

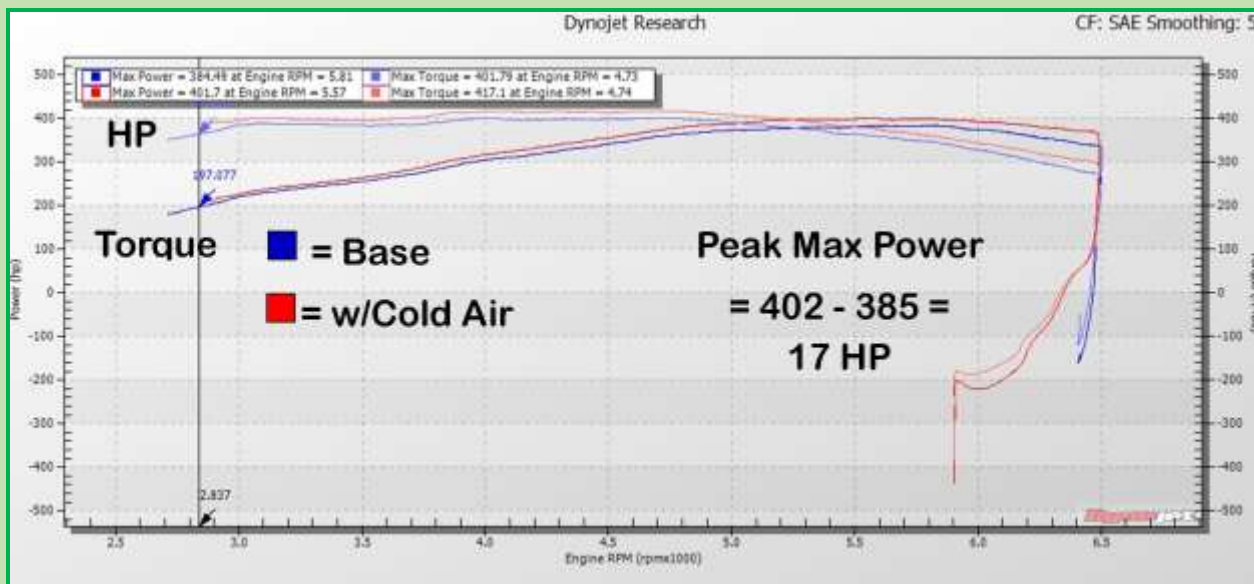
Cold Air Intake Low Restriction Filter & Duct for Z51 & Grand Sport More Power & “Sucking” Sound!



There is a debate on just how much a reduced restriction air intake system can increase hp in a C7. The manufacturers of these devices often quote higher power increases than some others report. Lots of reasons, one being statistically it's hard to have the same conditions even to get repeat dyno runs with no changes. Therefore it takes an average. Do the manufactures use the best data they develop? *No Doubt!*

We installed an *aFe* (*advanced Flow engineering*) system model Pro 5R (pt. # 54-74201) in our 2014 Z51 and removed it when we sold the car. It was reinstalled in our 2017 New Grand Sport. This PDF covers both installations.

It uses a multilayer oiled cloth filter. The C7 already gets cold air intake from outside the inner right fender and between the inner fender. The *aFe* filter is less restrictive as is their air duct, with smoother bends than the OEM. It had more induction noise for the ~3 years we had it installed on our 2014 C7!



Test Data: Corvette on Line reported this test data of a C7 with a Cold Air Intake *aFe* system installed. It shows a gain of 17 hp (see above published graph.) Check out the install and dyno info at: <http://www.corvetteonline.com/tech-stories/afe-cold-air-intake-gets-installed-and-tested-in-the-2014-stingray/>

Note they found an increase over a wide rpm range. What will we obtain other than more sucking sound? Don't know and doubt if we'll feel it!

Why Wouldn't GM Just Use a Lower Restriction Intake System?

This is question often asked and fortunately Tadge Juechter, the Corvette Chief Engineer in response to a forum question answered, This is a summary of what he said, quoting the key points:

"Aside from the exhaust, there is no greater noise source on a performance vehicle. Induction systems generally have many tuning elements that ensure the quality of the sound emanating from it are pleasing and harmonious with the exhaust note. These tuning elements also dampen the sound energy to help with pass-by requirements. Aftermarket companies don't have to worry about it, but as the OEM, we must guarantee that our products are quiet enough to be driven at full throttle by a microphone by the side of the road and meet certain decibel levels. There are pass-by laws in many states and pretty universal around the world.

Another important element in the induction system is the mass air flow sensor or MAF. Engines can only run at their optimal efficiency if they have very precise data on the amount of air flowing into them. Although most people think of air flow into an engine as fairly continuous, it really is not. The opening and closing of valves and reciprocating nature of internal combustion engines means the air flow is really a series of pulses which make measuring the exact flow challenging. Intake engineers spend a lot of time optimizing the system to get excellent signal quality out of the MAF. In addition to efficiency, or fuel economy, the precise metering of air and fuel is directly correlated with tail pipe emissions, an area of extreme scrutiny by government agencies for we manufacturers.

The air filter itself is the focus of many discussions on low restriction. Its job is to keep foreign material out of the engine. Here again, there are many trade-off decisions balancing restriction with filter life (service interval) and filtration quality. Sacrificing either of the latter two improve the former. We tend to be conservative to make sure that our engines are very durable, so that does open up an opportunity for aftermarket system.

As with many of the questions on this forum, all vehicle design is a balance of trade-offs. We do what is legal and right for the vast majority of customers. Aftermarket companies offer products that strike a different balance that might appeal to some folks."

Bottom Line

The aftermarket folks don't worry about things like max noise to meet state and federal noise requirements. They can use filters that optimize performance and not worry about the engine life for some cars that operate in dusty environments.

In fact, the increased sucking sound is a key reason I installed the aFe low restriction system. The sucking sound in my 8.2 Liter ProStreet Rod with a 14 inch OD x 5 inch high oiled cotton K&N makes as much noise at WOT as it's long tube headers and dual straight through Borla mufflers with 3 inch ID pipes!

Love the Street Rod "sucking sound" as I did with the aFe in my 2014 C7.

***NOTE:* When I sold the 2014 Z51, removed the aFe intake and installed it on my Grand Sport. Just needed a plug for a barb not used on the GS. Got from aFe. Same great results.**

Photo Sequence

First the Install in the 2017 Grand Sport, Then The Original Install in The 2014 C7

One way the *aFe* low restriction Intake gets more power is by using a larger air filter. The filter on the right is the OEM GM paper filter that comes with the Grand Sport. You can see the oiled cotton *aFe* filter (left) is not only made from a lower restriction material, it is significantly larger with more area.

To hold the larger filter, the filter housing and air tube are redesigned.

The oiled cotton *aFe* Vette filter will flow 318 CFM versus the OEM GM paper filter for the same pressure difference, 1.5 inches of water, flows only 224 CFM. *aFe* also sells a paper filter but it has a somewhat higher restriction. Some info showed the *aFe* paper filters flowed about 10% less than the oiled cotton, or in this case ~285 CFM.



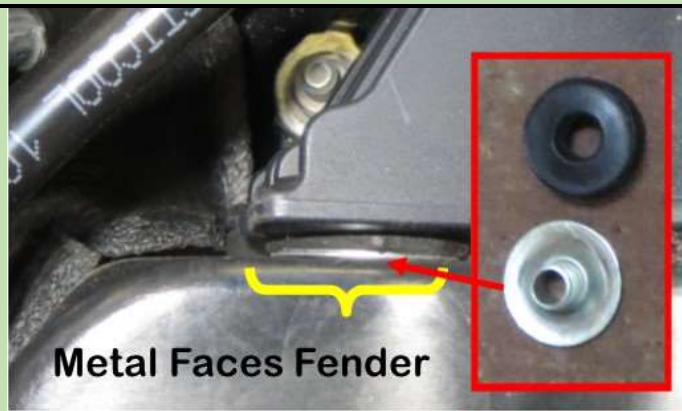
A Helmholtz Resonator in the intake tube forces air coming back out of the engine to slow down to fill the cavity, thus expending a great deal of its energy.. **Since these pressure waves are essentially sound, giving them a place to expend their energy before exiting the air filter box ends up dampening the intake noise and quieting the engine.**

The smaller resonator on the smother *aFe* tube provides less noise abatement!

The OEM intake tube has two sets of bellows that add to flow restriction, the *aFe* has smooth bends and only a one rib bellow.

First step of the install is to remove the radiator hood vent. Easy to do, just four 7 mm screws and it's out of the way.





View of the OEM filter housing attachment. As with the C7 install this is one step that can be missed. Note the metal part of this fitting is facing the fender. When the *aFe* filter housing is installed, the metal part faces the engine and rubber touches the fender.

A trick to installing these two fittings is to separate the two parts, install the rubber than insert the metal part after.

Where the 2014 C7 had two hose lines going onto the small Helmholtz Resonator in the 2014 C7 only one is needed for the Grand Sport. *aFe* has a threaded plug to replace the hose barb. It is there part number 03-50410. The line coming from the dry sump that goes to the hose barb, fit best by using the rear most hose barb so plugged the front one.

There is a white tab that when pressed releases the hose fitting.



The Following is The Detailed Install Procedure of The *aFe* Pro 5R on My 2014 C7 Z51.

I hesitate suggesting you look at this 4 minute video made by *aFe* since there is no way it is an easy an install as this technician makes it look! But worth your time to see the steps. Just remember it will take longer and there are some very tight fits!

I'll also cover some of the not so obvious issues not covered in the video or these instructions.



Well Packaged.

The product is very well packed. Mine came in a brown overpack and this is a pic of the inside box packed by *aFe*. All items are carefully bagged or covered in plastic. Very well done with lots of brown paper packing to prevent damage.





This is what is in the box. Everything is very well made and rugged. The oiled filter comes in a separate box with instructions on how to clean and re-oil. Note, a low restriction non oiled filter is also available. It doesn't have as high an airflow as the oiled cotton but some folks don't want to deal with the mess of cleaning and very carefully oiling the filter.

I have used K&N filters for a number of cars and their cleaning and oiling procedure is similar. It's critical you don't put excess oil on the filter or it could affect the MAF. You use very little in the spots suggested and let it spread and soak in. I let it sit for hours spreading uniformly on the cotton. You can tell by the color. I also don't put a lot of miles on the Vette so expect it will be a few years before I bother to buy the aFe cleaning and oil products to clean and reoil.



You'll need a 3/8 ratchet wrench, 7 mm, 10 mm and 7/16 inch sockets. A 7 mm and 10 mm deep socket are also useful. Several extensions and a 10 mm open end wrench are also a help. A small Phillips screw driver is needed to remove the OEM MAF.

The Optional Tools I used include a hand ratchet, very long and very short extension as well as my Dremel Tool. The text mentions where they were used.



First thing to remove is the duct that takes air from 1/3 of the radiator and ducts it out the hood vent. This is straight forward, you'll need a 7 mm socket and a ratchet. You can use a long extension to remove the two center bolts and the one on the driver's side. But a short one or hand ratchet is needed for the passenger side. **There is a bolt in the center but it is not holding the air duct, so don't remove.**

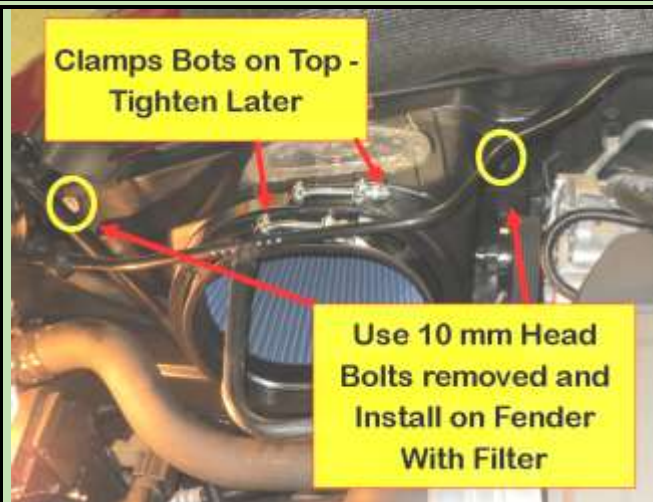
I found a small hand ratchet useful in a number of areas, if you have one.

Next disconnect the Mass Air Flow sensor. (MAF.) *That is all the instructions say!* There is a red protector covering the detent button. It just needs to be pulled in a direction away from the duct, don't have to remove it - which I did. Then with it pulled back depress the black tab below it that will release the plug connection. Just pull the plug straight out and tuck away so it's not getting tangled for the next steps.



Next remove the line that brings filtered air into the crankcase so it can come out with the PCV purge system. There are a number of these hose clamps used on the C7. There is a white tab that can be seen in this view. Press in and pull up the hose connector. This plastic tab springs back so it grabs onto a hose barb.

Next remove the hose that takes "burped air" from the dry sump tank and puts it back into the engine intake. I have an Elite Clean Side Separator that just uses a plane hose end. *In a dry sump, to get all the oil out of the pan a lot of air comes with the oil. The air with some oil mist will separate in the baffles in the dry sump tank and has to be disposed of without contaminating the environment. This way any residual oil mist is burned in the combustion chamber.*



Note: pic is the new filter box after install. Now loosen all clamps on the OEM duct and remove it. Then (as shown here on the new filter housing) remove two 10 mm bolts that hold the air cleaner and its case to the passenger fender. To remove it, there is a plastic line for the radiator overflow going over it, which must be raised. I also removed that line from a clip on the left so it was easier to raise. You'll have to tilt the air cleaner assembly several ways to get it out.

There are three grommets that must be removed from the OEM air filter housing and put on the new filter box. Note there is an opening on the outer edge so the grommets just slip out. Well they don't just slip out it takes quite a bit of force! I put an awl through the grommet and pulled with two hands. A large screwdriver helped extract the rubber grommet, lower left in pic. Note a forum poster said his slipped out easily.

See the *aFe* instructions and note from the picture, the metal grommets install in new housing backward from this OEM position!



The instructions say simply transfer grommets to new housing. Even a phone call to *aFe* to assure the proper install, was only a help defining exactly which way they go, **the opposite of the OEM!** The suggested, "Use WD-40 and press hard" did not work! Found a trick, which was to first remove the metal section from the rubber using a flat blade screwdriver. Then insert the rubber from the fender side of the box. Then insert the metal part back into the rubber thru the large hole from the engine side of the box. *Easy!*



Installed the Mass Air Flow sensor into the new duct. Where GM used sheet metal screws in plastic, *aFe* uses molded in metal threaded inserts and they provide the matching screws. Very well done.

Then installed the aluminum hose barbs that were supplied. Again these screw into metal nutserts molded in the plastic. Use their supplied 3M Threadlocker

Optional Install of *aFe* Duct from Filter to Throttle Body. Remove Clamps Red Arrows and Install After



Next was the most difficult task I found, installing the *aFe* air duct from Filter to Throttle Body. The instructions state and the video shows to install with clamps in place but not tightened. Could not get the filter side into the filter and the silicone rubber coupling was difficult to get onto the throttle body with the clamp in place.

With the clamp removed, the throttle body silicone coupling was easy to install. With the silicon coupling in place over the throttle body inlet it was easy to fully remove the nut from the clamp, spread it over the installed coupling and reinstall the nut.

Optional Install Put Clamps On Last, Needed More Threads Cut 1/4 " Shorter



The filter side T-Bolt Clamp could not be reassembled with all the force I could muster with one hand! I could see the rod end tip but needed another $\sim 1/4$ inch to get the rod thru to install the nut! Perhaps if I used two hands and had a helper put on the nut it would have worked. So cut off $1/4$ inch from the receiving end with my Dremel Tool and reinstalled the cap. Also used pliers to slightly bend the rod attachment side stainless to get more length. Worked fine! The filter went in easy and the clamp was installed.

That short treaded clamp rod is probably why I could not get the duct into the filter when the clamp was preinstalled. Considering the very well-engineered kit, perhaps my clamp was just slightly out of spec.

Note: Although the T-Bolt clamps hold better that a screw clamp that can be a bit of a pain to get started. On the throttle body clamp, that I installed last on the Grand Sport, it was not easy to get the threaded bolt through enough to get the nut started. In that case, coated the surface with some liquid soap and it slipped enough to get a few threads started!

The large clamp that secures the filter to the filter housing had the part that helps it slide when tightening, come loose. The two very small spot welds that can be seen on another T-Bolt Clamp in top right pic, broke.

Not a problem since I was able to use some double sided tape and secure the piece in the area where the clamp comes together on the filter housing. Worked fine, see it installed without the clamp in place in the bottom pic right. **Note, I requested and aFe sent a replacement clamp so when cleaning the filter I will replace it with the new one!**

Great Customer Service!



Next step is to install the MAF plug. Simple to do if you did not remove the red blocking clip, as I did! Just push the plug into the MAF socket you installed and then push-in the red blocking clip. The red clip just prevents access to the black tab below that secures the plug in the socket.

If you did remove the red clip, then just put it back.



Next install the crankcase air intake hose on the hose barb (right hose in pic.) I have an Elite Clean Air Separator hose coming from the dry sump tank that just uses the open end of the hose slipped over the barb. So installed it with a constant tension hose clamp. Left in pic.

Tightened all clamps-- *almost finished.*

There is a tight clearance between the air intake duct and the bottom radiator hose. There was a recess placed in the area by aFe. Was concerned if it might rub so put some silicon grease in the area! Was not needed as with all parts aligned and clamps tightened I was able to easily get a 1/8 inch wire in the gap. Good design.





Installation with all but the radiator to hood vent air duct in place. Looks neat and the clear access window lets you view the air filter to check to dirt! As they note in the instructions with the filter, if you can see any metal mesh it does not need cleaning. Like the K&N's I have used for years in other cars, you can wash with an *aFe* cleaner and water, let it air dry then very lightly oil by putting a small amount on a ridge and in the valley and letting it wick over the cotton filter material.

This is a pic of the finished installation with the OEM air duct from radiator to hood vent in place. It was installed with the four 7 mm screws that were removed.

Called *aFe* prior to purchasing and it was mentioned that it will take ~100 miles for the system to adapt to the lower flow restriction. However did test the sound, definitely louder at wide throttle openings! Like the 8.2 Liter, ZZ502 in my Street Rod, with its 5" high x 14" OD K&N makes as much noise at WOT as the exhaust with long tube headers, 3 inch pipes and straight thru Borla mufflers! The Vette is definitely louder on a 0 to 60 run or when past ~3000 rpm! No difference when cruising.



Was not sure how much clearance there was going to be between the *aFe* location for the clean air separator hose and the OEM air duct. Had thought if needed I could cut the original right angle hose end (like the one on crackcase the air inlet right) perhaps with a 6 inch long section of the plastic hose and silicone it into the ID of the hose and secure with a hose clamp.

Was not needed as you can see the clearance is the same as with the OEM connection. There is about 3 inches of hose above the fittings, which is enough for a gradual bend. Burped air and hopefully little oil vapor will enter the duct!

Can report the sound is great! At WOT you can defiantly hear the difference over the stock system. With several hundred miles, perforce is fine.

Of interest, there was no oil at all in the OEM duct, filter, and none on the throttle body.

I got my September 2013 built C7 in early October 2013, a year before the GM Bulletin recommending oil in dry sump cars be changed at 500 miles. Quoting the reason from their Service Bulletin: *"Some 2014/2015 Z51 and Z06 Corvettes may experience a condition that leads to oil leaking out from the air cleaner assembly. **This condition may be caused by running the engine continuously at a high engine speed** with the first factory fill oil, resulting in silicone sealants in the engine's gaskets degrading the oil's anti-foaming agents."*

Not having this info, I did not change my oil for 1500 miles.

Note it says the foaming issue *"may occur by running the engine continuously at a high speed."*

Overfilling, which GM did not mention in that Bulletin, (since IMO they did not want to blame dealers,) may be more of an issue with oil dripping from the air cleaner etc. Having the engine oil changed at 500 miles may help avoid the problem but not if the dealer overfills the car!

Although I did not change my oil for 1500 miles, I did check my oil level per the Owner's Manual after I brought my car home from the dealer ~150 miles away. It was just below the max level. I now keep it ½ quart low. Note per the manual, you cannot check the level after 10 minutes of shutting the car off.

Checked oil level the other day after the car had been sitting for a week while I was out of town. It was below the bottom of the full length of the dip stick, as expected! That is probably 6+ quarts low! Checked again within the 10 minute window when I returned from a trip to town and the level was right where I filled it 1000 miles ago, ½ quart low. Oil will drain back to the pan past the scavenge pump gears! Wonder how many mechanics' helpers doing oil changes know that?!



At the 2017 SEMA Show GM High Performance announced a low restriction air intake similar in appearance to the *aFe*. It's a similar appearing system to *aFe* with a plastic widow to check for filter dirt.

However it's not the large *aFe* filter and it uses a higher restriction paper filter.

They indicated it must be installed by a dealer BUT does not include tune! They show a power increase on an LT4 but none on an LT1. Perhaps the filter size or flow restriction characteristics is the reason.

“48” 2017 Grand Sport & 2014 Stingray PDF's Available:



48 PDFs discuss improvements or information about a 2017 Grand Sport and 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 (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.

Rusty GS/C7 Muffler

*Why the C7 muffler is rusted and a simply way to make rust turn matte black.
Bottom pic rusted, top pic treated*

http://netwelding.com/Muffler_Rust.pdf



Change GS/C7 Oil

*WHY change your own oil and HOW to do it
Revised, includes C7 Lifting Methods*

http://netwelding.com/Changing_Oil.pdf



C7 Carbon Fiber Side Skirts

*How to install side skirts with jacking information for
DIY's without lifts*

http://netwelding.com/Side_Skirts.pdf



C7 Carbon Fiber Splitter w/End Plates

How to install Splitter & Nylon bra fit

http://netwelding.com/CF_Splitter.pdf



C7 Removing GM Plastic Film

How To Remove The Rocker Panel Film

http://netwelding.com/Rocker_Panel_Film.pdf



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.

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. 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](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](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



GS/C7 Door Panel Protector

Black plastic protector added to prevent scuffing of door when exiting

http://netwelding.com/Door_Panel_Protector.pdf



GS/C7 Improved Cup Holder

A solution to the cup holder spilling under hard braking or sharp turns.

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 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

After using a GM type charger and showing fully charged a voltage low, replaced battery with AGM!

http://netwelding.com/Battery_Issues.pdf



GS/C7 Window Valet

Lower Windows with FOB

Window Valet Helps 2014/2015 Latch Hatch

http://netwelding.com/Hatch_Latch.pdf



GS/C7 Splash Guards

GM offers splash guards for the C7 Corvette. An easy DIY installation. 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 driveway ramps etc. Plastic protector helps.

http://netwelding.com/Skid_Pad_Protector.pdf



GS/C7 Wheel Locks

Wheel locks, torqued to required 100 ft-lbs, help protect your expensive wheels from theft.

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

Direct inject engines are subject to "coking." 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 on Front and Grill. 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



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_Emblems.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 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

