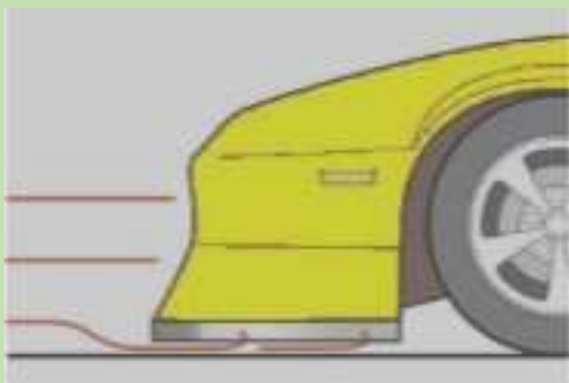


AIR DAM FUNCTIONS

And Why Some C7 Models Are Missing the Center Section



An air dam basically performs two different functions. It can reduce air drag and minimize the inherent lift caused by the airplane wing shape of most cars.

AIR DRAG:

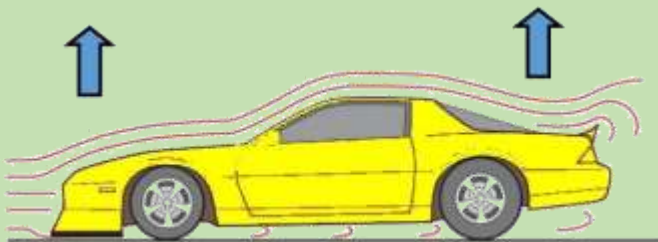
Unlike the air moving over the smooth shape of the top and sides of the body, the air that travels under the car encounters obstacles. These include front and rear suspension, engine parts, rotating wheels and brakes, mufflers etc.

That causes turbulence and increased drag. At highway speeds, on a flat road air drag uses over half the engine power to overcome air resistance. The faster the car is moving the greater the power required. It's proportional to the speed squared.

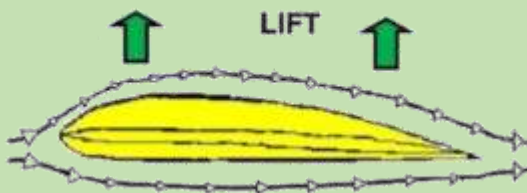
An air dam redirects some of the air going under the car to the sides, reducing the amount of turbulent air that causes increased drag. This reduces the power required at higher road speeds such as on an Interstate and increases mpg.

LIFT:

Cars have a shape like an airplane wing. And just like a wing it causes a lift force on the car. Bernoulli in the 1700s defined why lift occurs and a way to quantify the magnitude. The basic cause is the air going over the top of the car must travel farther, therefore faster to join with the slower speed air going under. When the speed increases, the air pressure must decrease. This can be proved using the principle of the conservation of momentum. You can google or just accept that airplanes fly!



An air dam while reducing the amount of air going under the car also causes it to reduce in pressure. That pressure reduces the pressure differential under and over the car, reducing lift or possibly creating downforce.



Benefits of Air Dams

HISTORY WITH LIFT: My 260Z was known to have considerable lift. 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.



My Combo Front Air Dam/Spoiler;
3 Piece Rear Spoiler (Fiberglassed to
Body); Similar Wheels / No Chrome



Text From May 1974 C&D: Crisis Fighter Z-Car
by Don Sherman

- Combo medium air dam/spoiler (*Spook*) gave 115 lb DF @ 70 (*smaller than what I added*)
- Longer straight air dam gave 85 lb downforce (DF) & 0.8 better mpg (twice mpg gain of *Spook*)
- Fiberglass angled rear spoiler added 75 lb DF @70
- At 100 mph, combo longer air dam/spoiler and rear angled spoiler, *similar to what I added*, provided 400 lb combined DF and 6 mph increase in max speed
- Note: *Pics not my car but is what I added. When I cracked and removed air dam car did not feel stable @ 100 mph! When reinstalled, it was very stable @ 120 mph max speed.*

AIR DAM DECREASES DRAG: Perhaps the best example is the Chevy Volt! Quoting GM: *“With the Air Dam the Chevy Volt has one of the lowest front end ground clearances of any production automobile – as low as some Corvettes and other sports cars. ... the main purpose for the Volt is to decrease drag while at highway speeds, thus increasing your overall battery range.”*

The GM Chief Aerodynamicist, John Bednarchik, in an article about the C7 aerodynamics published October 2, 2013 in Super Chevy magazine (about the time I got my September 2013 built Z51,) entitled *“2014 Corvette C7 Stingray-Like A Knife,”* stated, *“While shapes for improving fuel efficiency typically begin to have an effect at highway speeds, lift and drag components become critical from 150 mph to max velocity.*

I’ll come back to that word *“critical,”* which he used!

Does the C7 get 0.2 mpg or more with the full 3 pieces air dam? There is no viable data.



Chevy Volt Has a Low Air Dam to Extend Mileage When Highway Driving

The Internet is replete with folks running tests showing air dams providing 2 mpg and more increase! However, although some are long mileage tests they are always suspect due to variables that are difficult to control.

WHY SOME C7 MODELS DON'T HAVE A CENTER AIR DAM: Since my C6 Z51 had a center air dam and I knew my 2014 C7 would not, as I ordered it many months before the first production, I was curious as to why! I followed all C7 comments on forums and articles from when the C7 was announced!

The article quoted above, published on October 2, 2013 gave the key clue. Bednarchik said his task as aerodynamic engineer for the C7 was, *"To make it look good and still function—we gave them what was needed. Doing so required not only developing an aero-optimized grille and air dam, but also **a removable center section for the Z51 performance option, to provide better stability at high rates of speed.**"*

Note he states the Z51 needed to have the center air dam removed for better stability but did not give any details of what that was! Still left the details of the question.



WAS THE REASON COOLING? Some quote a GM marketing exec, saying the reason was to allow more air to reach the rear brakes. However, I searched forum comments and found this statement from that same marketing exec. A forum member posted on May 23, 2013 when he asked him at Sebring, quoting, *"He further explained that this was due to the different way the Z51 package diverts the air,"* The poster indicated he was puzzled with the answer! **Like Bednarchik he left the details unanswered!**



THE REAL REASON, IMO, COMES OUT!

On June 17, 2014 Corvette Forum member ZL-1 posted: *"At the Bash in April, Tadge said the aerodynamics is changed by the Z51's rear spoiler so the center air dam is deleted to balance the lift characteristics."*

This supports what Bednarchik was quoted as saying in the October 2, 2013 published article!

That statement was reinforced by Tadge Juechter's comments in 2015 about the Z06. He stated in a video **the center air dam was not used because it increased downforce excessively and resulted in Oversteer at high speeds when they require Understeer!**

The real reason comes out -it's safety related! They no doubt did not want to give Ralph Nader info for another book! **Note, the C7 could never have the Corvair Oversteer issues!**



CORVAIR: 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!

Oversteer is actually fun, *IF* it’s anticipated and you learn to correct excessive speed going into a corner by quickly turning into the expected direction of the rear end sliding off the road, toward the center of the turn. That is NOT a natural reaction. In an understeering car, when going to fast in a turn the front will “plow” or not fully respond to your steering input. The natural tendency is to turn the wheel more toward the center of the road. If the tires gain some traction the car can go back on the road.

However if you steer toward the center of the road with an oversteering car there is no time to correct that move. The car will just rotate quickly off the road and may, in fact spin! GM tried to partially correct the oversteering by recommending 16 psi in the front tires to reduce front grip. Few understood the reason or followed the recommendation. All was fine until they went into a turn too fast or had to make an evasive maneuver!

	CD Drag, Cdx	Lift Coefficient
C7 base	0.30	0.20
Z51	0.35	0.03
Z06 Base2	~0.35	~0.03
Z06 Stage 2	0.40	-0.152
Z06 Stage 3	0.50	-0.279
ZR1	??	??

Note the base C7 still has lift (a positive 0.20 coefficient,) the Z51 still has no downforce, the Stage 2 some downforce with the Stage 3 aero package needed to have downforce somewhat more that the base C7 lift!

In a 2016 in a forum post, Tadge provided the drag and lift information left. 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.”*

Final support for the major reason for removal of the center air dam on some models being to promote high speed understeer and NOT cooling whatever is a GM 2017 Bulletin for dealers showing which models did not have a center air dam. All Z51’s and only those Grand Sport and Z06 models right.

Note, if cooling was a significant issue they would not have a center air dam on the base Grand Sport and Z06!

Grand Sport	2017/2018	Center Air Dam
No CFV/Z Option	SPLITTER	
	Small	Yes
With CFVZ	Large	No
With Z07	Large	No
MY18 Carbon Edition Z06	Large	No
MY18 Carbon Edition Z06 & Z07	Large	No
Z06	SPLITTER	Center Air Dam
No CFV/Z Option	Small	Yes
With CFVZ	Large	No
With Z07	Large	No
MY18 Carbon Edition Z06	Large	No
MY18 Carbon Edition Z06 & Z07	Large	No



A Dodge Colt Turbo was my first 7 speed standard trans! A 4 speed with a twin stick overdrive. 8 gears, 7 separate ratios.

Sold it and bought my 1st Vette, a 1988. It had a Doug Nash 7 speed. 4 Speed with overdrive in 2nd, 3rd and 4th. Split shift for 7 gears!

However, with the extra power in a ~2200 pound front drive car, it did understeer! The NASCAR word “plowing” sure fit this model, my first front drive car! 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!

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 rotates around!



UNDERSTEER:

Had a front wheel drive Dodge Colt Turbo in the 1980’s when we were only allowed to get gas every other day! My V8 CJ5 could not get from CT where I was living to LaGuardia airport and back on one tank of gas! Recall staying out-of-town several times so I could fill-up to be able to get home! Bought a Dodge Colt Turbo! It was a great fun car once I did a “plus one” and bought 14 inch aluminum wheels and Pirelli P7s!

As it was called by the car mags, it was a “Pocket Rocket!”



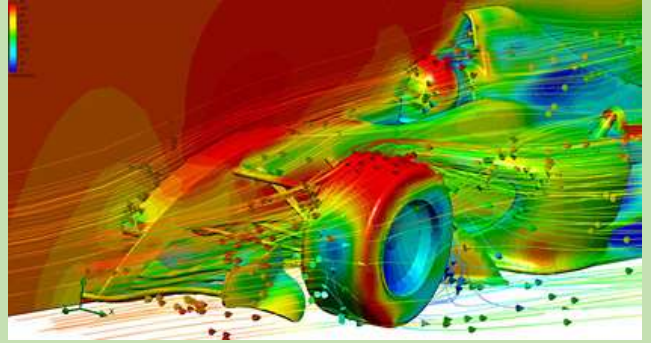
Living in Western CT we had a lot of ice in the winter. Bought European Gilslaved winter snow tires that had what they called a “Hydroponic” compound. They had better traction on ice for a few digress under freezing. Mounted them on the original 13 inch wheels.

They were great but going downhill still had to be careful so often used the emergency brake with the button held in! That was also a fun technique when making a turn on snow. Just a quick application of the rear brakes and the understeering car quickly oversteered!

In front drive sedan racing the locking button is removed and the hand brake used when turning!

COMPUTATIONAL AERODYNAMICS: Then why do some GS and Z06 models have center air dams! Only GM knows for sure. Tadge said in his forum post about C7 aerodynamics, computer programs can give answers very close to the much more expensive wind tunnel tests!

They no doubt have the answers. Perhaps the smaller “poverty” splitter and short side skirts allow the extra downforce generated by the center air dam. My Stage 2 aero package has a larger splitter and full length side skirts and it does not have a center air dam.



The video link left:

<https://www.youtube.com/watch?v=7hVMwKJQ0wE>

presents video of clips of the Sauber F1 team using their expensive wind tunnel for a full week. Note, their wind tunnel employs a moving steel floor!

The video states the teams were operating their wind tunnels 24/7 then as a cost reduction, limited by the rules 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.

Summary: Why No Center Air Dam on Some C7 Models:

- Bednarchik in October 2013 said it's for high speed stability.
- A GM Engineer mentioned “rear brake cooling”- that was “Marketing Speak.” **
- Tadge at the April 2014 Bash said the center air dam on the Z51 is deleted to balance the lift characteristics.
- Tadge in a 2015 Z06 intro video said it was not used because it was causing high speed oversteer and they require some understeer.
- Tadge in a 2016 forum post said they carefully control “pitch moment” to provide neutral handling biased to understeer.
- In a 2017 GM Bulletin it was shown the base models of even the Grand Sport and Z06 now have center air dams, minimizing the reason being extra cooling.

** GM uses “Marketing Speak,” of “No Pedal Room, etc” to explain why no standard shift C8. I postulate the real reason in a PDF with proof of the real reason, if interested: http://netwelding.com/C8_FWD_Hybrid.pdf

THIRD FUNCTION OF AIR DAM:

NOTE: Side Air Dams direct air around the front tires, reducing drag *WITHOUT* increasing downforce. So unlike the center Air Dam that reduces drag and at high speeds increases Downforce, the Side Air Dams just reduce drag.

The air dam also performs another function, they act as a “Curb Feeler!”



I Leave the Side Air Dams as Curb Feelers



The C6 & C7 has a device GM calls a “Radiator Support” it also performs as “Skid Pad.” The top pic is of a bare C7 frame. This part is square aluminum tubing and is significantly lower than the frame.

The lower pic is the GM part that needs to be replaced if it gets damaged. It wholesales for about ~\$200 and installation is not cheap!

A similar part was used in the C6 Corvette. I hit it several times!

Even if careful, it’s not hard to hit the skid pads. I used the side air dams on my 2014 Z51 and now Grand Sport as “curb feelers.” There are several driveways I enter where I can hear the plastic air dams scrape on the pavement, so I drive in slowly. But several times someone was traveling way over the speed limit and I was forced to accelerate to avoid the risk of a collision! Hit the skid pads! Fortunately it was just scraped!



That horrible sound of aluminum scraping on pavement makes the rubber air dam scraping noise sound like music!



There is a product called FANGS available at: www.saccitycorvette.com/C7Fangs.html

It is a hard rugged plastic that fits over the bottom of the aluminum skid pad. It is easily installed with a very strong glue supplied with the kit. Plastic ties are used to attach and hold it in place until the glue sets, then they are removed.


Installed on my 2014 and scraped several times but no horrible noise of aluminum on pavement and no harm it slides over the pavement! Pic is the install on my GS.

“50” C8, 2017 Grand Sport & 2014 Stingray Mods, Info Available As PDFs:



50 PDFs discuss improvements or info about a C8, 2017 Grand Sport, 2014 Stingray function and/or esthetics. Some are minor and others, like the installing the Rear Diffuser & MGW shifter, include detailed install 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 GUtrachi@aol.com and state the title desired, shown in Yellow:

C8 Install High Wing <i>How To Remove Rear Bumper- Install Wing</i> http://netwelding.com/C8_High_Wing.pdf	
C8 FWD Hybrid <i>WFWD Hybrid Provides More Power & MPG</i> http://netwelding.com/C8_FWD_Hybrid.pdf	
Rusty GS/C7 Muffler <i>Why the C7 muffler rusts way to turn matte black.</i> http://netwelding.com/Muffler_Rust.pdf	
Change GS/C7 Oil <i>WHY change your own oil and C7 Lifting Methods</i> http://netwelding.com/Changing_Oil.pdf	
C7 Carbon Fiber Side Skirts <i>How to install C7 side skirts with jacking info</i> http://netwelding.com/Side_Skirts.pdf	
C7 Carbon Fiber Splitter w/End Plates <i>How to install Splitter & Nylon bra fit</i> http://netwelding.com/CF_Splitter.pdf	
C7 Removing GM Plastic Film <i>How To Remove The Rocker Panel Film</i> http://netwelding.com/Rocker_Panel_Film.pdf	
C8/GS/C7 Mirror Proximity Alarm <i>Limit switch alarm warns when close to door frame</i> http://netwelding.com/Mirror_Proximity_Alarm.pdf	

Jacking Pads for GS/C7

Manual says Jacking Pads 2 1/2 inch max OD..
http://netwelding.com/Jacking_pads.pdf



GS/C7 Radar Power

For C7 tapped rear fuse panel. For GS tapped mirror
http://netwelding.com/Radar_Detector_Power.pdf



GS/C7 Belt Rattle

Passenger seat belt rattles against the seat back.
http://netwelding.com/Eliminate_Rattle.pdf



Aluminum C7 Chassis and Weld Repair

The C7 aluminum chassis. 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 when filling gas. Preventing door lock failure.
http://netwelding.com/Manage_Spilled_Gas.pdf



GS/C7 License Plate & Cargo Lights

LED license plate light & cargo area bulbs
http://netwelding.com/License_Plate_Light.pdf



GS/C7 Rear Cargo Area

Rear cargo area 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



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



GS/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



C7 Carbon Fiber Grille Bar

Install genuine carbon fiber grille bar overlay
http://netwelding.com/CF_Grille_Bar.pdf



Jacking a C8/GS/C7 Vette

Safely jacking either front only or back & front

http://netwelding.com/Jacking_A_C7.pdf



Deer Whistle Installed on GS/C7

Do they work? Plus Install Info

http://netwelding.com/Deer_Whistle.pdf



Replacing C7 Battery

Tricks for installing battery!

http://netwelding.com/Battery_Issues.pdf



GS/C7 Window Valet

Lower Windows With FOB Helps Latch Hatch

http://netwelding.com/Hatch_Latch.pdf



C8/GS/C7 Splash Guards

GM splash guards. ACS Best Front Guards for GS.

http://netwelding.com/Splash_Guard.pdf



GS/C7 Blind Spot Mirror

Smaller rear and side windows cause C7 blind spots. Small "blind spot mirrors" help

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 Wheel Locks

Wheel locks, help protect your expensive wheels.

http://netwelding.com/Wheel_Locks.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 with suggestions on jacking a C7.

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



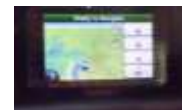
GS/C7 Cold Air Intake
Low Restriction Air Filter & Duct
http://netwelding.com/Cold_Air_Intake.pdf



GS/C7 Soler Modified Throttle Body
For Improved Throttle Response
http://netwelding.com/Soler_Mod_TB.pdf



Garmin GPS for GS Cubby
Garmin Mounts in GS Cubby & Apple CARPLAY
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



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_Embblems.pdf



GS Splitter Protector
Scrape Armor Protection for Splitter
http://netwelding.com/Splitter_Protectors.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



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 a 5 Page Article for AWS March 2018 Journal
Covers NHRA and NASCAR Chassis Design*
http://netwelding.com/Motorsports_Welding_2018.pdf

