C7 Rear Diffuser

Rear Diffuser Increases Downforce With Minimum Extra Drag

Several aerodynamic devices can increase downforce, such as rear spoilers. However, spoilers also significantly increase drag that takes power to overcome. For example, the Z06 Stage 3 aero, large spoiler, with full width wicker, is the main reason for the 35% higher drag compared to the base Z06 with smaller spoiler.

A diffuser is a shaped section of the car underbody which improves the car’s aerodynamic performance by enhancing the transition between the high-velocity airflow underneath the car and the much slower freestream airflow of the ambient atmosphere. This speeds up the airflow underneath the car, which using Bernoulli’s principles creates reduced pressure. A greater difference in pressure between the upper and lower surfaces of the car means more downforce, allowing faster cornering with minimum extra drag.

Diffuser Design is Complex

The fins or “fences” as they are referred to are important to the diffusers performance. There are two counter-rotating vortices formed along the fence surfaces. The flow is separated and this has a positive effect on flow quality and downforce performance.

In the graph at right, suffice for our purposes to note the line in red is the downforce over a wide range of heights from the bottom of the car over the road. That is the performance when “fences” are present.

The blue line is the downforce without fences and with more chaotic flow than when the counter-rotating vortex flow is present. It has a lower peak downforce over a narrow range and only a low height over the road.

If you want to work for a F1 team there is much theory and math to master! 😂
Install C7 Carbon Diffuser

Install of the C7 Carbon Diffuser is a 3 of 5 wrench difficulty unless you carefully read the modified C7 Carbon instructions (attached) AND this PDF - then it’s a 2 wrench effort!

Tools: 7 & 10 mm Sockets; a 7 mm open end wrench; Torx T15, T20 & T25; Plastic Trim Tools

The Diffuser uses exiting bolts including those outside ends (red circle) and 3 supplied bolts in each of the 4 “fences” as they are called. These allow the air under the car to merge more smoothly with the air behind the car.

The included Undertray extends the smooth path in the center of the car to assist air entering the rear Diffuser.

UNBOXING:
The box holding the Diffuser and Undertray is 6 feet long.
The product is very well packed

My experience with a C7 Carbon splitter installed on my 2014 Z51 was the same, excellent packing and well protected.
No damage. It has flexible foam padding covered by bubble wrap.

The carbon flash painted finish is excellent. Perfect match to the OEM diffuser bottom.
It has 4 added fins or properly called “Fences.” This gives 12 surfaces that will form counter rotating Vortex flow on each fence wall. This makes flow smoother and regular compared to the more turbulent flow without them.
These are the screws under the back of each fender. The one in Red holds the GM Splash Guard in the Grand Sport and Z06 and the one circled in Red, the splash guard.

The inner most Green circled bolt holds the Splash Guard for C7s with narrow rear fenders! I now see how this one part fits all C7s! The inner bolts are on all C7s and are at the same spacing regardless of model!

Prior to performing the C7 Carbon Instruction Step 3, I checked the fit.

Placed the Diffuser on two 6-inch-high stanchions I had available. Could use cardboard boxes etc. It is not heavy, 10.5 pounds, but it is awkward.

Best not to lift the car at this point. In fact not needed until installing the undertray.

Found it would hold with one bolt on each side. However, to get it to fit flush for accurate marking and to check the fit of the Fences I used a scissor jack to hold the Diffuser so the fences fit tightly.

There was a good fit. So ready for the Step 3 & 4 measuring for and drilling the 12 holes in the OEM diffuser.

Wondered why they would not just support the assembly with OEM bolts and perhaps two-sided tape? However, those 6 bottom auto body bolts are small like sheet metal screws! Much stronger to have bolts holding each Fence to the OEM Diffuser. It’s a secure assembly with the supplied 1.9-inch OD plastic washers to support added downforce.
I suggest you watch 1 minute of this video starting at 2:30 in to 3:30:

https://www.bing.com/videos/search?q=install+corvette+exhaust+c7+corvette&view=detail&mid=3B1AB478B4859AF42E933B1AB478B4859AF42E93&FORM=VRDGAR

However, don’t get the wrong impression! It will take up to 1 hour to remove the OEM part that you’ll see done in one minute!

In addition to the modified C7 Carbon Instructions in the Appendix, another pics/text from Stingrayforum, member Pilotsdiscreation, is included for installing another type of Diffuser that has some helpful removal hints and pics of the OEM lower bumper (diffuser.)

Will spend a number of pics on Step 3 and Step 4 as these were probably the most difficult to perform properly.

Tried several methods of the simple statement in Step 3, “Add marking material on the predrilled holes.” As well as marking the OEM diffuser for drilling.

Devised a method that worked. Using the suggested clay and paint to mark masking tape placed on the OEM diffuser face- did not!

“Eight pics down is a summary of the Suggested Best Approach in Red.”

“"
Although it is not easy to get the hole marks identified on all three holes it is possible to mark a line on the masking tape placed on the OEM diffuser surface.

The outer, Top hole mark is also easy to reach and accurately placed on the masking tape for the proper hole location. 

As noted in the “Suggested Best Method” below, properly marking these top hole locations is all that is necessary. The other two holes can be located on a fence centerline with a simple paper template!

The lines placed were wider than the 7/8-inch-wide fence but by using the midpoint they defined the centerline.

This would have worked better if I had used a sharp very short pencil as the marks placed further inside the “tunnels” between fences did not show well and were not accurate. In addition, only the first hole locations were accurate as ones further down the “tunnel” were difficult to reach and proved not to be in the exact locations needed.

However, I only drilled 1/8-inch pilot holes so no harm done. The method used to locate the proper position was easy to mark with a few properly located top holes.

All of the upper most or top marks were relatively easy and accurate to mark on the OEM diffuser masking tape. However, the center and particularly the marks farthest into the “tunnel” could not be reached to accurately mark them.

A template was made from paper that accurately marked all of the holes. It followed the contour of the fence on the surface of the OEM diffuser. Using the center location between the lines made on the masking tape along the edges of each fence allowed a more accurate location to mark for drilling.
All pilot holes along the top edge, as were in good alignment. This positioned the new diffuser system properly. Note the 6 end holes that attach the diffuser to the body must align perfectly. I used a bolt and nut on each side and two screws in those holes to assure proper alignment before final drilling.

Note, I only used a 9/32 drill (0.281”) for the 0.250 threaded holes while the fence is 7/8 inches wide. Could have used a larger drill but some holes were off sufficiently, that would not have worked!

Where the drilled 1/8-inch pilot hole did not fall directly over the predrilled ¼ inch threaded holes but was close, I used a 9/32 drill and then enlarged the hole where needed with a Carbide Burr to get alignment.

Checked to see if the 1/8-inch hole was over the ¼ inch hole by inserting the drill bit. With the two parts bolted together with the 6 bolts on the ends, used the 1/8-inch drill through the original pilot holes to just make a mark on the inner fence surface. As shown in pic right this one was off about 1/4 inch. Then drilled a 9/32 hole in the OEM diffuser in that location. It wasn’t always in perfect alignment BUT a Carbide Burr quickly enlarged the hole to the side where needed. **Better than using a very large drilled hole!**

If the 9/32 (0.281) hole was close to correct for the 0.250 threaded hole, enlarged the edge needing adjustment with a Carbide Burr.

Pic shows the finished assembly with the supplied, thick 1.9-inch OD hard plastic washers that spread the load over the back of the OEM diffuser.

This approach suggested (left text) was much easier than trying to get the original holes perfectly aligned. With the shape, even a full template would not have achieved perfect alignment. Once the 6 end holes are aligned using nuts and bolts, using the 1/8-inch pilot holes and drilling just the fence surface to mark the exact location needed, was relatively easy.

**SUGGESTED MARKING APPROACH:** Just mark the sides of each fence on masking tape placed on OEM diffuser. Mark the Top hole position on a center line between side lines. Then using a paper template mark the other two hole locations on each fence. Use a 1/8-inch pilot drill then check position.
Six OEM body bolts hold the diffuser to the body and screw into metal extruded U nuts. They are a fine thread 4.2 mm X 25 mm long automotive body bolts with a captive washer. Could not locate a longer hex head body bolt but was able to fine one with a T20 Torx head bolt (screw.) By using a small fender washer, they worked as good replacements. As shown in the pic, after going through the C7 Carbon diffuser they protruded the same as the OEM screw without it.

Was concerned the OEM screws were not catching enough of the extruded nut threads. These six screws (only two in a narrow body C7) bolt the OEM and new C7 Carbon diffuser to the other body parts. The C7 Carbon part is about ½ inch thick so the longer screw grabs all the extruded threads. Note, a #8 sheet metal screw is slightly larger and also has a coarser thread. It would probably work OK by cutting new threads in the extruded nut.

Bolting the assembled OEM diffuser with the added 4 fences and bottom assembly is straightforward. Slip the top tabs into the matting slots and a modest hit with the side of your hand is all that is needed. Put in the bolts you removed and the 6 longer body bolts described above on the underside. The side vents are a bit more of a pain. Putting the three tabs on one side, it’s hard to get the side in! Used a plastic trim tool to leverage the tabs into the matting slots.
Up to this point there was no need to jack up the car. This next task is to install the Undertray and that requires raising the rear about 6 inches.

The first task that can be completed with the car raised is installing the two OEM screws that attach the OEM diffuser to a tubular brace. Those could not be reached without lifting the car and accessing from the rear. The new lower diffuser section prevents easy access but the screw can be started by hand.

You can move the tubular brace with one hand while aligning the hole to start the screw.

After screwing in as much as possible by hand a 7 mm open end wrench is needed to tighten the screw. Can only get about a 90 degree turn so it takes patience!

There is another screw to the outside of the two on either side connecting to the brace. It is only attaching a piece of fiber type material with an extruded U nut. It does not appear to be needed and hopefully it is not as it was difficult to get the screw started. Left it out!

Installing the Undertray is straightforward following the simple instructions. A T25 Torx bit is needed.

Used a long ¼ x 20 bolt in the rear center hole to hold the end up before installing the very short screws supplied.

The front supports float and I wondered about possible vibration when at speed.
This is the finished Undertray install. However, the front edge is the lowest point in the rear underside! Lower than the diffuser.

The TEE does not hold the undertray it floats in the hollow C7 rear crossmember. One of plastic TEEs broke and while I waited for C7 to ship a “new design” (which they did—see pic insert, it’s metal, much better IMO.)

*I had an idea for a fix!*

I could thread the center of an aluminum bar the same size as the top of the supplied TEE. Then use a bolt with washer to pull and hold the Undertray tightly to the hollow C7 crossmember.

The bar would be inserted like the TEE with it parallel to the crossmember and slipped into the crossmember hole. Then it would be rotated 90 degrees to hold in the Undertray. The only question—*HOW TO HOLD THE BAR SO IT DID NOT TURN AS THE BOLT WAS TIGHTENED?*

An answer is to make two finger-hold holes in the Undertray near the bar!

Not a solution C7 Carbon would use but good enough for me!

Drilled two finger-hold holes next to each bolt, using a 1¼ inch hole saw. The Undertray is made of fiberglass and drills easily.

The holes are to the outside of the bolts as that is where the C7 hollow crossmember holes are located.

As the plastic TEE is used, the bolt is placed through the Undertray (with a washer and lock washer) into the aluminum bar on the top side. Before tightening the bolt, the bar is positioned parallel to the crossmember and inserted in holes in the hollow crossmember.

Then the bar is rotated 90 degrees to clamp the front of the Undertray.
Undertray Installed:
Treaded the bolts and washers through the Undertray and turned both bars parallel to the C7 hollow crossmember to insert. Then turned both 90 degrees and held the bar with my finger as the bolt was tightened. Once it contacts the inside of the crossmember, friction also helps stop it from turning.

The rear 5 bolts were tightened then the front two. The Undertray bent slightly to the shape of the crossmember and is held tightly to it.

Interesting Observation:

Viewing the pic right, shows why C7 Diffuser can fit the narrow fender Base/Z51 as well as the wider fender Grand Sport/Z06.

Pic shows that is possible because the three inner screws are in the same location for both narrow and fat fenders! In my Z51 the inner screw held the splash guards.

It Fits Well with the C7 Rear and Finish is Great
Appendix: Aerodynamics

General, Followed By Specifics

The base C7 was designed with many optimized aerodynamic elements. But more can be done! The rear spoiler on the Z51, for example, decreases lift at speed but adds drag. It also reduces the slight vacuum formed behind the car.

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<th>CD Drag Cd</th>
<th>Lift Coefficient</th>
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<td>C7 Base</td>
<td>0.30</td>
<td>0.20</td>
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<tr>
<td>Z51</td>
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<tr>
<td>Z06 Base</td>
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</tr>
<tr>
<td>Z06 Stage 2</td>
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<td>-0.152</td>
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<tr>
<td>Z06 Stage 3</td>
<td>0.50</td>
<td>-0.279</td>
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Note the base C7 still has lift (a positive 0.20 coefficient,) the Z51 spoiler provides no downforce, it just counters lift. The Stage 2 aero Z06 provides rear downforce, Stage 3 even more but both adding significant drag!

Aerodynamics is not intuitive, even the Wright Brothers measured lift on various models in a home-built wind tunnel.

Of interest, the shape they developed for the propellers for best performance is optimum even today!

In his 1923 race car, Bugatti knew at speed there was a partial vacuum formed in the rear of a flat rear shaped car so he used the tapered shape shown.

This 1968 907 Porsche used a long tail approach to reduce drag.

Tadge provided this drag and lift information in a 2016 post. He also stated; “We have strict criteria for pitch moment. The ratio needs to be held within a fairly narrow range so that the vehicle handling remains consistent. Too much down force on the rear and the car will understeer at higher speeds. Too much on the front and the car will oversteer. We tune all our cars to maintain neutral handling biased slightly towards understeer.” A rear diffuser can add downforce with minimum extra drag.
In addition to providing downforce, a small rear spoiler decreases the low-pressure area directly behind the car.

This Ferrari 1960 Superamerica employs a small rear spoiler than allows a sharp cut off rear body shape.

A personal example occurred as I was stopped waiting to enter a 4-lane highway! An 18-wheeler cab was traveling about 60 mph on a light rainy day. The rain and light created visible air streams. The turbulence directly behind the cab was obvious. You could visualize the partial vacuum being formed. That pressure difference was pulling on the cab causing a drag force.

Recall in a fluid dynamics class the Prof showed the Teardrop Spotlights used “In The Day” had more drag with the bullet shape facing forward! The low pressure behind the flat surface “pulls” it back. Air forms a bubble in the front on the forward flat surface.

On high humidity days you can see the vortices form at the ends of the wing in a race car.

As the low pressure under the wing increases to atmospheric pressure, the gaseous water vapor becomes visible. Like in a cloud!

MY EXPERIENCE WITH LIFT:
My 260Z was known to have considerable lift at speed. The standard car produced about 140 lbs. of lift in the front and 35 lbs. in the rear at 70 mph. That was a lot for a 2700 lb. car. At 100 mph you could feel the front end become light and stability was inferior to that at normal highway speeds.
The balance between front and rear downforce must be considered.

I added a large front air dam and a rear spoiler like those shown left. The front was advertised as adding 100 lbs. of downforce and the rear 35 lbs at 100 mph. It was very stable at even 120 mph! Then I hit the air dam on a curb! It cracked so I took it off. While I waited for a new one to arrive, have it painted, then found time to install, the stability even at 70 mph was definitely worse! The spoiler adding downforce in the rear made the situation worse that even stock!

Front and Rear Downforce Balance

When adding downforce, you must consider how the balance affects handling. Excess on one end or the other can cause understeer or oversteer.

Tadge said regarding the Z06, “The center air dam was not used because it increased downforce excessively and resulted in Oversteer at high speeds when they require slight Understeer!”

Perhaps with the increased downforce, with a diffuser the air dam could be added to models without one!

C7 oversteer could never be like the Corvair!!

CORVAIR OVERSTEER:

My first new car was a 1967 Corvair ordered with every HD option offered; quick steering, HD suspension, etc. Like the pic left I added aluminum 14-inch wheels and “low profile” Continental 714 tires. Great car. It was my 2nd Corvair and I was very familiar with high speed oversteer!

UNDERSTEER:

Had a front wheel drive Dodge Colt Turbo in the 1980’s when we were only allowed to get gas every other day! It was a great fun car once I installed 14-inch aluminum wheels and Pirelli P7s!

As it was called by the car mags, it was a “Pocket Rocket!” But like all front wheel drive cars it had significant understeer.
That 2200-pound front drive Colt was fun to drive if the understeer was understood and managed. The NASCAR word “plowing” sure fit this model. Being my first front drive car, I wasn’t used to turning the wheel, hitting the gas coming out of a turn and having the car trying to go off the road, front first!

Found I could use a form of trail braking to get the car pointed in the direction I wanted to go! Used the emergency brake with the button held in to reduce the side traction of the rear tires! The car rotated around!

The center handle brake was an excellent tool to steer the car in turns! For racing, just remove the locking button.

Fun Aero Discussions:
One area I had fun discussing aero was my pick-up truck and how leaving the tailgate down was decreasing mpg! All documentation says it is worse! There is a bubble of air in the bed makes air move over the area and reduce drag.

These are information that quantifies the amount of extra drag as measured by mpg with the tailgate up versus down. The graph left shows a 2% mpg advantage being up and a 7% mpg advantage with my full bed cover.

Adam and Jamie, hosts of the TV show MYTH BUSTERS, drove two identical Ford F150 pickup trucks filled with identical amounts of gas. One with the tailgate up the other down. They drove the same road and after 500 miles the one with the tailgate up went 30 miles further before it ran out of gas! That’s 6% better (30/500!)

With the tailgate down there is a larger area of low pressure behind the cab increasing drag!

COMPUTATIONAL AERODYNAMICS
Tadge said in a forum post about C7 aerodynamics, computer programs can give answers very close to the much more expensive wind tunnel tests!

These programs are getting very sophisticated and can match very expensive moving floor wind tunnel data.
This video link: https://www.youtube.com/watch?v=7hVMwkJQ0wE shows the Sauber F1 team using their expensive wind tunnel for a full week. Note, their wind tunnel employs a moving steel floor!

It states the teams were operating their wind tunnels 24/7 then as a cost reduction, F1 rules limited that to a number of test runs they can make.

Because of the accuracy of simulated aerodynamics programs, the F1 rules also limit the amount of computer teraflops of solver time they can use to help reduce costs.

Boundary Layer

The layer of air next to a moving body is moving at the same speed as the body. Further from the surface, the velocity progressively changes to the surrounding velocity.

Pic right is form Reference 1. It shows the air moving at ~60 mph hugs the surface in a thin layer at the start (~ 1/16 inches) but can increase to an inch or more toward the rear of a car. A thicker boundary layer results in a more drag.

A step increase in the boundary layer thickness creates a turbulent boundary layer and flow separation. Flow separation in a wing, for example, will decrease downforce. (See Coanda Effect below.) Pic left from Reference 1 shows this effect occurring on a flat plate.

This turbulent area creates even more drag. However, where separation is inevitable, as in the rear of the car, it is usually better to have a turbulent area with some drag penalty than flow separation that reduces downforce!

There are ways to induce turbulence where desirable such as small vortex generators or even sandpaper!
Coanda Effect

Aerodynamics pioneer Henri Coanda made a very important contribution to how the aircraft wings produce lift when he discovered what is now called the Coanda Effect.

A natural question is "how does the wing divert the air down?" When a moving fluid, such as air or water, comes into contact with a curved surface it will try to follow that surface.

Coanda Graphic: The pressure difference across the air jet causes the jet to deviate towards the nearby surface, and then to adhere to it. If the surface is not too sharply curved, the jet can, under the right circumstances, adhere to the surface even after flowing 180° round a cylindrically curved surface, and therefore be traveling in a direction opposite to its initial direction. The forces that cause these changes in the direction of flow of the jet cause an equal and opposite force on the surface along which the jet flows. These Coandă effect induced forces can be harnessed to cause lift and other forms of motion, depending on the orientation of the jet and the surface to which the jet adheres.

This phenomenon explains why a wing (airplane or inverted race car) stops being effective if the angle of attack is too steep.

To get around air stream separation problem in Formula 1, and increase the Coanda effect on wings, dual or more element or slot-gap wings are used, these allow for some of the high-pressure flow from the upper surface of the wing to bleed to the lower surface of the next flap energizing the flow. This increases the speed of the flow under the wing, increasing downforce and reducing the boundary flow separation.
Blown Diffuser

An interesting approach was used in F1 as rules reduced the allowable configuration of diffusers. A blown diffuser is basically a way of using the exhaust gases to add to the diffuser airflow. There are two main purposes for this:

1. To try to move the wake from the rear wheels outwards where it will cause less disturbance
2. To re-energize the low-pressure air at the back of the diffuser to create more rear downforce.

Does the C7 exhaust position add to the diffuser rear downforce? Don’t know how much but appears it should!
Summary: There Are Number Of Devices That Increase Downforce:

- A Rear Spoiler Increases Downforce But Also Significantly Increases Drag.
  For example, the larger spoiler on a Stage 3 Z06 provides an increased downforce coefficient of -0.279 from 0 for the base Z06 with its smaller spoiler. However, it is also responsible for the majority of the drag increase that goes from a coefficient of 0.37 to 0.50 = a 35% increase!

- A Rear Diffuser Increases Downforce With Minimum Increase in Drag.

Diffuser with fins/fences: Item D
Flat Plate (Item UT)
Item T; Supports rear Item of Item UT
Both metal and 1 7/8 inch Black Washers

Diffuser with fins/fences: Item D
Flat Plate (Item UT)
Item T; Supports rear Item of Item UT
Both metal and 1 7/8 inch Black Washers
5.- Locate all the screws at the bottom.
**NOTE:** OEM hardware will be re-used to reinstall the diffuser later on.

6.- Use any tools at your disposal to safely remove the screws. A size 7 socket is recommended for removal.

7.- Gently Pop out the reflector using a plastic pry tool.

8.- Remove the bolts that are located behind the reflector as well as the bolts located inside the exhaust area and behind the license plate.
9- Pop out the tabs on the splash guards behind the rear tires. Afterwards remove the torx screws beneath the splashguard.

10. Use both hands to gently remove the vent by pushing it from the inside aperture where the splash guard was located.
Note: Remove the vent from the bumper fascia only.

11. Remove the diffuser starting from one side to another by gently pulling the tabs located above of the diffuser.

12. Drill the 12 holes on the diffuser that correspond to the undertray's pre drilled holes. Make any necessary adjustments.

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13. Place the reinforcement plates behind the diffuser, matching up the plate’s pre-drilled holes with the holes previously drilled on the diffuser.

14. Secure the plates against the diffuser using the set of hex bolts and washers provided.

15. Prepare the car for re-installment

16. Snap the diffuser back in place, making sure that all the diffuser’s upper tabs line up properly with the rear bumper fascia’s slots.

PLEASE NOTE: All parts must be prepped and installed by a professional body shop that has experience working with carbon fiber and fiberglass car parts including but not limited to cutting, filling, sanding, and shaving. Extra fees can be incurred for proper fitment. All parts are sold for off-road and show use only. We do not accept liability for injuries resulting from customization of buyer/owners car, this is done at their own risk. You, as the buyer, are responsible for complying with any/all local, state, and federal laws.
17. - Re-attach the tabs making sure they snap in with the bumper fascia.

18. - Re-attach the vent tabs on to the diffuser.

19. - Make sure to screw the bolts previously removed after snapping in the diffuser.

20. - Re-attach torx screws and splash guards.
21.- Screw back the OEM bolts previously removed making sure that the undertray’s pre-drilled holes match up with the vehicle’s factory mounting points.

22.- Place the T shaped mounts behind the pre-drilled holes of the undertray’s attachment, use a flat allen screw to secure the mount. Note.- Do not fully tighten the bolt until the mount is fully assembled with the vehicle.

23.- Locate the “Rear Crossmember subframe”, the T shape mounts are going to be mounted on the holes that are present in this subframe.

24.- Locate the two holes that are going to act as a mounting support.

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25. - Insert the two T mounts that were assembled on step 18.

26. - When the T shape mounts are inserted all the way through, rotate them 90 degrees so the extensions on the T mounts rests directly on top of the subframe’s top outer surface.

27. - Screw the 7 alien bolts that correspond to their respective pre-drilled holes, making sure to also tighten the bolts for the T-mounts.

28. - This ends with all the installation steps.

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HELPFUL INFORMATION ALSO WORTH REVIEWING

The following Instructions/ pics are from Pilotsdiscreation, a Stingrayforum, member who posted the procedure/pics on the forum:

[NOTE: This is for installing a carbon fiber OEM type diffuser so it is only related to that activity. Some items on reinstalling don’t fit and most were removed.]


Here's How to Change the Diffuser - should take about 45 minutes, no need to jack or lift the car, and I did all by myself without the aid of an assistant and with no special trim tools:

Step 1: Start by removing the license plate
Step 2: Remove the 10 lower bolts underneath the diffuser that I highlighted in the red box below:
Step 3: Remove the two bolts located behind the rear license plate. These are located where the blue circles are below (can't see the bolt heads here, but simple to remove):
Here's where the fun starts! This would be very simple if not for the fact that each horizontal reflector has two bolts behind it. This is why I think others recommend removing the entire façade, but it's not necessary due to the next steps...

Step 5: Remove the vertical side vents, aka 'rear fascia center grille'. The trick here is to start at the bottom outside, between the edge of the vent and the body color paint... simply pull fairly hard and it will pop right out. There are three tabs on each side, pull the three outside ones off, and leave the inside ones for later after the diffuser is all the way off:
Step 6: Now the bottom and sides of the diffuser should be loose, but it is still firmly held on top. To remove the horizontal reflectors firmly pull the plastic diffuser from the bottom side and slide your arm up to the back of the reflector. Use a finger to poke the back side of the and it will simply pop out!
This exposes two bolts per side, circled in blue below. Remove those bolts each side.
Blue Circles
My Note: I found from text and video these two clips hard to understand. Easier than words indicate!
I used a thin trim tool to open the gap from the top diffuser to the rear upper bumper.
Then I used a 1 inch wide stiff paint scraper to push down the tab circled in yellow.
Pull on the OEM diffuser and it will pop out. Only two such clips on each side.

CAREFULLY unsnap each tab securing the top corners to
Now the diffuser is hanging from some tabs on the top. Step 7: Pull the diffuser gently off, and set onto something soft that will protect it.

7c: Remove the side grills completely and install the 3 inside tabs onto the new diffuser.

Step 8: **INSTALL**

Carefully hang the new diffuser by inserting the top two tabs in there respective mating parts.

Step 9: Reinstall the upper bolts making sure that the part is received correctly by the upper façade. You may need to apply up force to close the gap while tightening the upper bolts in order to ensure a tight fit.
Some 45 items discuss improvements or information about a 2017 Grand Sport and 2014 Stingray function and/or esthetics. Some are minor and others, like the installing ceramic brake pads, include detailed install information.

Below are the PDF’s available. Click on picture (may need Ctrl pressed.) Or just copy and paste the PDF info (Blue type) into your browser. Or email me at GUtrachi@aol.com and state the title desired, shown in Yellow:

**Note:** A GS in the title indicates the info was updated from that available for the C7 Z51 PDFs.

<table>
<thead>
<tr>
<th><strong>Rusty GS/C7 Muffler</strong></th>
<th><img src="http://netwelding.com/Muffler_Rust.pdf" alt="Rusty Muffler" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>Why the C7 muffler is rusted and a simply way to make rust turn matte black.</td>
<td></td>
</tr>
<tr>
<td>Bottom pic rusted, top pic treated</td>
<td></td>
</tr>
<tr>
<td><a href="http://netwelding.com/Muffler_Rust.pdf">http://netwelding.com/Muffler_Rust.pdf</a></td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th><strong>Change GS/C7 Oil</strong></th>
<th><img src="http://netwelding.com/Changing_Oil.pdf" alt="Change Oil" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>WHY change your own oil and HOW to do it</td>
<td></td>
</tr>
<tr>
<td>Revised, includes C7 Lifting Methods</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>C7 Carbon Fiber Side Skirts</strong></th>
<th><img src="http://netwelding.com/Side_Skirts.pdf" alt="Side Skirts" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>How to install side skirts with jacking information for DIY’s without lifts</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>C7 Carbon Fiber Splitter w/End Plates</strong></th>
<th><img src="http://netwelding.com/CF_Splitter.pdf" alt="Splitter" /></th>
</tr>
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<tbody>
<tr>
<td>How to install Splitter &amp; Nylon bra fit</td>
<td></td>
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</tbody>
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<tr>
<th><strong>C7 Removing GM Plastic Film</strong></th>
<th><img src="http://netwelding.com/Rocker_Panels_Film.pdf" alt="Rocker Panel Film" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>How To Remove The Rocker Panel Film</td>
<td></td>
</tr>
<tr>
<td><a href="http://netwelding.com/Rocker_Panels_Film.pdf">http://netwelding.com/Rocker_Panels_Film.pdf</a></td>
<td></td>
</tr>
</tbody>
</table>
GS/C7 Mirror Proximity Alarm
Limit switch alarm warns when passenger mirror is too close to door frame
http://netwelding.com/Mirror_Proximity_Alarm.pdf

Jacking Pads for GS/C7
Manual says Jacking Pads 2 1/2 inch max OD.. Have 1 inch, 2 inch pads semi-permanent pads.

GS/C7 Radar Power
For C7 tapped rear fuse panel. For GS tapped mirror

GS/C7 Belt Rattle
Passenger seat belt rattles against the seat back. The solution, add a shoulder belt pad.
http://netwelding.com/Eliminate_Rattle.pdf

Aluminum C7 Chassis and Weld Repair
The C7 has an all aluminum chassis, made from 117 welded pieces. Includes weld repair info.
http://netwelding.com/Aluminum_Chassis.pdf

GS/C7 Ceramic Brake Pads
The Z51 has very dusty brakes. These pads help!
http://netwelding.com/Ceramic_Pads.pdf

GS/C7 License Plate Frame;
Must Meet South Carolina Law
http://netwelding.com/License_Plate_Frame.pdf

Manage GS/C7 Spilled Gas & Door Lock
Protect the side of the Vette when filling up with gas. Includes info on preventing door lock failure.
http://netwelding.com/Manage_Spilled_Gas.pdf

GS/C7 License Plate & Cargo Lights
LED license plate light & cargo area bulbs are brighter and whiter
http://netwelding.com/License_Plate_Light.pdf

GS/C7 Rear Cargo Area
Rear cargo area needs storage device and rear protector
http://netwelding.com/Rear_Cargo_Area.pdf

GS Rear Diffuser (Fits Any C7)
Rear Carbon Flash Composite Diffuser
http://netwelding.com/Rear_Diffuser.pdf
<table>
<thead>
<tr>
<th><strong>GS/C7 Door Panel Protector</strong></th>
<th>![Image]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black plastic protector added to prevent scuffing of door when exiting</td>
<td><a href="http://netwelding.com/Door_Panel_Protector.pdf">Link</a></td>
</tr>
</tbody>
</table>

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<tr>
<th><strong>GS/C7 Improved Cup Holder</strong></th>
<th>![Image]</th>
</tr>
</thead>
<tbody>
<tr>
<td>A solution to the cup holder spilling under hard braking or shape turns.</td>
<td><a href="http://netwelding.com/Improved_cup_Holder.pdf">Link</a></td>
</tr>
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</table>

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<tr>
<th><strong>GS/C7 Wheel Chatter/Hop</strong></th>
<th>![Image]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Why sharp, low speed turns with cold tires causes the front tires to chatter/hop.</td>
<td><a href="http://netwelding.com/Wheel_Chatter.pdf">Link</a></td>
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<tr>
<th><strong>C7 Carbon Fiber Grille Bar</strong></th>
<th>![Image]</th>
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<tr>
<td>Install genuine carbon fiber grille bar overlay</td>
<td><a href="http://netwelding.com/CF_Grille_Bar.pdf">Link</a></td>
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<tr>
<th><strong>Jacking a GS/C7 Vette</strong></th>
<th>![Image]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safely jacking either front only or back &amp; front</td>
<td><a href="http://netwelding.com/Jacking_A_C7.pdf">Link</a></td>
</tr>
</tbody>
</table>

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<tr>
<th><strong>Deer Whistle Installed on GS/C7</strong></th>
<th>![Image]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do they work? Plus Install Info</td>
<td><a href="http://netwelding.com/Deer_Whistle.pdf">Link</a></td>
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<tr>
<th><strong>Replacing C7 Battery</strong></th>
<th>![Image]</th>
</tr>
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<tbody>
<tr>
<td>After using a GM type charger and showing fully charged a voltage low, replaced battery with AGM!</td>
<td><a href="http://netwelding.com/Battery_Issues.pdf">Link</a></td>
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<tr>
<th><strong>GS/C7 Window Valet</strong></th>
<th>![Image]</th>
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<tr>
<td>Lower Windows with FOB</td>
<td><a href="http://netwelding.com/Hatch_Latch.pdf">Link</a></td>
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<tr>
<th><strong>GS/C7 Splash Guards</strong></th>
<th>![Image]</th>
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<tbody>
<tr>
<td>GM offers splash guards for the C7 Corvette. An easy DIY installation. ACS Best Front Guards for GS.</td>
<td><a href="http://netwelding.com/Splash_Guard.pdf">Link</a></td>
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<tr>
<th><strong>GS/C7 Blind Spot Mirror</strong></th>
<th>![Image]</th>
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<tbody>
<tr>
<td>Smaller rear and side windows cause C7 blind spots. Small &quot;blind spot mirrors&quot; help</td>
<td><a href="http://netwelding.com/Blind_Spot.pdf">Link</a></td>
</tr>
<tr>
<td>GS/C7 Skid Pad Protector</td>
<td>After the air dam, the aluminum &quot;skid pad&quot; hits driveway ramps etc. Plastic protector helps. <a href="http://netwelding.com/Skid_Pad_Protector.pdf">http://netwelding.com/Skid_Pad_Protector.pdf</a></td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>GS/C7 Wheel Locks</td>
<td>Wheel locks, torqued to required 100 ft-lbs, help protect your expensive wheels from theft. <a href="http://netwelding.com/Wheel_Locks.pdf">http://netwelding.com/Wheel_Locks.pdf</a></td>
</tr>
<tr>
<td>GS/C7 OnStar Lights</td>
<td>The OnStar LED's in the rear view mirror, at a quick glance, look like a police car flashing light! This is a fix. <a href="http://netwelding.com/OnStar_Lights.pdf">http://netwelding.com/OnStar_Lights.pdf</a></td>
</tr>
<tr>
<td>GS/C7 Catch Can &amp; Clean Oil Separator</td>
<td>Direct inject engines like the LT1, are particularly subject to &quot;coking.&quot; What is Coking and how to reduce the potential? <a href="http://netwelding.com/Catch_Can.pdf">http://netwelding.com/Catch_Can.pdf</a></td>
</tr>
<tr>
<td>GS/C7 Stingray Sill Plate</td>
<td>Stingray sill plate replaces original. <a href="http://netwelding.com/Sill_Plate.pdf">http://netwelding.com/Sill_Plate.pdf</a></td>
</tr>
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</table>
| **GS/C7 Cold Air Intake**  
*Low Restriction Air Filter & Duct*  
[http://netwelding.com/Cold_Air_Intake.pdf](http://netwelding.com/Cold_Air_Intake.pdf) |
| **Garmin GPS for GS Cubby**  
*Garmin Mounts in GS Cubby & Apple CARPLAY*  
[http://netwelding.com/GPS_In_Cubby.pdf](http://netwelding.com/GPS_In_Cubby.pdf) |
| **GS Splitter Stage 3 Winglet**  
*Stage 3 Winglets Integrate with Spats*  
[http://netwelding.com/Stage_3_Winglets.pdf](http://netwelding.com/Stage_3_Winglets.pdf) |
| **GS 2LT to 2.5 LT**  
*Red Upper Dash Pad Like 3LT*  
| **Jake Emblem/Decals for GS**  
*Jake Symbols Support GS Racing Image*  
| **GS Splitter Protector**  
*Scrape Armor Protection for Splitter*  
| **GS Engine Compartment Mods**  
*Cosmetic Additions in Engine Compartment*  
| **GS Vitesse Throttle Controller: Fits All C7s**  
*Adjustable Throttle-by-Wire Control*  
| **Boomy Bass Solution**  
*Use Presets to Adjust Bass etc Tone/Balance*  
[http://netwelding.com/Boomy_Bass](http://netwelding.com/Boomy_Bass) |
| **GS Air Dam, Functions**  
*Why Missing from Z51, Some GS & Z06*  
[http://netwelding.com/Air_Dam.pdf](http://netwelding.com/Air_Dam.pdf) |
| **Engineering a ProStreet Rod**  
*How Our '34 ProStreet Rod Was Designed and Built*  
[http://netwelding.com/Engineering%20Street%20Road%203-08.pdf](http://netwelding.com/Engineering%20Street%20Road%203-08.pdf) |
| **Motorsports Welding Article**  
*Wrote a 5 Page Article for AWS March 2018 Journal Covers NHRA and NASCAR Chassis Design*  