W A Technology

Cross Brace Increases C8 Chassis Stiffness 8+%

The C8 Chassis Stiffness is Good But Not Great

Ed Moss, Corvette structures engineer, noted *"The C8 employs complex, thin-wall aluminum, vacuum die-castings supporting the suspension mounts with aluminum extrusions that are "glued and screwed." There are six large castings at the car's corners, plus two more for the halves of the engine cradle. In total, the car has 20 castings."*

The large castings have integral thin, low weight gussets that help to provide a 13.8% higher chassis stiffness than the all-aluminum but welded construction C7. That's good BUT not great!

Dave McCauley saw his C8 side skirts moving away from the body as the car moved up his driveway. He made measurements and found the rear cast aluminum chassis coilover mounts were moving relative to each other. He designed a carbon fiber tube structure tying the top of those coilover mounts more firmly to the chassis. Tests at an F1 chassis stiffness measuring facility showed his design increased chassis stiffness over 8%. Pic of my install above right.

Photo Sequence: Detailed Install Pics Start on Page 6.

In an Autoline AfterHours video, the Executive Chief Corvette Engineer, Tadge Juechter said: *"He was Paranoid and Deathly Afraid the C8 would have the trailing throttle oversteer of his Dad's early Porsche!"* He said they did everything possible to make the C8 handle benignly. That included: suspension geometry, and precisely located suspension attachments to a very stiff, ridged chassis.

A MUST SEE FOR ALL C8 OWNERS:

2020 Corvette Chief Engineer Talks C8 Stingray - Autoline After Hours 489 (youtube.com)

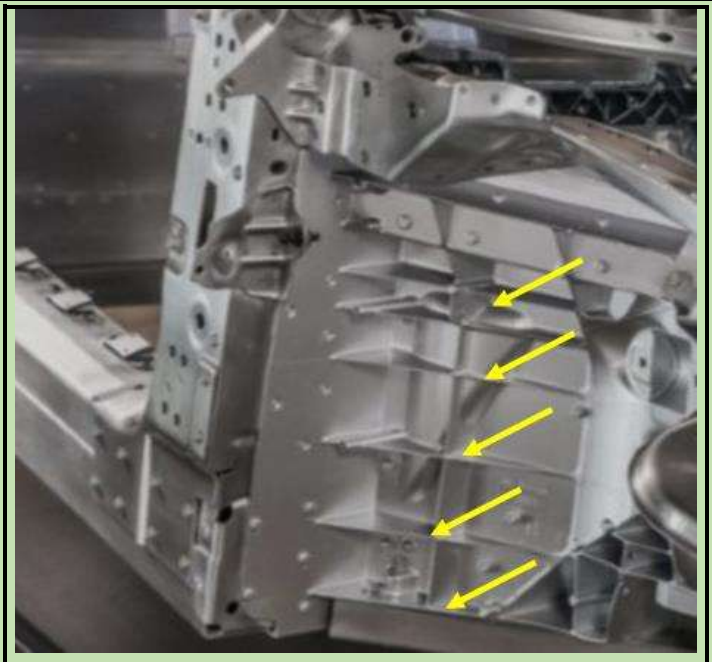
Tadge said in a written interview: *"It took Porsche several generations" to solve the rear heavy car oversteer issue. We had to get it right the 1st time- AND DID!* One clue Tadge mentioned as how they accomplished was: "*You can't have the chassis acting like an undamped spring!"* Yep need to predict what the suspension and tires will do in all possible transient conditions.

The improved C8 chassis design, using ridged castings, adhesives and screws that don't cause distortion, like welding, were big factors in improving the stiffness of the C8. GM states 13.8 % over the C7.

Good but 3.5 times less stiff that one of the best, a Bugatti. Even the older Ford GT was almost double.

The Dave McCauley's Cross Brace increases the C8 stiffness by 8% (*possible 10%., which would be 18,151 Nm/degree versus standard C8 = 16,501 Nm/degree)*

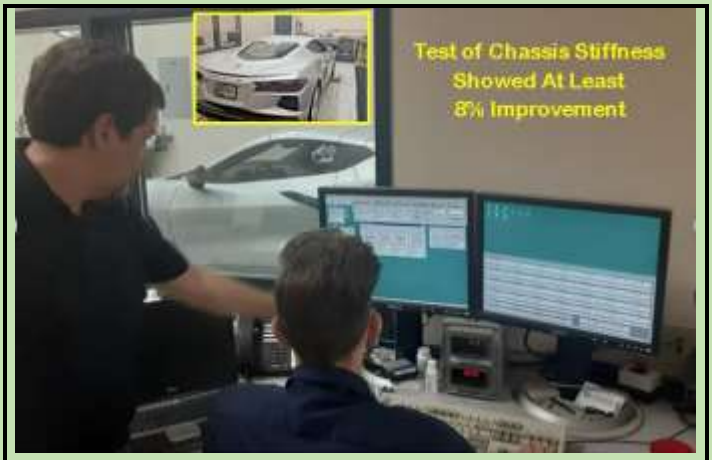
C5: Stiffness = 9,100 Nm/degree
C7: Stiffness =14,500 Nm/degree
C8: Stiffness = 14,500 x 1.138 =
16,501 Nm/degree
C8 Stiffness is Good BUT Not Great.
With Cross Brace It's 8% Better =
16,501 x1.08 =17,820 Nm/degree
Some Comparison Data:
Alfa 159 = 31,400 Nm/degree
Aston Martin DB9 Coupe =
27,000 Nm/degree
Aston Martin DB9 Convertible
= 15,500 Nm/degree
BMW Z4 Coupe, =32,000Nm/degree
Bugatti Veyron = 60,000 Nm/degree
Ford GT = 27,100 Nm/deg
Porsche Carrera GT = 26,000 Nm/degree
Rolls-Royce Phantom = 40,500 Nm/degree
Audi A8 = 25,000 Nm/deg



Being in the Welding Business for >60 years was not great to hear Tadge say welding caused distortion was a reason they went to castings and more adhesives. *BUT Tadge is Right.* Their use of rigid, aluminum castings with many stiffening gussets is understandable. The integral cast gussets are thin, long and add little weight. Sure, we could add those gussets using welding BUT the part would come out looking like a Pretzel!

As weld metal cools to room temp from its molten ~1300F (*for aluminum*,) it shrinks. (*BTW, aluminum shrinks ~twice as much as steel/degree of temp change*.) That causes high stress and distortion in the part being welded.

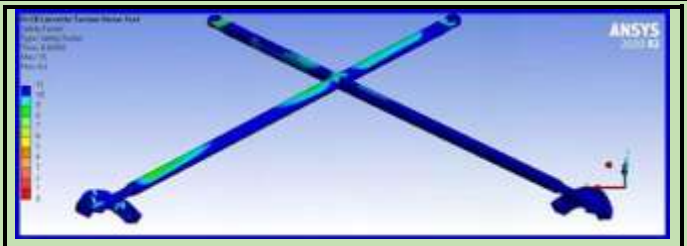
Dave McCauley devised a test of his Cross Brace to see how much coilover support movement occurred as he had a rear wheel drive up a ramp. He bolted his very ridged Cross Brace to 3 points and allowed the other to float. He installed a dial gauge to measure the movement of the coilover tower versus the other tower and chassis. The dial rotated a full 360 degrees. BUT he also thought there might be some movement of that cross brace unbolted arm.



To have more definitive evidence of the Cross Brace effectiveness than his "movement test," he brought a C8 to a facility that measures F1 car chassis stiffness.

They put the car on their testing equipment and measured an 8+% stiffness improvement. They said it could be up to ~10% more ridged.

Stress analysis was performed on the Cross Brace and weaker places improved for optimum stiffness. Dave said Tommy Milner (*Team Corvette Driver*) saw his Cross Brace and said *"connecting to the shock towers makes total sense."*



An avid Tracker tested his C8 Z06 over 4 weekends. He started with new tires and tested with and without the McCauley Cross Brace. After analyzing all results, he found when using the brace he improved lap times 1 second.

A video out the cabin rear window showed the C8 Z06 engine moving on it's mounts while the chassis and cross brace showed no movement.

Others report feeling and measuring improvements when tracking their C8.

GM sells a strut brace made from Carbon Fiber. Looks Nice! But they state it enhances chassis stiffness UP TO 3.40%. Thats's less than half of Dave McCauley's cross brace design that attaches to the coilover housing not just a brace. GM's cross brace is also ~4 times the price.

No wonder the GM Brace it's not as effective. It's only on the side stiffening brace metal members NOT connecting to the coilover cast aluminum structural towers.

Thought the Carbon Fiber Brace might look out of place in the mostly plain black engine compartment.

Found some carbon fiber (and CF look) pieces to add to improve the overall engine compartment appearance. This Pic is an inexpensive ~$30 part for the black engine cover. Easy install. Wash, use alcohol to wipe down the engine cover. Had some 3M adhesive promotor packages so applied after the alcohol dried. It should be allowed to dry as well but that typically takes only a few minutes.

Saw some install info that had the edge red tape cover pulled sideways at one end. The part was in place before pulling the red plastic cover off. Not logical for this item as there are many small tape pieces. Also, it fits snuggly and only one way.

Removed all tape covers and just carefully put in place. Weighted the top for 10 minutes. It looks great.

To have the Carbon Fiber Cross Brace look like it "belongs" added some real CF pieces to the side sheet metal. Some sell these parts for ~$400. But on Amazon $99 shipped from China! Shipped by air and received in 9 days! Look great.

Used alcohol first, my standby 3M All Purpose Adhesive Cleaner (*common for car painters to use*) next and although probably not needed had a package of 3M Adhesive Promotor. Unlikely the red plastic cover on these Chinese parts is by 3M, but it's designed to change the surface activation of materials and help adhesive bond.

Each only need a few minutes to dry.

Removed the Red plastic coving the adhesive on the back of the visible fiberglass sections. Started with a knife point in a corner.

Here are the two pieces on the driver's side. They match the center CF look on the engine cover.

Right side is the same. They fit on the raised areas so no question how they are to be positioned.

Added carbon fiber circle. Was a perfect place to put a statue of Artemis! That is who are interior is named after. The Greek Goddess of the hunt and Nature.

It has hues of dark olive green. A key reason for what appears to be color differences are the materials. Napa Leather seating surface, faux leather Mulan and Microfiber faux Suede, on "A" pillars, headliner and a section of the door panel. Sun reflects off each differently.

To add more carbon to the plan black engine cover this real carbon fiber attaches to the aluminum Corvette . Everyone knows it's a Corvette so this adds to making the cross brace look like it "belongs.

The Corvette inset is not bright and looked better in real carbon fiber.

The finished look matched the carbon fiber Cross Brass perfectly.

The Cross Race arrived same day as the Carbon Fiver sheet metal cover pieces. It is large. It arrived via FedEx well packaged.

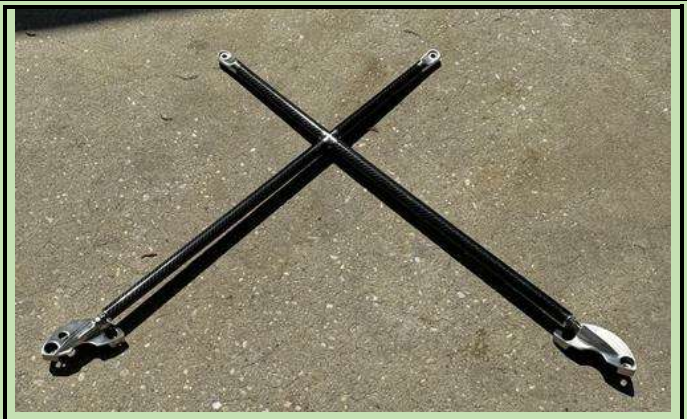
Bought directly from SPEEDWAY Composites so their offer was FREE shipping at the time.

SPEEDWAY Composites does a great job packaging to assure damage free receipt. It was taped to wood braces on both sides.

The carbon fiber tubes the Cross Brace is fabricated from, are protected from scratches with Foam Pipe Insulation.

Quick wipe with one of my car cleaning products cleaned all tape etc residue.

The Cross Brace is perfect. Carbon Fiber tubes and Stainless Steel ends secure the Cross Brace to the end of the structural metal braces close to the cabin. The rear ends fit on the tops of the aluminum castings that hold the MRC Coilovers.



TOOLS FOR CROSS BRACE INSTALL

#40 Torx Bit

13 mm deep thin wall socket

3/8 & ½ inch drive ratchet

3/8 to ½ inch drive adapter

15mm & ¾ open end wrench's

Blue Loctite

Hand ratchet and magnetic nut/bolt tray

Large rag (*to stop a possible dropped screw or nut from falling onto the aero panel!)* No fun trying to get it out!

Careful. Don't let ratchet handle hit cabin glass!

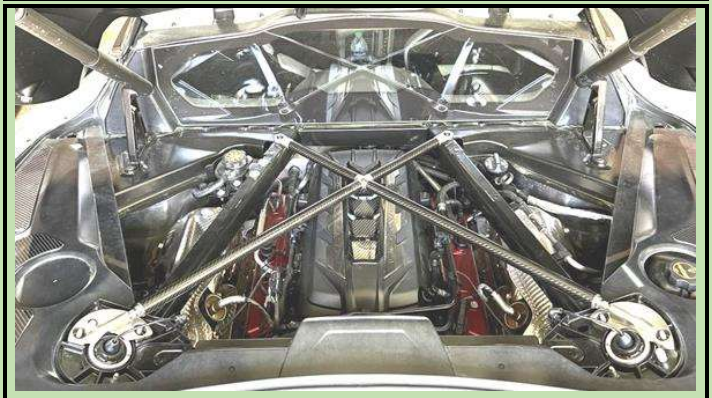
Note reason for rag. Just in case you drop a bolt or nut!

Instructions say "note torque needed to remove bolts and nuts. I found NOT much. ~8 to 10 ft-lbs on front two bolts and ~15 ft-lbs on rear 13 mm nuts.

Install the Cross Brace front bolts first hand tight with Blue LocTite. I had trouble getting the driver's side bolt started. The OEM bolt length has to compensate for the added thickness of the cross brass end fitting. Removed both bolts and loosened the tensioning bolts on the rear stainless brackets. Once started there are more than enough threads to secure.

On top of coilover end, remove the 13 mm nuts from two of the three retaining bolts. Note in PIC a thin deep socket is needed to fit into the stainless steel bracket. It touches the tensioning bolt nut on passenger side. Slip the stainless fitting over the bolts. Loosen the threaded Cross Brace tensioning bolt so the stainless bracket slips down flush. Install the two nuts, and tighten. Use small amount of LocTite. The bolts and nuts hand tight before final tightening.

Tighten the threaded tensioning bolt and lock nut.



Noted in a How to install video someone used a 10 ft-lbs for all bolts and nuts. I tightened with my 3/8 ratchet and probably used ~10 to 12 lbs on the rear bolts and ~15 ft-lbs on the front nuts. Blue LocTite will prevent the rear bolts from turning!

LOOKS GREAT!

Minor Mod! Small CF Addition

I like the Carbon Fiber on the steering wheel. Similar to the engine compartment, thought since this Start/Stop button is close- WHY NOT ADD this Carbon Fiber Button Cover!

Simple Install:

They recommend using Isopropyl alcohol to clean the button surface.

I had packets of adhesive promotor that is useful for hard non absorbing surfaces so opened one and used a cue tip to apply to the button surface.

Then after peeling the 3M adhesive protective backing carefully placed on the metal button and pressed. Held for a mute and DONE.

Note the open slot must be placed on the bottom so the "ON" indicator light shines thru.

Appendix: Why A Stiff Chassis Is Important

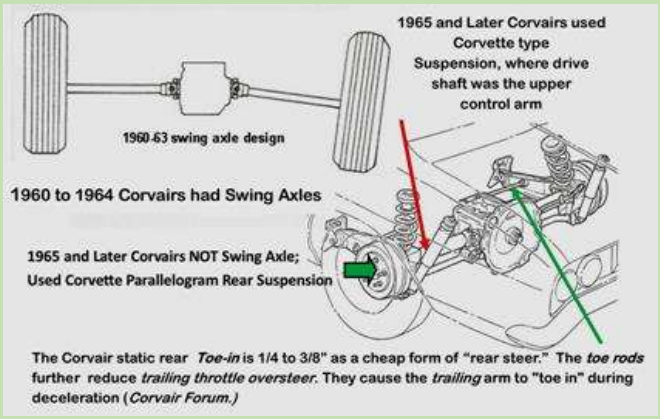
Some may not understand Tadge's comment saying, *"He was paranoid and deathly afraid of the C8 having Trailing Throttle Oversteer (also called Snap Oversteer etc.)"* I do, as I was aggressively driving a 60% rear weight car about the same era of his Dad's Porsche. Had to learn how to deal with Snap Oversteer. *It was fun IF you acquired and practiced the skill.* But Ralph Nader made a name for himself with some unskilled folks who drove one of the million Corvairs GM produced! I'll provide information that may help understanding.

Tadge has not said all of the things they had to do BUT his comment that *"Can't have the chassis acting like and undamped spring is a key one!"*

Understand some of the younger folks, who only know Porsche as a great handling car, may not understand Tadge's comment of concern. Also, some may not understand how a Corvair can compare with a Porsche. Well, I did with my last Corvair; 1st new car bought with every HD option GM offered that year; Quick Steering, HD Springs, Shocks, Sway Bar, Metallic Brakes. To which I added Plus 1 custom wheels and high performance low profile radial tires, headers, carb mods, finned, (*including internal "Pin Fins"*) aluminum oil pan and valve covers to reduce engine oil temp etc.

Yep in SCCA races the Corvair Turbo, 2.7 Liter engine produced 180 hp and bested Porsche! Both good handling cars IF you learned and practiced how to deal with Snap Oversteer in high "g" turns! Could get ~160 natural aspirated hp with some mods on the 4 carb, non-turbo model.

First, Ralph Nader blamed the Corvair swing axles for the "unsafe handling" in his full of incorrect info book. He said in the 1965 and later Corvair's GM went to Corvette type parallelogram suspension to solve the issue and that "Proved" GM knew swing axles were the issue. That was totally wrong. Yep the parallelogram rear suspension was a help BUT no solution. I owned both types, a 1962 and 1967. Had to learn how to counter oversteer with both. AND follow GM's specified front tire pressure of ONLY 16 psi to promote Understeer. Even dealer mechanics and gas station attendants (*who checked tires when they pumped gas*) set all tires at ~30 psi causing handling issues.



The 1965 and later Corvair's used a cheap form of "Rear Steer" so the outside rear tire in a high "g" turn was "steering back" helping the rear from sliding out! Today some cars use this method with much more sophisticated suspension, like BMW CSi, Porsche 911 GT3, some Ferrari's and Lambo's. I used the max spec 3/8 rear toe-in in my 1967 Corvair and it helped. But the sheet metal trailing arms and soft rubber bushings caused it not to be that effective.

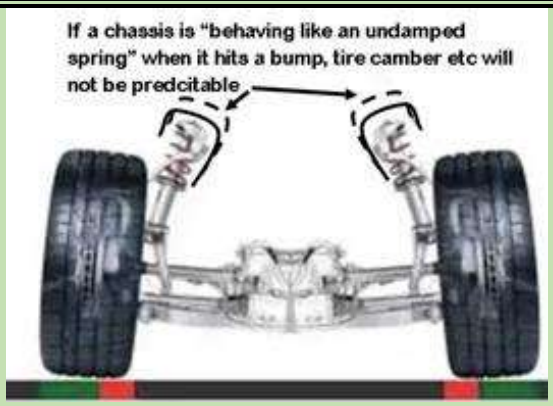
Yep had to learn to counter steer like Tony Stewert in a turn with his dirt car!

This is what a November 15, 2017, Road and Track article said re driving the Corvair, *"To avoid spinning the car, I have to counter-steer almost immediately after initiating the turn. I could see how the lightly trained driver might get into trouble. That was Nader's point: The average driver wasn't equipped to handle an over-steering car."*

Particularly when racing and someone caused you to take an unplanned line thru a turn. You only had a split second to counter steer and *HOPE* you could catch the rear from sliding off the road.

Tadge: "Chassis cannot behave like an undamped spring."

If the chassis is flexing when making a high "g" turn with the wheels cambered as desired, once the wheel load is reduced the tire will not follow the planned path IF the Chassis is flexing back and forth as there is little dampening to prevent an undesirable angle.



5 Genuinely Impressive "Flaws" Of The C8 Corvette (youtube.com)

Avoiding Oversteer Also Affected Braking

What Tadge and his staff did to make the C8 Chassis behave beingly and avoid objectional Oversteer affected braking. It's the reason the C8 Z51 TAKES LONGER TO Stop than the C7 Z51. That is what Jason Fenske found when he interviewed the GM Brake Engineers. They said in aggressive stops the ME C8 should stop faster as more uniform loads are on it's front and rear tires compared a C7. BUT that causes issues in hard braking making the rear skittish and OVERSTEER.

Quoting Jason: ***If they made the C8 brake faster, which they could faster than the C7, it's a recipe for an inexperience driver to get in trouble with Oversteer. Understeer is safer if you're inexperienced and don't know what you're doing behind the wheel.***

Brian Gillogy an automotive writer said it this way: ***"The C8 Stingray will tend to Understeer at the limit. That behavior means that it helps keep novice drivers from swapping ends and winding up in a ditch!"***

BOTTOM LINE:

Best Have The Stiffest Chassis Possible

Car Year Rotor Type	Rotors F/R	Feet From 60 mph	Source	Feet From 70 MPH	Source
C7 Grand Sport 2017 Steel	14.6"/ 14.4"	90 feet	MT	136 feet	C&D
C7 Grand Sport 2017 CCB	15.5"/ 15.4"	129 feet Cup 2	R&T	129 feet	C&D
C7 Z51 2014	13.6"/ 13.3"	**90 feet**	MT + others	*137 feet*	C&D
C8 Z51 2020	13.8"/ 13.0"	**97 feet**	MT + others	*153 feet*	C&D
C8 Z06 2023 Steel	14.6"/ 15.0"	99 feet	MT	144 feet	C&D
C8 Z06 2023 CCB	15.7"/ 15.4"			139 feet Cup 2	C&D
C8 E-Ray 2024 CCB	15.7"/ 15.4"			152 feet Summer	C&D

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"60" E-Ray, C8 Z51, 2017 Grand Sport & 2014 Z51 Stingray Mods or Info Available As PDFs:

60 PDFs discuss improvements or info about a E-Ray, C8, 2017 Grand Sport, 2014 Z51 Stingray function and/or esthetics. Some are minor and others, like installing "Low Dust Brake Pads" on C8 & C7s, have detailed information.

Below are the PDF's available. Click on picture or Blue PDF link or copy and paste the PDF link (Blue type) into your browser. Or email me at *TechSupport@NetWelding.com* **and state the title desired, shown in Yellow:**

E-Ray PDI & Info ***Details of My E-Ray PDI*** **http://netwelding.com/E-Ray_PDI.pdf**	
E-Ray 1st Mod ***Details of My E-Ray Cross Brace*** **http://netwelding.com/E-Ray_Mod_1.pdf**	
E-Ray Need Lift? ***Yep, How I Scraped My Front Aero Panel*** **http://netwelding.com/E-Ray_Lift.pdf**	
E-Ray PPF Bottom Of Rocker Panels ***Small Amount of PPF Added To Rocker Panels*** **http://netwelding.com/E-Ray_PPF.pdf**	
C8 Bigger Brakes ***C8 Brakes Are Anemic Compared to Other MEs*** **http://netwelding.com/C8_Big_Brakes.pdf**	
C8 PDR SD Card Selection ***Things to Consider When Buying SD Card*** **http://netwelding.com/PDR_SD_Card.pdf**	
E-Ray, C8, C7 eLSD vs Positraction ***eLSD is a Modern Dif; Positraction is from 1960s*** **http://netwelding.com/eLSD _VS_Posi.pdf**	

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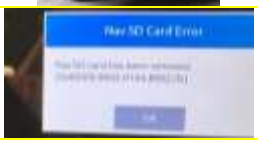
E-Ray, C8 FWD Hybrid ***WFWD Hybrid Provides More Power & MPG*** **http://netwelding.com/C8_FWD_Hybrid.pdf**	
C8 Edge Red Engine Cover ***Engine Cover Matches Valve Cover*** **http://netwelding.com/Engine_Cover.pdf**	
C8 Engine Compartment Lights ***Multicolor Lights Remote operated*** **http://netwelding.com/Engine_Lights.pdf**	
C8 Side Skirts & Splitter ***Install C7 Carbon side skirts & splitter on C8*** **http://netwelding.com/Side_Skirts.pdf**	
C8 Z51, GS/C7 Z51 Ceramic Brake Pads ***Performance Vettes have dusty brakes. These help!*** **http://netwelding.com/Ceramic_Pads.pdf**	
C8 Low Restriction Air Intake ***Low Restriction Air Filter Why & How To*** **http://netwelding.com/C8_Air_Intake.pdf**	
C8 & C7 Splitter & C8 Condenser Mesh ***Mesh Protects AC Condenser & Splitter Install*** **http://netwelding.com/CF_Splitter.pdf**	
C8 NAV SD Card Removed Error ***Error When SD Card and Reader Are Fine*** **http://netwelding.com/NAV_SD_Card.pdf**	
C8/GS/C7 Splash Guards ***GM splash guards. ACS Best Front Guards for GS.*** ***http://netwelding.com/Splash_Guard.pdf***	
Jacking a E-Ray/C8/GS/C7 Vette ***Safely jacking either front only or back & front*** ***http://netwelding.com/Jacking_A_C7.pdf***	
E-Ray, C8 & C7 Plates & Frame; **Must Meet South Carolina Law** **http://netwelding.com/License_Plate_Frame.pdf**	
Change C8/GS/C7 Oil ***WHY change your own oil and C7 Lifting Methods*** **http://netwelding.com/Changing_Oil.pdf**	
E-Ray/C8/GS/C7 Mirror Proximity Alarm ***Limit switch alarm warns when close to door frame*** **http://netwelding.com/Mirror_Proximity_Alarm.pdf**	
Jacking Pads for E-Ray/C8/GS/C7 ***Manual says Jacking Pads 2 1/2-inch max OD..*** **http://netwelding.com/Jacking_pads.pdf**	

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E-Ray/C8/GS/C7 Radar Power *For C7 tapped rear fuse panel. For GS tapped mirror* http://netwelding.com/Radar_Detector_Power.pdf	
E-Ray, C8 & C7 Wheel Chatter/Hop *Why sharp, low speed turns with cold tires causes the front tires to chatter/hop.* *http://netwelding.com/Wheel_Chatter.pdf*	
E-Ray/C8/GS/C7 Wheel Locks *Wheel locks, help protect your expensive wheels.* http://netwelding.com/Wheel_Locks.pdf	
Deer Whistle Installed on E-Ray/C8/GS/C7 *Do they work? Plus Install Info* *http://netwelding.com/Deer_Whistle.pdf*	
C8 & C7 Splitter Protector *Scrape Armor Protection for Splitter* http://netwelding.com/Splitter_Protectors.pdf	
E-Ray, C8 & C7 Cargo Area *Rear cargo area storage device and rear protector* http://netwelding.com/Rear_Cargo_Area.pdf	
C8 Front Coilover Tower Covers *Prevent water from filling Cast aluminum cavities* http://netwelding.com/Tower_Covers.pdf	
C8.R Info & GS Rear Diffuser (Fits Any C7) *Rear Carbon Flash Composite Diffuser* http://netwelding.com/Rear_Diffuser.pdf	
GS/C7 Belt Rattle *Passenger seat belt rattles against the seat back.* http://netwelding.com/Eliminate_Rattle.pdf	
Aluminum C8 & C7 Chassis and Repair *The C7 aluminum chassis. Includes weld repair info.* http://netwelding.com/Aluminum_Chassis.pdf	
Manage GS/C7 Spilled Gas & Door Lock *Protect when filling gas. Preventing door lock failure.* http://netwelding.com/Manage_Spilled_Gas.pdf	
GS/C7 License Plate Light *LED license plate light & cargo area bulbs* http://netwelding.com/License_Plate_Light.pdf	
E-Ray/GS/C7 Door Panel Protector *Black plastic protector prevents scuffing of door* http://netwelding.com/Door_Panel_Protector.pdf	
GS/C7 Improved Cup Holder *A solution to the cup holder spilling* http://netwelding.com/Improved_cup_Holder.pdf	

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C7 Carbon Fiber Grille Bar ***Install genuine carbon fiber grille bar overlay*** ***http://netwelding.com/CF_Grille_Bar.pdf***	
GS/C7 Blind Spot Mirror ***Smaller rear and side windows cause C7 blind spots.*** **http://netwelding.com/Blind_Spot.pdf**	
GS/C7 Skid Pad Protector ***After the air dam, the aluminum "skid pad" hits*** **http://netwelding.com/Skid_Pad_Protector.pdf**	
GS/C7 OnStar Lights ***Rear view mirror OnStar LED's, at a quick glance, look like a police car flashing light! This is a fix.*** **http://netwelding.com/OnStar_Lights.pdf**	
GS/C7 Skip Shift Eliminator ***Skip Shift Eliminator install*** **http://netwelding.com/Skip_shift_Eliminator.pdf**	
GS/C7 Catch Can & Clean Oil Separator ***What is Coking and how to reduce the potential*** **http://netwelding.com/Catch_Can.pdf**	
GS MGW Flat Stick Shifter ***The MGW shifter shortens throw and is more precise*** **http://netwelding.com/MGW_Shifter.pdf**	
GS/C7 Round Shift Knob ***A round shift knob shortens throw on OEM shifter*** **http://netwelding.com/Shift_Knob.pdf**	
GS/C7 Stingray Sill Plate ***Stingray sill plate replaces original.*** **http://netwelding.com/Sill_Plate.pdf**	
GS/C7 Nylon Bra ***Nylon Bra Stops Bugs. Fits with Stage 3 Winglets*** **http://netwelding.com/Nylon_Bra.pdf**	
GS/C7 Clutch Fluid Change ***Clutch fluid after 3000 miles gets dirty*** **http://netwelding.com/Clutch_Fluid.pdf**	
C7 Carbon Fiber Hood Vent ***Replaces Plastic Hood Vent*** **http://netwelding.com/Hood_Vent.pdf**	
GS/C7 Cold Air Intake ***Low Restriction Air Filter & Duct*** **http://netwelding.com/Cold_Air_Intake.pdf**	
GS/C7 Soler Modified Throttle Body ***For Improved Throttle Response*** **http://netwelding.com/Soler_Mod_TB.pdf**	

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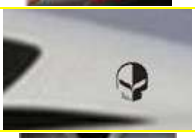
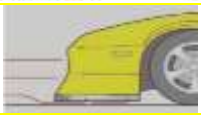
GS Splitter Stage 3 Winglet ***Stage 3 Winglets Integrate with Spats*** **http://netwelding.com/Stage_3_Winglets.pdf**	
C7 Removing GM Plastic Film ***How To Remove The Rocker Panel Film*** **http://netwelding.com/Rocker_Panel_Film.pdf**	
GS 2LT to 2.5 LT ***Red Upper Dash Pad Like 3LT*** **http://netwelding.com/Red_Dash_Pad.pdf**	
Jake Emblem/Decals for GS ***Jake Symbols Support GS Racing Image*** **http://netwelding.com/Jake_Emblems.pdf**	
Rusty GS/C7 Muffler ***Why the C7 muffler rusts way to turn matte black.*** **http://netwelding.com/Muffler_Rust.pdf**	
GS Engine Compartment Mods ***Cosmetic Additions in Engine Compartment*** **http://netwelding.com/Engine_Compartment.pdf**	
GS Vitesse Throttle Controller: Fits All C7s ***Adjustable Throttle-by-Wire Control*** **http://netwelding.com/Throttle_Control.pdf**	
Boomy Bass Solution ***Use Presets to Adjust Bass etc. Tone/Balance*** **http://netwelding.com/Boomy_Bass**	
GS/C7 Air Dam, Functions ***Why Missing from Z51, Some GS & Z06*** **http://netwelding.com/Air_Dam.pdf**	
Rusty GS/C7 Muffler ***Why the C7 muffler rusts way to turn matte black.*** **http://netwelding.com/Muffler_Rust.pdf**	
Engineering a ProStreet Rod ***How Our '34 ProStreet Rod Was Designed and Built*** **http://netwelding.com/Engineering%20Street%20Rod%203-08.pdf**	
Motorsports Welding Article ***Wrote Article on NHRA and NASCAR Chassis Design*** **http://netwelding.com/Motorsports_Welding_2018.pdf**	

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