



The Redline Times

NEWSLETTER OF THE CAROLINAS CHAPTER NATIONAL CORVETTE RESTORERS SOCIETY



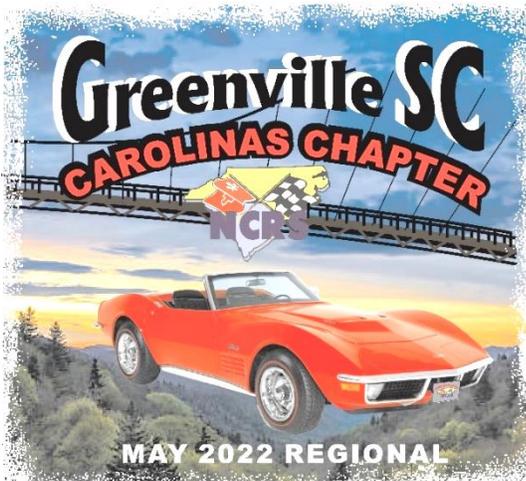
25th Anniversary 1996 – 2021

<http://www.ncrscarolinas.org>

January – February 2022

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Chapter Prepares to Host Regional May 19-21 Seventh Since Chapter Organization

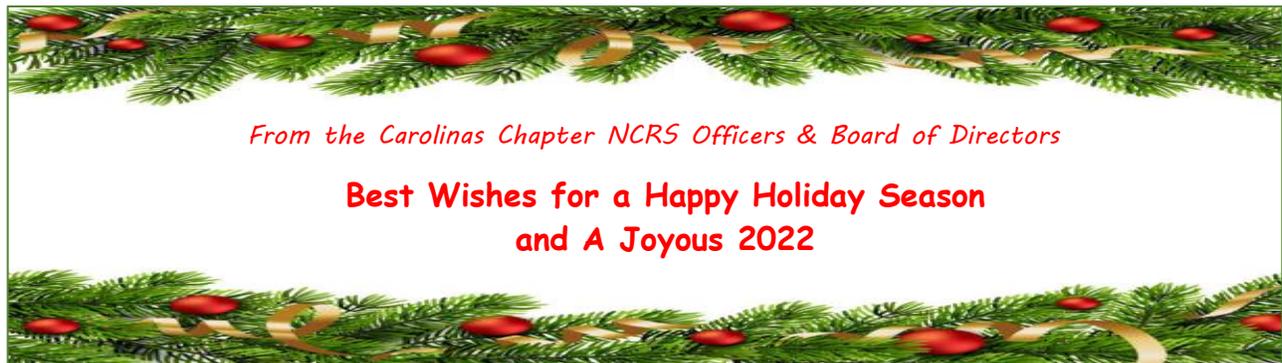


On May 19-21, the Greenville Convention Center will be the hub of NCRS activity as the Carolinas Chapter hosts its seventh NCRS Regional. The name has changed but the location will be the same convention center where the 2018 Regional and 2019 National Convention were held. This will be the last of four regionals between February and June, so it is difficult to predict turnout.

A registration form is included in this newsletter and will also be in the January *Driveline*. Online registration, which is preferred and offers a \$20 discount, will open January 2.

Make plans to attend and volunteer for a portion of the time you are there. It takes many hands and feet to stage an event like this.

See Page 5 for how to volunteer.



From the Carolinas Chapter NCRS Officers & Board of Directors

**Best Wishes for a Happy Holiday Season
and A Joyous 2022**

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The Redline Times is the bimonthly newsletter of Carolinas Chapter NCRS published the first week of January, March, May, July, September, and November. It is sent electronically to all who have an email address on file and mailed to chapter members who have no email.

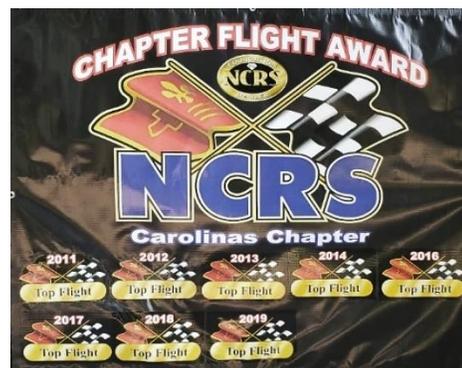
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Material for the newsletter should be sent in a Word file to the editor at the above address. We especially welcome technical articles and human-interest stories about you and your Corvette. Deadlines are the 20th of the month preceding publication unless a change is announced.

Unless otherwise noted, all material is original to this publication. All member articles contained in *The Redline Times* are the property of the authors and cannot be reprinted without their permission and proper credit given to them and this publication.



2011 2012 2014 2016
 2017 2018 2019 2020



2011 2012 2013 2014 2016 2017
 2018 2019 program suspended 2020-21

From the Chapter Chair Bob Kinstrey



I cannot believe that 2021 is almost gone, and like the end of 2019, we are still having to deal with Covid-19. When will it end?? Never??

The mid-December tornados that devastated the heartland did minor damage to the NCM and caused a fire at the Corvette Assembly plant. Corvette assembly was suspended for a week. However, significant damage was incurred at the NCM Motorsport Park, and it will remain closed for some time. The chapter has made a \$100 donation for toys for the kids who lost everything in Kentucky. Financially the chapter is sound and membership remains about constant from year to year.

But onto happier subjects. Everyone who attended the Christmas party at Paul and Mary Meyer’s home had a great time, and if they left hungry, that was their own fault. The chapter extends a very well deserved THANK YOU to both Mary and Paul.

There are several upcoming events for which registration is open: a tech session, judging school, social event, and the REGIONAL in Greenville, SC, May 19-21. The best way to get the most out of your NCRS membership is to participate, so plan on attending these events.

The Regional, if it is to be successful, requires the support of volunteer workers. Steven Heck is the volunteer manager for the regional, so contact Steven at sheck327@gmail.com and tell him when you help. See Page 5 for complete information.

Also note that at the regional, we have space for inside vendor set-up. If you want to sell some parts, sign up for a spot and remember if power feeds are needed, there is an extra fee.

Past the Regional and fall judging event, nothing has been planned. We hope to have the fall judging event at Banner Elk, NC, in September; the date depends on ASU’s football schedule. We do need HELP with events. Do you have a project that can be the subject of either a technical session or a judging school? Are you willing to chair this year’s picnic, which involves picking a location and organizing the event? Do you have a suggestion for a road tour? The success of the chapter depends on members coming forth and volunteering to support the chapter activities. Yes, you have heard this before, but it is true. If you have any suggestions, contact Bob Kinstrey (rbkinstrey@aol.com).

I hope everyone has a very Merry Christmas and a fantastic New Year. Keep driving your Corvettes as you only live once.



**NCRS Carolinas Regional
Greenville SC
May 19-21, 2022**



From Region IV Director John Ballard

On the occasion of the Christmas season and holidays, we extend our warm wishes to you and your family from your Board of Directors. May the upcoming year be full of many opportunities to enjoy the Corvette NCRS car hobby together. We have a good selection of events for 2022.

There was an issue with the 2021 Sam Folz Award at last July’s convention. After NCRS Board discussion and review, National Judging Chairman David Brigham has elected to issue the Sam Foltz Award for the longest-driven Top Flight car to Tom and Kaye Bulluck, longtime Carolinas Chapter members. Belated congratulations to them.



CHRISTMAS PARTY CONCLUDES 2021 EVENTS



Bob Kinstrey

This year's Christmas party, held at the home of Mary and Paul Meyer, in Waxhaw, NC, was a cheerful event. There were 16 families with 28 people in attendance. The food was fabulous as was the fellowship.

Silent auction items, donated by Reba Whittington and Libby Gregg, raised \$95 for our charities. The 75-degree weather was unseasonable, and the event managed to wrap up before the severe storm rolled into the area, although several people did have interesting rides home.

Thanks to Paul and Mary for coordinating the event and allowing us to enjoy their home during this festive season.



Photos by Bob Kinstrey and Brian McIntyre



Toys collected for the Marine Corps Toys-for-Tots program filled the base of the Christmas tree, even though the bicycle was not placed under the tree.

Volunteers Needed for Regional in May

Bob Kinstrey

The Greenville Regional (May 19 – 21, 2022) is fast approaching. The event's format will be very much as it was in 2018 with the same location for trailer parking and same layout for judging.

Schedule

- Volunteers will be needed to help stuff goody bags on Wednesday afternoon (May 18) at the Greenville Convention Center.
- Cars will arrive on Thursday (May 19).
- Operations will be completed in the trailer parking lot Thursday afternoon and the cars will then be placed in the convention hall by 5 pm.
- Pictures of the cars will be taken as they enter the hall.
- Flight Judging will occur on Friday and Saturday (May 20 – 21).
- At the completion of all judging on Saturday, cars will be removed from the convention center.
- The awards banquet is Saturday night (May 21) at the Embassy Suites.

Assigned Leaders

Steven Heck (sheck327@gmail.com) is going to provide overall volunteer management.

- Chip Drennan has agreed to manage the trailer parking lot.
- Fred Jenkins is in charge of all activities associated with judging.
- Brian McIntyre will manage placement of the cars in the convention hall.
- Tim Hayden is to be the official photographer.
- Janet Kennedy will be coordinator all Embassy Suite activities.
- Paula Culbertson is the event registrar and will oversee onsite registration.

Volunteers Needed

Volunteers are needed to help make this another great event.

If you want to help – and we need lots of that – 10 to 15 people are needed most days. However, on Thursday, the busiest day, we will need upwards of 40 people. A total of about 75 people will be needed for the entire event.

We are asking CCNCRS members to help. If you can volunteer, please contact Steven Heck via email and provide him with the following basic information:

- day(s) that you will work and preference for work assignment
- your cell number and email address
- your spouse's cell phone number and email address if he/she is volunteering
- tee-shirt size for each volunteer.

It is critical to have this information so that Steven can correctly staff events. Please provide all the information requested in order to avoid unnecessary phone calls.

Thanks in advance for your support in making this a great event.

Assistance Needed in the Trailer Parking/Unloading Area

Chip Drennan

Anyone who able to come down early for the Regional in May, please consider contributing a few hours to the trailer parking area. We will probably start letting trailers in Wednesday afternoon and will be fully open Thursday morning. That will be the busiest day outside with parking trailers, unloading cars, and doing operations checks.

We will also need some extra help when the cars are released on Saturday afternoon. In addition to a free tan, lunch, and all the cold water you can drink, Chip and Dave will be providing tall tales and somewhat funny jokes. Come add yours. And remember, the folks in the trailer lot get first look at all the cars without having to walk far!

Contact Steve with all the info requested above.

News from the October National Board Meeting in Frisco

Here are some major items of interest from the October National Board meeting in Frisco, Texas, submitted by Region IV director John Ballard. Complete minutes will be in the January issue of *The Restorer*.

Mentoring Program for new Judges

It is proposed that 400+ level judges mentor 100-200 level judges to develop them.

Financial Report

John Tidwell reviewed the financial results for the first nine months of 2021. Status is much better than originally forecast. Membership renewals and new memberships are up, and expenses are down.

Judging Manuals and Virtual Judging Schools

Several new judging manuals were on sale at Frisco, Texas, and others have been released since then. (They are available from the online store.)

One judging point for virtual judging schools will continue through December 2022.

2024 National Convention

Two sites have been under consideration for the 2024 national convention. The National Corvette Museum in Bowling Green is one of them, but the major negative is renting tents, which are prohibitively expensive.

Judging Retreat

A judging retreat was discussed, but Dave Brigham is not sure he can get the help to plan and execute one. However, one is under tentative consideration for 2024.



Apology and Congratulations

The editor apologizes to and congratulates Dennis Lombardo who passed his PV in Frisco, Texas, in October. His name was listed incorrectly in the November issue.

Thought and Prayers for Norm Lontz Undergoing Cancer Treatment

Brian McIntyre has forwarded the following from Queen City Corvette Club regarding Norm Lontz who is also a member of CCNCRS: Two biopsies in October did not remove all the cancer cells so a new cancer treatment (T-VEC) for his melanoma began December 3 and will continue every two weeks.

Norm and Joyce are longtime Carolinas Chapter members and have led past road tours from the Southeast to national conventions and the National Corvette Museum. Keep them in your prayers as they face this ordeal. To send a card, their address is 3572 Valiant Avenue SW Concord, NC 28027.

SEVERAL REVISED JUDGING MANUALS AVAILABLE

The NCRS office has the following new *Technical Information Manual and Judging Guides* available for purchase. They may be ordered online at https://www.ncrs.org/shop/index.php?main_page=index&cPath=1 or by calling David King at 513.760.6277.

- 1963-64 7th Edition
- 1967 7th Edition, 3rd printing
- 1975-77 3rd Edition
- 1990-91 3rd Edition
- 1997-2004 Operations & PV Guide
- Judging Reference Manual 9th Edition

For anyone having a car judged, these are invaluable. All car owners and judges, as well as those planning events, should also own the reference manual.

National Corvette Restorers Society
1967 7th Edition
3rd printing
Corvette Technical Information Manual and Judging Guide



- Vital reference information for purchasing, restoring and authenticating your Corvette.
- Minute details uncovered during four decades of NCRS research into factory originality.
- Includes color photos.



Membership Report *Janet Kennedy, Membership Manager*

We are getting down to the wire with membership renewals. There are still a few people that need to pay, and I'd really like to clear this up PRIOR to December 31. On January 2, you will be dropped from the chapter roster until payment is received.

There are a lot of activities planned for 2022 including a regional event in Greenville. We need all the helping hands we can get, and more importantly, we want YOU to be part of it with a current CCNCRS membership. Please do not wait any longer to RENEW!

There are two ways to do this. If you prefer to renew for one year only at \$25, you may do so through the NCRS website. If you want to take advantage of the two-year discount of \$40, then make your check payable to CCNCRS and mail to Janet Kennedy CCNCRS Membership Manager 108 Corvette Drive Gray Court, SC 29645

Merry Christmas to all and to all a good night.

The following members have not yet renewed:

- | | | |
|------------------|-------------------------|----------------|
| Bulman, James | Mariano, Michael | Smith, Glen |
| Dawson, James | McAlear, Phil | Smithson, Greg |
| Freshwater, Ed | Morris, John | Steele, James |
| Garver, Michael | Padley, Steven | |
| Lombardo, Dennis | Pardo-Barrett, Nicholas | |

Five Carolinians Assist with Judging in Florida

Five chapter members attended the Florida Chapter event Howie in the Hills on November 20 and assisted with judging. They were Steve Heck, Joe Wick, Hank Hale, Bob Puls, and Bob Kinstrey.

Report and photos by Bob Kinstrey



Chapter Members Will Lead Two Road Tours to Convention

Two Carolinas Chapter members will be leading two of the nine road tours to the National Convention in Mobile, Alabama, in July. If you have interest in participating, contact either of them for more information.

Attendance at the convention is not required, but you must register for the National Tour online at <https://www.forums.ncrs.org/register/event-subscription.php> beginning February 1 or by using the paper form in the January-February issue of *The Driveline*. You will then receive detailed information on the trip and how to make reservation at hotels that have reserved rooms.

Carolinas Tour: 3 days, 3 states — Western NC-Tennessee-Alabama

Jimmy Gregg will be leading this short trek on twisting roads through the Smoky Mountains and then south through Alabama. Contact Jimmy at tio2jim@aol.com or 704-577-9812 cell by **text only** for more information.

Tentative schedule

Thursday - July 21

1:00 p.m. Leave Smoky Mountain BBQ West Jefferson, NC, drive the “the snake,” with 400+ turns in 14 miles, spend night in Morristown, TN

Friday - July 22

Travel through Western NC/ East TN mountains, drive the “Tail of the Dragon,” 13 miles with 300 turns, spend night in Gadsden, AL, area

Saturday - July 23

Tour Barber MotorSports Museum in Birmingham, AL, with 1500 motorcycles on display.
Travel to Last-Night-Out gathering of all nine road tours at the host hotel in Mobile.

Southeast Tour: 4 days, 4 states

South Carolina-Tennessee-Mississippi-Alabama

The Southeast Tour, led by Donald and Ann Warmuth, will leave Central, SC, for four days of driving and visiting places of interest in Tennessee, Alabama, and Mississippi.

For information, contact Donald at 864.634.0260 or donald.warmuth@att.net

Proposed itinerary

Tuesday - July 19

Enjoy evening BBQ at the Warmuths' home

Wednesday - July 20

Depart from Central, SC (near Clemson), the model-train capital of South Carolina, spend night in Chattanooga, TN

Thursday - July 21

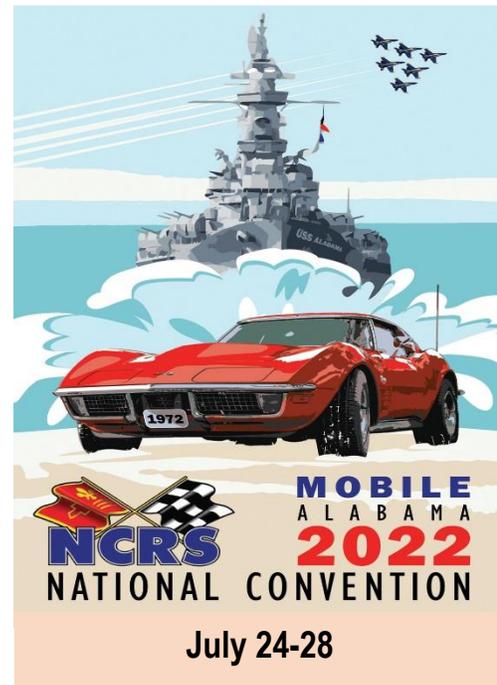
Tour Coker Tire Museum and its antique car display, spend night in Huntsville, AL, “Rocket City”

Friday - July 22

Tour largest space museum in the world, drive to Tupelo, MS, Elvis's hometown, and hopefully visit places associated with the king

Saturday - July 23

Drive southeast through Mississippi to the Last-Night-Out gathering at the host hotel in Mobile.



2021 Financial Report

Kirk Turner, *Treasurer*

January 1 - December 21

<u>Income</u>	
Anniversary shirts	786.75
shipping	135.09
Chapter dues	3905.00
Finding-the-numbers school	285.00*
Judging reproduction parts school	275.00*
Clock & gauge tech session	195.00
Spring judging mini-meet	725.00
Hendrick museum tour	50.00*
Picnic registration	10.00*
Picnic silent auction	424.00*
Fall judging meet	1672.00
Fall meet charity sales	130.00*
Charitable funds	3089.00
Newsletter advertising	60.00
Transfers from 2020 income	(640.00)
Frame stencil tech session	135.00
2022 charity fund	150.00
Transfer from 2020	(640.00)
*transferred to charity	
TOTAL INCOME	10,192.84

<u>Expenses</u>	
Christmas party (2020)	665.00
Anniversary shirts	786.75
shipping	125.00
Membership nametags	145.06
postage	29.09
Lunch mini-meet	150.62
Lunch at clock & gauge tech session	72.21
Picnic food	675.89
Fall meet	1317.89
Judging expenses	217.80
Check printing fee	91.57
PayPal transaction fees	187.91
Greenville Convention Center deposit	4000.00
Reimburse fall meet deposit to Kinstrey	100.00
Memorials to charities (2)	149.99
Donation to NCRS convention	100.00
Event refunds	85.00
St. Jude Children's Hospital	1544.50
Gary Sinese Foundation	1544.50
NCRS Regional	500.00
Donation Western KY toy drive	100.00
Redline Times 2021 mailing expense	46.60
TOTAL EXPENSES	12,559.38

Current liabilities

2022 chapter dues	475.00
2023 chapter dues	320.00
2024 chapter dues	40.00
2025—27 chapter dues	45.00
TOTAL CURRENT LIABILITIES	880.00

Beginning Balance 17,998.28

Ending Balance 15,631.74

Charity Report

Paula Culbertson, *Charitable Activities Manager*

2022 Charity Recipients: Gary Sinese Foundation and St. Jude Children's Hospital

Date	Location	Income Source	Winner	Paid out	Chap. share	Transfer*	Year Total
December 11	Waxhaw NC	Silent auction		95.00			
		Donation		25.00			140.00
January 15	Clover SC						
February 5	Indian Land SC						
March 26	Troutman NC						
May 20	Greenville SC						

*If food is donated, registration fees transfer to charity.

After many years, we reluctantly had to raise prices and shipping.

Carolinas Chapter Clothing



The Carolinas Chapter NCRS offers several clothing items with the chapter logo. The tee shirt is 100% cotton basic crewneck with a left front pocket. The chapter logo is screen printed in full color on the pocket and the back. Only available in medium gray as pictured. Men's sizes only

- #101** S – XL **\$23** **#102** 2X and 3X **\$25**
Caps (baseball style) **\$13** ~~#201 navy~~ out of stock **#202** black

The fleece-lined jacket has an outer shell made of Taslan, a modern high-tech woven polyester fabric that is strong and durable. Color is graphite (dark gray) with full-colored embroidered logos—small on left front and large on back. Men's sizes only. **Orders for these jackets are taken only in the fall. Last chance this year**



- #301** Jacket with logo left front only S—XL **\$55** **#302** 2X--6X **\$60**
#303 Jacket with logo front and back S—XL **\$80** **#304** 2X--6X **\$85** First name on right front **\$10**

Name _____

Address _____ Apt. _____

City _____ State _____ ZIP _____

Phone _____ email _____ *if there is a question*

Item #	Size	Name of Item	Color	Quantity	Item Price	Embroidered first name PRINT PLAINLY	Item Total
							+ \$10
							+ \$10
							+ \$10
							+ \$10
							+ \$10
							+ \$10
							+ \$10
							+ \$10
							+ \$10
							+ \$10
							+ \$10

<p>Make check payable to CCNCRS and mail to</p> <p>Carolinas Chapter NCRS Alan Beaver 500 South Main St Landis NC 28088</p>	Merchandise total	
	Ship to me	15.00
	Deliver to me at an event	<input type="checkbox"/> xxx
	TOTAL ENCLOSED	



November 24, 2021

Bob Kinstrey
 3 Brick House Ct
 Simpsonville, SC 29681-4896

Dear Bob,

Thank you. The Gary Sinise Foundation is very grateful for your generous gift of \$1,544.00 on October 22, 2021.

Please see below for a copy of your tax receipt information for your donation. The humanitarian efforts of the Gary Sinise Foundation provide comfort and hope to so many during their times of need. Thank you for your commitment to this critically important work. Our mission depends on the support and compassion of donors like you.

On behalf of those we serve, thank you for standing with us.

With gratitude,

Gary Sinise Foundation

NCRS REGIONALS AND NATIONAL CONVENTIONS

2022

February 23-26	Lakeland FL
April 7-9	Kenner LA
April 28-30	Auburn IN
May 19-21	Greenville SC
July 24-28	NATIONAL CONVENTION
	Mobile AL
August 18-20	Redmond OR
October 27-29	Frisco TX

2023

February 22-25	Lakeland FL
June 1-3	Altoona PA
June 8-10	Rochester MN
July 23-28	NATIONAL CONVENTION
	French Lick IN
September 13-15	Ontario CN
October 19-21	Frisco TX

Engine Torque and Horsepower – What’s Going on Here?

by Bill Bertelli

This article was published in the NCRS Northeast Chapter Northeast News, Volume 36, Issue 2, June 2021.

Bill is in the process of moving to North Carolina and has already joined the chapter. He is a retired engineer who loves to talk technical with anyone “who will pretend to listen to him babble on and on.”

As Corvette owners and aficionados, we all know that horsepower has always been keenly associated with Corvettes of all vintages, from C1 to C8. This article attempts to present a clearer understanding of power and the underlying principles behind it. We will not start from the piston exerting pressure onto a rotating crankshaft and how camshaft profile characteristics affect this pressure over the rpm band, but rather engine output **torque** as presented to the flywheel as a function of **rpm**. From these two entities, lies the answer on how a Corvette accelerates as you “go through the gears.”

Torque: Anyone who has picked up a wrench can relate to torque. We have various torque specifications in the AIMs and Service Manuals for almost every fastener in our Corvettes. Simply stated, it is the twisting force applied to an object. I’ll use an analogy to illustrate.

Say the Corvette is parked on a level concrete surface, engine off, in neutral, and parking brake on. We attach a special adapter to the left rear tire that picks up the wheel lugs and has a shaft emerging from the center. We attach a foot-long ratchet to the device shaft parallel to the ground and apply clockwise downward force to the end of the ratchet.

We grunt, groan and start to work up a sweat. We are applying a torque of approximately 150 ft-lbs to the wheel, but it ain’t moving. We are applying torque but doing no work. (try telling my body that!) So, in this situation, we have torque but no horsepower because there is no motion. (Torque (Q) = 150 ft-lbs, Horsepower (hp) = 0)

Now, let’s release the parking brake and try it again, after ensuring no objects are in the way of the vehicle’s path. We apply the 150 lbs to the end of that foot-long ratchet and see the wheel start to slowly turn. (and the vehicle starting to move in reverse) OK, now quickly lift up on the ratchet handle a couple of notches and reapply pressure. The wheel starts to turn slightly faster. Hurry up and repeat the procedure. Repeat over and over again. Faster! Put your back into it! Holy Crow! The car is going almost three miles per hour in reverse. You can stop now and rest.

Exhausting, wasn’t it? In this example, we have the same amount of torque applied, but because things are moving (the wheel rotating), there is WORK being done and horsepower is no longer zero! The faster the wheel rotates with the 150 ft-lbs applied, the

higher the resulting horsepower. Our takeaway from the above example? Horsepower is simply the application of torque (ft-lbs) times the rotational speed (rpm). The formula for the relationship is $Hp = [\text{Torque (ft-lbs)} \times \text{rpm}] / 5252$

OK, we get that, but how does that predict performance (acceleration) of our Corvette? It’s all in the torque curve — its shape and where it lies in the rpm band. I like to talk torque instead of horsepower because at the end of the day, it is torque of the rear wheels that is going to generate the force to the pavement to propel the vehicle. And it is what we use to calculate that force to the pavement as we go through the gears.

Torque Multiplication Say what? The transmission, whether it be automatic or manual, and the rear differential are torque-multiplying devices. Mechanical advantage if you will. To put things in perspective, let’s use another analogy here.

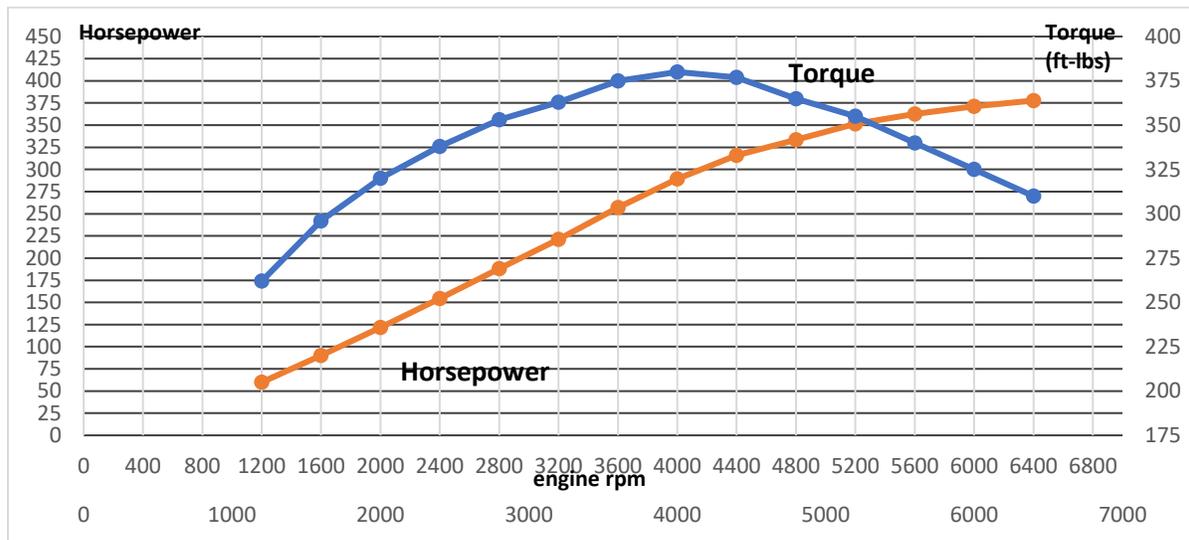
Let’s use a 12" crowbar and a small metal wedge to lift a corner of a very heavy object. If we place that wedge six inches (midpoint) between the bar and the floor and apply that 150 lbs of force, we would be applying 150 lbs to the object’s corner. But if we place that wedge very close to the object (1.1 inches from the end of the bar) and then apply the 150 lbs of pressure to the end of the bar, we would be applying approximately 1,500 lbs of lifting force to the object’s corner! That is mechanical advantage. The same concept directly applies to torque multiplication of the driveline as well.

Let’s take a Muncie close-ratio 4-speed as an example. It has a 2.20 to 1 first gear, a 1.64 to 1 second gear, a 1.28 to 1 third gear, and a 1.00 to 1 fourth gear. Let’s say the final drive (differential) is a 4.11 to 1 gear set. So, in first gear, we have a total mechanical advantage of $[2.20 \times 4.11] = 9.042$. If the engine is outputting a torque of 380 ft-lbs, there would be $[380 \times 9.042] = 3,436$ ft-lbs of torque being applied to the half-shafts to turn the rear wheels. Assuming the radius of the rear tire was exactly one foot (close to being actual), that would calculate to 3,436 pounds of propelling force being applied to the pavement by the tires to accelerate the vehicle.

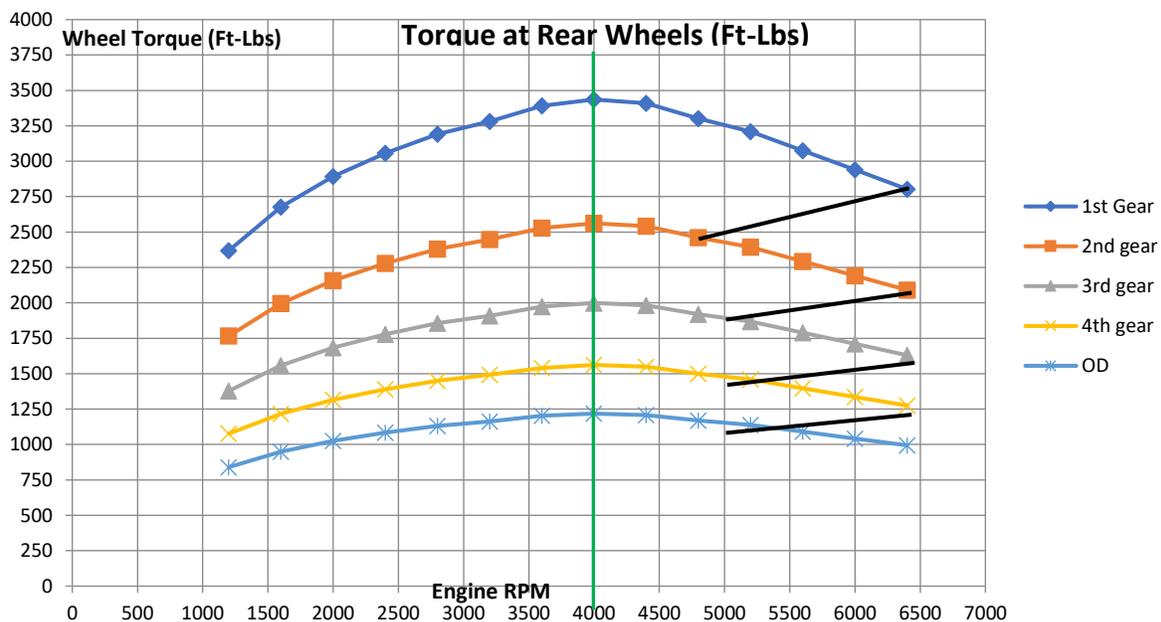
380 ft-lbs of torque is unfortunately not constant. It varies with engine rpm. If we take a typical published gross torque curve from the AMA spec (thanks GM Heritage Center) for a 1970 LT1 engine, we see the following:

→

I took the graphical torque data and entered it into an Excel spreadsheet. The horsepower was calculated and plotted from the formula mentioned above.



Now, one must keep in mind that this is *gross* data, meaning that the factory’s engine dynamometer results probably had no water pump, alternator, power-steering pump, air filter, or mufflers, and most likely had exhaust headers, not the rams-head exhaust manifold. So, we cannot use this data to accurately predict this vehicle’s performance (i.e. 0-60, or quarter-mile performance). It is sorta like the high-school physics class where you calculate the force required to push an object up an inclined plane and are told to assume the inclined plane is frictionless. But this raw data is useful to make comparisons and to visually see how engine torque occurring at specific rpm and shifting gears (and where to shift gears) makes a difference. Using the engine-torque data and the transmission-gear ratios, I calculated and plotted the resulting rear wheel torque as a function of engine rpm:

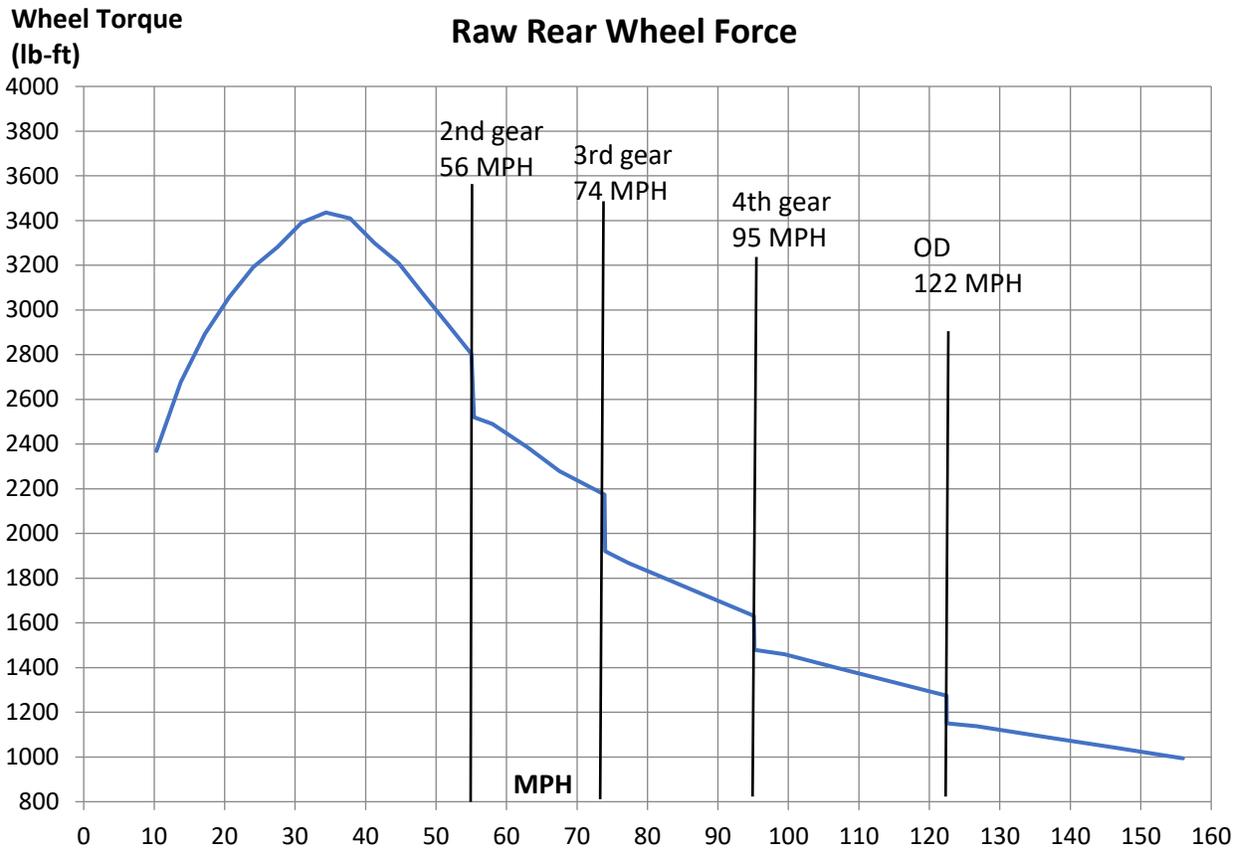


I forgot to mention that I have a Gear Vendors Overdrive unit installed, thus the OD curve. The vertical green line is the peak torque point; the black lines between the gear torque plots are the shift points.

The plot speaks volumes on how upshifting significantly reduces the torque to the rear wheels. The plot suggests that staying in the lowest possible gear the longest time will provide the most torque, thus the most acceleration. Presented another way, I plotted rear-wheel torque over velocity (mph) using the shift points from the above plot.

→

Assuming a 12-inch tire radius, the torque in ft-lbs equals rear-wheel propelling force to the pavement in pounds:



One can now get a better sense of gear shifts and the resulting propelling force reduction that is occurring here. Just like the raw engine torque vs actual (as installed and operating) engine torque available, we have more vehicle dynamic forces in play to reduce acceleration. Not accounted are the tire-rolling resistance, wind friction, drivetrain losses (gear clash, transmission and differential oil splash, etc.), but again, we get a simple picture of relative performance. Ultimately, there will come a point where the frictional resistance forces will equal the available rear wheel force, thus terminal velocity, where you are giving it all it's got but it ain't going any faster!

So how does acceleration relate to this? Simple! $F = m \times a$, where F is force in lbs, m is the weight of the car in lbs, and a is acceleration in feet per second per second. If we turn the equation around, $a = F / m$. Since the vehicle weight is a constant (i.e. 3,200 lbs), one can see that acceleration is directly proportionally related to the calculated propelling force as torque generated from the engine applied through the drivetrain and finally to the wheels. And there you have it!

Getting back to that torque being applied at higher and higher rpm, the further we can push that peak torque-curve to the right in the engine-torque plot, the higher the resulting horsepower. Acceleration over time is better the longer we can stay in the numerically ratioed higher gear. This enables the higher mechanical advantage giving more torque to the rear wheels before we have to shift to a

lower mechanical advantage gear. And of course, the more gears we have in the transmission available (i.e. 5-speed, 6-speed), the smaller the torque reduction between upshifts, resulting in greater acceleration over time as the vehicle gains speed.

If I had more space and time, I would plot a comparable example of the same torque curve shifted to the left (lower rpm thus lower horsepower) and the resulting rear-wheel force. It would show that from 0-30 mph, the lower rpm-torque vehicle would pull ahead in competition as it has greater torque (propelling force) at that lower rpm compared to the higher rpm-torqued vehicle, but after about 40 mph, its look-in-the-rearview mirror time and forget about it as the higher rpm-torqued curve vehicle passes and accelerates away. 😊

The last point of this article is that with some relatively simple instrumentation (an accurate linear accelerometer and a data logger inputting engine rpm and the acceleration ft/sec/sec), one can perform wide-open throttle (WOT) data, as separate individual runs in each gear from 1500 rpm to redline. One can then plot that data and determine true performance through the gears and find the optimum shift points for maximum acceleration and the resulting vehicle acceleration as wind resistance becomes more of a factor at higher vehicle speeds.

Well, that's it for now. Enjoy your Corvette and have fun with it! ##



Tech Session

Applying A Frame Stencil
January 15, 2022

Chip Drennan's Garage
258 Pine Bark Circle
Clover SC 29710

10:00 am – 2:00 pm with lunch



Register online beginning November 1 at <https://www.ncrs.org/services/coming-events.php>

This is a tech session and does not offer any judging points.

A frame stencil will be applied to the chassis of a 1967 that is undergoing a frame-off restoration.

There will also be a discussion with photos about cleaning techniques that do and do not destroy original markings.

Bring a folding chair so your fee won't complain.

Postmark deadline is January 7. No refunds after that date.

Name _____ NCRS # _____

Family members attending _____

Address _____

Phone _____ Email _____

Family Registration ----- \$25.00 *\$15 online*

Family number for lunch _____

Late fee after January 7 ----- \$10 _____

Non-NCRS guest (includes lunch) ----- x \$15 _____

Print guest's name _____

TOTAL ENCLOSED \$ _____

Register online at link above or mail this form and a check payable to CCNCRS to

Paula Culbertson 124 Beech Run Drive Greenwood, SC 29649

Submit event questions to Bob Kinstrey 864.346.6126 rbkinstrey@aol.com

I AGREE to insure my vehicle and property against loss, damage and liability and to provide proof of such insurance to NCRS at time of registration. I AGREE to assume the risk of any and all damages or injury and to indemnify and hold harmless NCRS, its officers, directors, agents, employees, chapters and event workers for any acts or omissions that may result in the theft, damage or destruction of my property or injury to me or others occurring during, or as a consequence of this event, wherever located.

I AGREE to abide by the NCRS Policy on drugs and alcohol. The use of illegal drugs is prohibited by anyone attending an NCRS event. The use of alcohol is prohibited by anyone participating in an NCRS event (includes while on the judging field, participating in driving tests and/or road tours), except during social events.

I agree to follow the mandates that are in place on that given day at that event location as set forth by the United State Centers for Disease Control (CDC) or another branch of the US federal government, Public Health Agency of Canada, European Centre for Disease Prevention and Control, any host state and/or local government, and/or a private host facility.

Name _____ Date _____



Judging School
**1963-67 Headlight Motors,
Distributors Caps, and Coils**

February 5, 2022

**Monte Carlo Garages
8461 Possum Hollow Rd
Indian Land, SC 29707**

10:00 – 3:00 with lunch break at a nearby BBQ



This is a two-part judging school that offers 1 point for attending both sessions.

10:00 - noon
1963-67 headlight motors and adjacent areas will be reviewed. Some disassembly will be done for observation.

Lunch break

1:00 – 3:00
The afternoon session will concentrate on judging and servicing distributors, caps, and related areas, including coils.

Bring a lawn chair

Register online beginning January 2 at <https://www.ncrs.org/forums/register/event-subscription.php>

Postmark deadline is January 29 ---- No refunds after that date.

Name _____ NCRS # _____

Family members attending _____

Address _____

Phone _____ Email _____

Family Registration ----- \$25.00 *\$15 online*

Family number for lunch _____

Late fee after February 4 ----- \$10 _____

Non-NCRS guest (includes lunch) ----- _____ x \$15 _____

Print guest's name _____

TOTAL ENCLOSED \$ _____

Register online at the link above or mail this form and a check payable to CCNCRS to

Paula Culbertson 124 Beech Run Drive Greenwood, SC 29649

Submit event questions to Jimmy Gregg 704.577.9812 tio2jim@aol.com **TEXT or EMAIL ONLY**

I AGREE to insure my vehicle and property against loss, damage and liability and to provide proof of such insurance to NCRS at time of registration. I AGREE to assume the risk of any and all damages or injury and to indemnify and hold harmless NCRS, its officers, directors, agents, employees, chapters and event workers for any acts or omissions that may result in the theft, damage or destruction of my property or injury to me or others occurring during, or as a consequence of this event, wherever located.

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Name _____ Date _____



A Conversation with Tom Wallace Retired Corvette Chief Engineer

March 26, 2022

10:00 am – 2:00 pm with lunch

Tommy Loftin's garage
244 Hicks Creek Road Troutman, NC 28166



Registration opens February 1 at <https://www.ncrs.org/forums/register/event-subscription.php>

Tom Wallace was Corvette chief engineer 2005-2008, during some of GM's darkest days. He was inducted into the National Corvette Museum Hall of Fame in 2018 with this statement from the museum website: "In Corvette's history, there have been a few engineers who were also real race car drivers, but only two of them have been Corvette **chief** engineers — the legendary Zora Arkus-Duntov and Tom Wallace." That puts him in some rare company.

Now retired, Tom lives in Denver, NC, and is a Carolinas Chapter member. The chapter will host a get-together to meet and talk with Tom at Tommy Loftin's.

Bring a lawn chair

Postmark deadline March 16

No refunds after that date.

Name _____ NCRS # _____

Family members attending _____

Address _____

Phone _____ Email _____

Non-NCRS guests attending _____

Family registration \$25 *\$15 online*

Number for lunch _____

Late fee after March 16 \$10 _____

Guest fee (*non-NCRS members*) ____ x \$15 _____

Total amount enclosed _____

Use the online registration link above or make check payable to CCNCRS and mail with this form to

Paula Culbertson 124 Beech Run Drive Greenwood, SC 29649

Address event questions to Bob Kinstrey 864.346.6126 rbkinstrey@aol.com

I AGREE to insure my vehicle and property against loss, damage and liability and to provide proof of such insurance to NCRS at time of registration. I AGREE to assume the risk of any and all damages or injury and to indemnify and hold harmless NCRS, its officers, directors, agents, employees, chapters and event workers for any acts or omissions that may result in the theft, damage or destruction of my property or injury to me or others occurring during, or as a consequence of this event, wherever located.

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Name _____ Date _____



CAROLINAS REGIONAL GREENVILLE CONVENTION CENTER GREENVILLE SC May 19-21, 2022



Must be postmarked after January 2 or entered at <https://tinyurl.com/vr3tk75u> by April 20

Name _____ NCRS # _____
 Spouse/Companion/Children (if attending) _____
 Address _____ City _____ ST/ZIP _____
 Phone _____ Email _____ Chapter affiliation _____
 Non-NCRS Guests _____

NO CARS and NO REFUNDS AFTER APRIL 20

Family registration	105	_____ <u>105</u> _____	\$85 online
Late registration <i>after Apr. 20</i>	30	_____	
Guest (Non-NCRS member)	_____ x 30	_____	Print name _____
Awards banquet (adult)	_____ x 65	_____	Contact registrar for special dietary needs or child's meal
Event tee shirt	_____ x 25	_____	___ M ___ L ___ XL ___ 2X ___ 3X
Event polo shirt	_____ x 45	_____	___ M ___ L ___ XL ___ 2X ___ 3X
Vendor Space inside 20' x 20'	_____ x 50	_____	
Electrical hookup for vendor space	75	_____	(\$100 at meet)
Secure Corvette parking at hotel	60	_____	(7:00 pm – 7:00 am)

Flight Judging	_____ x 95	_____	Check if this is sign-off for Bowtie <input type="checkbox"/> Crossed Flags <input type="checkbox"/>
Performance Verification	_____ x 95	_____	Enclose proof of Flight award in past three years
Founders Operations	30	_____	Enclose proof of Flight award in past three years
Concours Judging	_____ x 95	_____	<input type="checkbox"/> stock <input type="checkbox"/> modified
Sign-off American Heritage <input type="checkbox"/> or Challenge Car <input type="checkbox"/>	95	_____	
Sportsman Display	30	_____	
Generational Flight Award	_____ x 25	_____	Name(s) & relationship to you _____
Fee to mail award if not attending banquet	25	_____	
Display of Bowtie, Duntov, Crossed Flags, McLellan, Hill, Heritage, Challenge car			<u>no charge</u> (Circle award received and give car info below)
Secure trailer parking		_____	<input type="checkbox"/> single trailer 50 <input type="checkbox"/> double 75 <input type="checkbox"/> triple or semi 100 Attach copies of tags and/or insurance
RV parking inside gated lot (no hookup)	75	_____	24-hour access

TOTAL AMOUNT ENCLOSED _____

Advanced Judging School n/c Enter number of attendees per day of attendance _____ Friday _____ Saturday
 Thursday afternoon judging school n/c x _____

Car Information (Make copy if another car is being registered)

Year _____ Body Style _____ VIN _____ HP _____
 Build date _____ Paint Code _____ Trim Code _____ Body Number (1963-67) _____
 Exterior Color _____ Trim Color _____ Interior Material _____
 Insurance Company _____ Policy # _____ Exp. Date _____
 Car will be _____ driven _____ trailered One-way mileage _____

Copies of current liability insurance card or policy **showing VIN** and ownership for all registered cars **must** be submitted with this form or emailed to the registrar before car judging can be confirmed. **Original documents must be presented at check-in.**

I would like to judge: 1st Choice: Yrs. _____ Sect _____ 2nd Choice: Yrs. _____ Sect _____ Judging Level _____
 I would like to be an observer judge _____ *Indicate preferences above*
 (Name) _____ would like to tabulate. Tabulating Level _____

Print, sign, and include the hold-harmless statement on p. 20 with this page. Registration will not be approved without it.

SIGNATURE _____ DATE _____

HOST HOTEL Embassy Suites
ca. 4.5 miles away
670 Verdae Blvd Greenville SC 29607
864.676.9090
\$144 group rate opens January 2, ends April 20
Online booking code: COR

Greenville Convention Center
1 Exposition Drive
Greenville SC 29607
<https://meetgcc.com>
<https://www.visitgreenvillesc.com/>

TENTATIVE SCHEDULE OF EVENTS (Subject to change before the date)

All judging activities are in the Greenville Convention Center Hall 1 (GCC)

The café in GCC will be open for lunch 11:00 am --2:00 pm daily.

Thursday, May 19

8:00 am – 4:30 pm Registration/ information desk open in GCC
Registration packets for participants with registered cars will be in the trailer parking area. All registrations without a car will be inside GCC.

9:00 am – 4:30 pm PVs and Founders Operations by team leaders: *by appointment only*

9:00 am – 4:30 pm Flight Operation checks and car photos completed outside before entering GCC

11:00 am – 1:00 pm Judges and volunteers lunches in GCC

5:00 pm All cars must be checked in, processed, and parked in place

5:15 – 6:15 pm Judging school in GCC; topic determined by National Judging Chairman

6:30 pm GCC and trailer lot closed and locked

Friday, May 20

7:00 am GCC Hall 1 opens
Breakfast on your own

8:00 – 4:30 pm Registration/information desk open in GCC

8:15 am Judges' meeting in GCC

8:25 am Observer judges' meeting in GCC

8:35 am Owners' meeting in GCC

8:45 am Flight judging begins in GCC: Car years will be determined after registration closes.

9:00 am – 3:30 pm Advanced Judging Seminar (with lunch break): Both sessions required for judging points

11:30 am – 1:00 pm Judges' lunches GCC

5:30 pm GCC and trailer lot closed and locked

7:00 pm Dinner on your own We suggest one of Greenville's great downtown restaurants

Saturday, May 21

7:00 am GCC Hall 1 opens
Breakfast on your own

8:00 am – 12:30 pm Registration/information desk open in GCC

8:15 am Judges' meeting in GCC

8:25 am Observer judges' meeting in GCC

8:35 am Owners' meeting in GCC

8:45 am Flight judging begins in GCC: Car years will be determined after registration closes.

9:00 am – 3:30 pm Advanced Judging Seminar (with lunch break): Both sessions required for judging points

11:30 am – 1:00 pm Judges' lunches GCC

4:00 pm estimated Cars released from the judging field after all judging & tabulation are complete

5:00 pm All cars must be removed from the building; GCC closed and locked

7:00 pm Awards banquet at Embassy Suites

All Flight and display cars must be checked in and parked by 5:00 pm on Thursday and will remain in place until the completion of all judging and tabulation Saturday afternoon when they will be released by the judging chair.

Meet information	Bob Kinstrey	rbkinstrey@aol.com	864.346.6126
Judging information	Fred Jenkins	fredjenkins@cacsnc.net	252.268.9624
Registration questions	Paula Culbertson	rpculb@wctel.net	864.980.0098
Hotel information	Janet Kennedy	resalared@prtncnet.com	864.923.4445

Online registration is preferred and discounted. If paper is used, include ALL required forms and a check payable to CCNCRS to [Paula Culbertson](mailto:Paula.Culbertson@wctel.net) 124 Beech Run Drive Greenwood SC 29649

NEW NCRS HOLD HARMLESS *Adopted June 2021*

I AGREE to insure my vehicle and property against loss, damage and liability and to provide proof of such insurance to NCRS at time of registration.

I AGREE to assume the risk of any and all damages or injury and to indemnify and hold harmless NCRS, its officers, directors, agents, employees, chapters and event workers for any acts or omissions that may result in the theft, damage or destruction of my property or injury to me or others occurring during, or as a consequence of this event, wherever located.

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Print name _____

Sign name _____

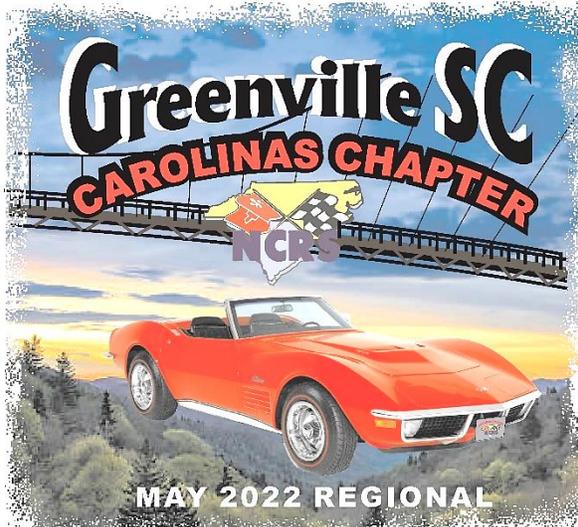
Date _____

SALE ITEMS FROM DICK WHITTINGTON'S GARAGE Shipping not included

YEAR	ITEM	GM NUM	DESCRIPTION	PRICE in \$
1956-62	repro horn button		marked as not correct for 1958	30*
1963-67	repro rear bow bolts (4)		1/2-inch countersunk w/gripper nuts, Coffman Corvette	5
1963-67	glovebox flocked liner		reproduction	10
1966-69	air-cleaner decal (partial)		427 only -- NO curved bottom listing HP	2
1966-72	limited-slip lubricant tag		red plastic warning tag, original font	10
1967	used Rally wheel centers (4)	3901712	with disc-brake wording, used on 1967 Corvettes and other GM lines, minor dents in a couple	75 for all
1968	owner's manual & plastic bag		Corvette News stub, 1st ed., Aug. '67, original plastic bag	50
1968-69	console engine data plate		L71 11.0:1 compression NOS GM	20
1969	emissions tuning decal	3956682	code CF for 350 c.i. 300 & 350 hp	5
1969 L	steering column decal		rotating interlock warning, clear w/ white lettering	5
1969-73	gas door emblem	3957808	will work on 1968	55
1969-77	RH T-top weatherstrip, repro		Supersoft by Metro, says it may be modified for '68	20*
1971	console engine data plate	3995089	454/365 NOS GM	15*
1977-82	printed circuit for center gauges	25015147	NOS in box	50
1979	temp gauge	8993319	NOS in box	65
1984-89	rear emblem CORVETTE	14064531	NOS GM but no packaging, black letters outlined in red	15*
	blank Protect-O-Plate tape	3865901	8 rolls in GM box	20 ea/ 150 all
	rubber mat 33 x 22 inches		with 2013 Hampton Roads VA convention logo	10

*Price reduced; others may be negotiable

Contact Reba Whittington rhwhittington2@gmail.com



May 19-21, 2022
Greenville Convention Center

Registration opens January 2

Volunteers are desperately needed for the NCRS Greenville Regional
May 19-22, 2022

Experience isn't necessary!
You just need to be willing and physically able.
We will train and feed you.

Contact Steven Heck
Volunteer Coordinator

See Page 5 for details

Carolinas Classifieds

Chapter members may run one free personal ad 2" x 3" or business card per issue. Include your NCRS number and contact information.

Commercial rates: \$10 business card \$20 one-quarter page \$30 half page \$40 entire page

Ads will not be carried over but must be renewed for each issue. Ads will not be disseminated by email between issues.

FOR SALE

1967 1st edition owner's manual w/half *Corvette News* card
 Washer bottle 1957 - 1962 NOS
 1961 radiator cap Delco 306
 1961 voltage regulator dated 0M
 Fan clutches for BB and SB
 RC26 radiator caps, both restored and unrestored
 RC15 1966-67 restored radiator cap
 C6 Z06 Lloyd trunk and floor mats, cheap
 Many other parts—email for list or ask if I have what you need.
 Jim Gregg #2756 tio2jim@aol.com or text to 704.577.9812

1974 original spare wheel with Goodyear Steelgard raised white-letter tire, never on road \$300. Complete original 1974 ignition and spark-plug shielding \$350. Four 1980-82 replacement wheels, like new \$500. Tom Lombardo #22194 704.845.0947 home 978.423.8567 cell

Set of 1998 Corvette GM service manuals (3 books), MINT condition, still in original Helm shipping box, \$75 plus shipping. New 1993-1996 Corvette key fob remote for convertible, single button \$25 plus shipping. Blackwing air-filter unit complete with MAF, throttle body to air-filter style, \$300. Can send pictures
 Steven Heck #48456 sheck327@gmail.com

1969-76 used tilt/tele column, includes top hub and cap, no ignition switch, \$900
 1969-75 used stainless molding cover for T-top center bar \$100
 1968-72 rear window, frame needs polishing, glass dated AT (Sept 1970), \$50
 Reba Whittington #8804 rhwhittington2@gmail.com

1965 and 396 parts: 208 heads, 963 intake manifolds, bellhousings, dimple rods, 378 NOS voltage regulators. NOS spark plugs, NOS Harris bushings, NOS bearings, 1965 alternators, NOS light lenses, used 65 glovebox door, new '65 door panels, Non-DOT Firestone Dulux tires and rims like new and one NOS in the wrapper! Never saw another one. Many other parts. Call or email for complete list. Dave Sudzina, #20446 252-347-6640 dsudzina@hotmail.com

NCRS ONLINE ADS

Buy, sell, and search for Corvette stuff you need at <http://www.ncrs.org/classified/index.php>
 All NCRS members may submit a free 50-word online ad at <https://www.forums.ncrs.org/register/submit-driveline-ad.php>

WANTED

Two 1965 standard hubcap spinners, original, perfect to almost perfect condition.
 1965 fuel-injection air cleaner, any condition considered.
 Stephen (Bunky) Byrd #12641 865.250.1968



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- Gauge Clusters
- Clocks
- Radios
- Wiper Motors
- Window Motors



MOBILE
ALABAMA
2022
NATIONAL CONVENTION

July 24-28



CAROLINAS CHAPTER NCRS MEMBERSHIP APPLICATION

You must be a current member of the national NCRS organization.
Write national membership number where indicated below.

Membership includes
Name badge(s)
Bimonthly newsletter
Inclusion at all events

Name _____ NCRS # _____

Address _____ City _____

State _____ Zip _____ Email _____

Home Phone (_____) _____ Cell (_____) _____

Spouse or significant other _____

(optional) Cell _____ Email _____

Children under 23 if they will be involved _____

If different from above, the name you would like to appear on your name badge

Member Name _____ Spouse/Significant Other _____

Corvette(s) currently owned:

Year	Model	Color	Year	Model	Color

Would you be willing to help with any of the following?

_____ Judging _____ Tabulating _____ Newsletter _____ Photography _____ Event planning

List any talents or abilities that you may have that would contribute to the success of the chapter:

Chapter dues \$25 per family Payable with application and renewable each December 31.
New members joining after Oct. 1 do not renew until December of the next year.

Check amount enclosed _____ \$25 for 1 year _____ \$40 for 2 years

To take advantage of the two-year discount, a check made to CCNCRS MUST be mailed to the address below.
Online payment will not allow the discount.

Make checks to CCNCRS and mail with form to Janet Kennedy 108 Corvette Dr. Gray Court SC 29645
or JOIN AND PAY ONLINE at <https://www.ncrs.org/forums/register/chapter-membership.php>

I hereby state that I am a member in good standing of NCRS Inc. and that I agree to abide by the NCRS and Carolinas Chapter bylaws.

Signature _____ **Date** _____

For new members only: Please circle how you heard about the Carolinas Chapter

Friend NCRS website Carolinas Chapter website *The Corvette Restorer* *The Corvette Driveline*
Chapter invitation letter Another car event Other _____

Rev. Jan 2017