pyrometer available, including an infrared "gun" style and a probe style. The infrared pyrometer provides inconsistent readings because there's too much interference from the hot brakes and exhaust. Even if you were to touch the tire for a "point blank" reading, the surface of the tire will always be different than the area near the cords. This variance is caused by the cooling of the outer surface of the tire as it goes through the air, and sometimes through water standing on the track at the pit entrance. I once demonstrated this phenomenon for a client at a track on a set of new tires stacked in the paddock. The outer surface of the tread facing the sun was 116°F while the temp about 1/8" inside was 126°F. On the shady side, the outer surface was 98°F and 119°F inside. This was on a day with about a 90°F ambient temp. The infrared pyrometer, while still great to have for other applications (like brake rotors, oil and coolant hoses, and intercooler piping) wouldn't have picked up these temperature variances.

The goal for tire temps is to maintain the outer, center, and inner regions as closely as possible (within 10°F). Here is a good rule of thumb: if the outer temperature is considerably higher than the center and inner temperatures, then you need more negative camber (lean the top of the wheel and tire inwards) to minimize the wear on the outer shoulder of the tire. If the inner temperature is much higher than the center and the outer temperatures, then you need less negative camber (lean the top of the wheel and tire outwards). If the center temperature is much higher than the inner or outer temperatures, then you need to reduce the pressure (usually in one psi increments). If the inner and outer temperatures are much higher than the center, then you need to increase the tire pressure. Once you've consistently achieved even temperatures across the tread of the tire, you'll most likely notice your lap times drop-

(Continued on page 17)



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(Continued from page 5)

rules in order to run in the two higher groups.

The groups were divided into Yellow (touring, no helmets, no roll bars, single file behind the pace car), Red (helmets, roll bars for open cars, passing on the straights Okay with "passee" permission) and White (same as Red, but passing anywhere).

The Sunoco pumps were ready to top-off the tanks. At \$5.75 per gallon for 100 octane unleaded, a half-tank puts a dent in a \$100 bill. Let's hope regular street prices don't go this high....ever.

With the tech inspections out of the way, it was time for the mandatory drivers meeting. Everyone stressed Safety, Fun and Learn Something. The instructors were available to



drivers meeting. Everyone Driver's Ed event participants warm up on stressed Safety, Fun and a crisp October morning at VIR.

Photo by Bill Sanders

help those of us learn what our cars can do and how to safely and quickly make our way around the course.

CDOC was present to support the effort, bringing their truck loaded with supplies and equipment to buy: from helmets, shoes, books, brake fluid, and coil-over kits to driving gloves and brake bleeding systems. Colin

d coil-over kits to driving gloves and brake bleeding systems. Colin Dougherty showed up with a rig loaded with his and his wife Chris'

GT-3 Cup cars.

Colin's new white GT3 Cup now sports an orange, black and chrome paint scheme that looks sharp. It ran the track as well as it looks standing still... a fast ride. His crew fitted a passenger seat so he could give rides to some who wanted to see the track from the point of view of a fast car in capable hands. Colin also drove his wife Chris' white GT3 Cup car, with it's blue and red graphics. Both cars looked and ran great all day.

day.

The day was divided into two run sessions, one before lunch (Continued on page 16)

VIR driver's Ed event......\$295

New HAWK HPS brake pads from CDOC for those high-speed stops....\$135

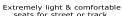
One night's lodging at VIR Lodge....\$85

12 gallons Sunoco 100 racing gas @ \$5.75/gallon....\$70

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#### Autocross lures wife away from home/hubby

By Chess Earman



y wife Diane "crossed over" at the last autocross.

She's driven her 944 Turbo and my 911 Turbo at club autocrosses for about four years, but, she's not a thrill seeker by birth. I once talked her into parasailing and riding a roller coaster. She vowed she would not repeat either for a million dollars.

I was just happy that she enjoyed driving at the autocrosses. She usually finished last mostly for two reasons: Not many ladies autocross, and as mentioned earlier, she's not a thrill seeker. Even finishing last, she loved it. She was really competing with herself. She usually scrubbed off time with each run, but typically had the STD (Slowest Time of Day). She even won an award at the Crewe autocross for the "Snail with a Whale Tail", but she had fun. She said that autocrossing was an adrenalin rush like no other! Forget my performance in the Hobble Palace, this was for real!

I don't know what happened at the Verona autocross this time. She knew my friend Howie Dunbrack and I were competing for end-of-the-year points lead in two classes. She knew we both had been modifying our cars to be more competitive, and the whole season came down to this race. For whatever reason, this day she found the accelerator and the brake and embraced them in ways previously unheard of. I saw her lose traction with turbo boost and smoke four tires braking into a turn. I thought the 944 had been hijacked!

After one of her runs she came in complaining the car had lost boost!! Prior to today, she had never known what boost was. Now, she's bellyaching! Sure enough we open the hood and one of the hoses to the pop-

(Continued on page 16)

#### Autocross Results.....

	Name	Car	Class	Time	Pts.
1	Rick Ebinger	'04 GT3	Late '95-'04	69.805	3
2	Gary Krichbaum	'98 Camaro	other	70.487	3
3	Erik Boody	'04 GT3	Late '95-'04	70.686	2
4	Rick Ebinger	'74 914	early	71.209	3
5	Erik Boody	'73 911 T	early	71.485	2
6	Chess Earman	'86 944 Turbo	944	74.182	3
7	Howie Dunbrack	'86 930	Mid '80-'94	74.548	3
8	Howie Dunbrack	'86 944 Turbo	944	74.850	2
9	Bill Sanders	'94 928 GTS	944	75.295	1
10	Bryan Lamond	'86 944 Turbo	944	75.360	
11	Rick Kiser	'98 993 C2	Late '95-'04	75.672	1
12	Scott Mandell	'04 911 GT3	Late '95-'04	75.864	
13	Stephen Garstang	'73 BMW	other	77.509	2
14	Andy Mohn	'94 VW Jetta	other	78.402	1
15	Steve Mohn	'91 Volvo 740	other	82.308	
16	Diane Earman	'86 944 Turbo	ladies	83.478	3
17	Stuart Moore	944 S	944	87.543	
18	Pam Grey	'74 914	ladies	88.986	2
19	Chess Earman	'86 930	Mid '80-'94	dns	2

## The National Radio Astronomy Observatory Tour by Chad Hurst



ur tour started from the Tastee Freeze parking lot in Churchville, Va. on Sunday, 17th of October. There were seven cars and the following participants: Jim Bourie, Dale Weatherholtz,

Robert Whissen, Jim Pullen, Bill Armentrout, Joan and Robert Dunley, Jim Condon and Sherry Westfall, Johnny Johnson, Darrell Hurst, and Chad Hurst. There were two Boxsters, two 996's, and three late model 911's. The day was perfect for a Porsche tour! The skies were a deep blue without any clouds. The temperature was in the upper 40's with a stiff breeze. It was truly an autumn day! As we meandered in a westerly direction over several mountains into West Virginia, the color of the turning leaves against the backdrop of the landscape was breath taking!

We arrived at the Observatory shortly after 12 noon. There was plenty of parking, so we could line our cars together. After stepping out of the car, I soon realized I would definitely need my jacket to block the wind which was pretty sharp! Before touring the Observatory, a club member and scientist, Jim Condon gave us a brief history of the facility and radio astronomy. He works for the Observatory in Charlottesville and conducts experiments in Green Bank at the National Radio Astronomy Observatory.

Sitting in a glassed-in atrium with a great panoramic view of the grounds with the telescopes in the background, the group enjoyed a very pleasant lunch. Although the Observatory Café was not gourmet four-star, it filled the bill quite well. As lunch was winding down, everyone took Professor Chad's Porsche quiz. To our astonishment, Bill Armentrout a member of the British car club and friend of Jim Pullen and my Dad, won the prize, a book entitled *Porsche Racing Milestones* by Hal Thoms. It was quite a surprise that a British car guy would win a Porsche quiz! Does this make sense?

THE HEAT EXCHANGER

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Tour participant wend their way through the mountains. Photo by Sherry Westfall

where the Green Bank Telescope (GBT) is controlled. After Jim's tour, we took the standard bus excursion around the facility. The bus stops just beneath the GBT so you can get up close to look at this massive structure! What a sight! We ended up leaving the Observatory and our wonderful experience about 3:00 p.m. In his arena red 996 coupe, Jim led the carayan from

Green Bank toward home. A special thanks goes to him for his detailed and knowledgeable explanation of the important work that takes place at the Green Bank Observatory! -Chad Hurst See the article to the right.

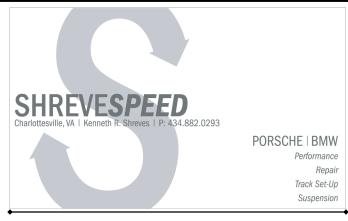
#### **Membership Report**

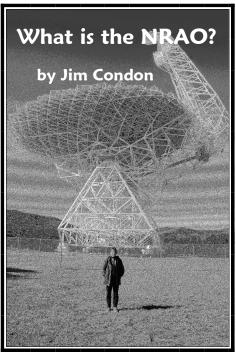
Oct. 2004 by Mel Brannan

#### 164 Members

#### Welcome to the following New Members:

- James Grace of Locust Grove, VA 1976 Porsche 912E
- Tom Shafran of Viewtown, VA 1985 Porsche 911
- Scott Mathews of Charlottesville, VA 1980 Porsche 911SC





Sherry Westfall puts the GBT into where the world's most sensitive perspective! The dish has a diameter radio receivers are assembled in a larger than a football field! Photo by vacuum and cooled to just a few Jim Condon.

degrees above absolute zero. We

(Editor's note: Besides being a member of this car club, Jim also happens to be a radio astronomer who works for the National Radio Astronomy Observatory, NRAO, headquarters in Charlottesville. The Shenandoah Region PCA took a tour to its telescope facility in Green Bank, West Virginia recently, and tour goers were treated to a behind the scenes look from Jim.)

he Green Bank area was selected by the NRAO because it has the lowest population density east of the Mississippi and is in a high valley that is shielded from manmade radio interference by the surrounding mountains. I took the group on a private tour of the electronics lab, where the world's most sensitive radio receivers are assembled in a vacuum and cooled to just a few degrees above absolute zero. We also went to the control room of

the Green Bank Telescope (GBT). The GBT, temporarily stowed to protect it from high winds, was being used to observe natural radio signals emitted by molecules of carbon monoxide gas in a galaxy nearly 13 billion light years away. Since radio waves travel through space at the speed of light, the galaxy appears now as it was 13 billion years ago, when the universe was less than one billion years old and the very first galaxies were being formed.

As part of the regular public tour, the group rode a bus to see the GBT, which stands about two miles from the Science Center. The GBT looks like a giant satellite dish with a 2.3 acre surface that reflects natural radio emissions from astronomical sources (galaxies, quasars, pulsars, etc.) to sensitive receivers located near the end of the feed arm about 450 feet above the ground. The surface consists of about 2000 high precision panels whose positions are continually adjusted by a computer to maintain an overall parabolic shape within 0.4 mm, about the thickness of four sheets of paper. The GBT can be turned on a circular rail and tilted in elevation to track a source anywhere in the sky, and weighing 16 million pounds, is the largest moving structure on land! For more info, go to http//www.gb.nrao.edu/