

Carbon Flash Stage 3 Winglets for Grand Sport

A Splitter Increases Downforce and Looks Cool!



At the speeds I mostly travel, a Splitter is not doing much other than looking good!

Aerodynamics is complex; NASCAR, F-1, manufacturers etc., spend thousands of hours and millions of dollars in wind tunnels and computational aerodynamics computer time because it is not intuitive!

The front Splitter serves to increase the amount of downforce at the front of the car. Air flow is brought to stagnation above the Splitter causing an area of high pressure. Below, the front Splitter air is redirected away from this stagnation point and accelerates air under the

car, which in turn causes a low pressure area. High pressure over the Splitter and the low pressure caused by the airflow under the car create downforce.

SPLITTER END PLATES (also called Winglets): End Plates help trap more of the high pressure air on top of the Splitter giving more downforce at the front of the car. The End Plates help stop the high-pressure air on the top of the wing from being encouraged to roll over the end of the wing to the low-pressure air beneath, causing induced drag. They also change the shape of the vortices that occur at the end of the Splitter and help reduce drag caused by the turbulences that are generated by the front wheels.

For the Grand Sport the Stage 2 Aero package ordered has small end plates (pic right.) They are so small, wonder how effective they are? There are Stage 3 winglets available used to increase effectiveness.

A Z07 has the option of using the supplied smaller or larger End Plates so they, along with the adjustable wicker bill on the rear spoiler can be used to adjust the cars downforce balance at various tracks.



The Stage 3 Winglets also have a major function for me. It helps integrate the “spats” that the Grand Sport (and Z06) use to handle the wider front tires (285 versus 245 in the base and Z51.) Thought the “spats” looked like a cheap add-on! OK for my V8 powered 1974 Jeep Renegade! Could justify that approach for the rag top Jeep but for a Corvette?



Tadge Answered, “Why Spats?” His reason for “spats” versus making wider fenders in my mind made them “look better,” since I accept “*form follows function:*” This is his explanation:

“All Corvette exterior features and surface shapes are designed for maximum performance and great aesthetics. Around the front wheel openings, both the C6 (Z06, GS and ZR1) and C7 (GS and Z06) feature what you are calling spats arcing down the forward edge. These features create high pressure on the front/top and low pressure on the back/underside resulting in down force and evacuation of hot air from the wheel opening. The aerodynamic studies for both C6 and C7 independently proved their value. To work, they need to be a very specific shape - specifically a sharp break in the surface where the spat meets the fender. I have been asked many times why we couldn't just form that shape from the front fender so it would be all one painted piece instead of looking "tacked on". We looked at that and decided it looked pretty bad when painted bright colors. Your eye is immediately drawn to that feature and it does not look integrated or graceful. Naturally the question is, "If it is so important, why don't we see it on the C7.R race car?" The reason is that the race car sits so low to the ground it can take advantage of even more efficient aerodynamic features such as an "underwing" that sits beneath the front splitter.”

Invention of End Plates:

Of interest, airplanes use wing End Plates and are seen, especially on many newer passenger jets. The initial concept dates back to 1897, when English engineer Frederick Lanchester patented wing end-plates as a method for controlling wingtip vortices. In the United States, William Somerville patented the first functional winglets in 1910. Somerville installed the devices on his early biplane and monoplane designs.

Controlling the size of wing tip vortices with the addition of winglets, as they are also called, increased the 747-400's range by 3.5 percent over the 747-300, which is otherwise aerodynamically identical but has no winglets.



THE FOLLOWING IS A PICTURE REVIEW OF THE INSTALLATION OF STAGE 3 WINGLETS ON THE STAGE 2 AERO PACKAGE ON MY GRAND SPORT

Photo Sequence

Bought the Stage 3 Winglets from Corvette Mods for \$199 where the GM product lists for ~\$500. Why the difference? These are made from ABS plastic, painted carbon flash (same as my Aero option) versus carbon fiber for the OEM.

Wondered at first how they would perform then found this info about ABS:

ABS thermoplastic is widely used by automobile manufacturers as original equipment for trim, bumper covers, and some body panels. ABS plastic is more expensive and heavier than fiberglass and has a finish superior. It is a very easy surface to apply paint on. Of interest, LEGO blocks are made from ABS plastic because it is so durable!



The Stage 2 winglets are held in place with 6 mm visible bolts that are screwed into threads formed in the carbon flash painted, carbon fiber splitter.

Bought 30 mm long, 6 mm stainless bolts with a hex head so an open end wrench could be used to tighten them from the exposed underside of the Stage 3 winglets.



The flat plastic splitter bottom screws were removed to check clearance and since they will be replaced with "Splitter Guards" (more on those at the end!)

Little room inside the Stage 3 splitter for washers so an 1/8 inch thick aluminum plate helped support and attach the winglets to the splitter with lock washers. The winglets have two slots that just slip over the bolts. The parts are held in alignment with one hand while the bolts are tightened.

Three of the inner fender bolts are removed and hold the upper portion of the Stage 3 winglet in place.

There was no hardware supplied with the winglets but just as well since I planned to install snaps for a Nylon Bra I had for my 2014. Purchased 1 inch long #10 stainless male snaps from Harvard Marine (bottom of pic) and used two different size washers.



The 1 inch long snap screws (shown installed left) are needed to reach through the winglet supports held the winglet fine. The original screws were shorter as noted in the above pic (black screws with wahers.)

Should provide enough clearance to hold the Nylon Bra female snaps. Also bought some snap extensions that will provide the extra length required for the Bra to stretch around the spats/winglets.

The Stage 3 Winglets look fine and do integrate well with the spats. They in combination with the ASC Splash Guards, which are wider and deeper than those from GM all help make the spats look “good!”

Well perhaps you need to consider Tadge’s comment about the spats aerodynamic function to use the word “good!”

When asked why I added them, “*making the spats look better*” will be my answer!





Splitter Guard Washers

Was concerned about the vulnerability of the carbon flash, carbon fiber splitter as I was with the visible carbon fiber splitter I installed on my 2014 C7.

Saw a unique new product by ZL1 Addons (zl1addons.com.) They are simple steel cone washers that replace the screws holding the plastic bottom aero part of the splitter.

They are supplied with screws that have a #20 Torx head. Makes installation very easy. They supply three larger cone washers to be placed in the very center and at the splitter ends.

Talked to the owner of ZL1 Addons who said they were now being ordered by some NASCAR teams! Their splitters often hit the pavement!

This is a pic of 4 of the cone washers installed.

They extend about $\frac{3}{32}$ - $\frac{1}{4}$ inch from the bottom edge of the splitter. Not a lot but when you're being careful entering or leaving a dip in the road or near a curb it's nice to know these will scrap first! Like curb feelers!



Another view of the Splitter Guard Washers.

Other 2017 Grand Sport & 2014 Stingray PDF's Available:



Some 40 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: GS indicates that info may only be in the process of being added to C7 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

Jacking Pads must 2 1/2 inch max OD. Made four. Also Hockey Puck pad and 2 1/2 inch OD x 2 inch high pads bought after installing side skirts.

http://netwelding.com/Jacking_pads.pdf



GS/C7 Radar Power

The C7 cannot tap the mirror or sun visor for power !

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

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

Protect the side of the C7 when filling up with gas

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



C7 Door Panel Protector

protector plate 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 and 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, 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.

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

The OnStar LED's in the rear view mirror, 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



C7 Catch Can & Clean Oil Separator

Direct inject engines like the LT1, are particularly subject to "coking." What is Coking and how to reduce the potential?

http://netwelding.com/Catch_Can.pdf



GS/C7 Round Shift Knob

A round shift knob shortens throw.

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.

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

http://netwelding.com/GPS_In_Cubby.pdf



GS Splitter Stage 3 Winglet

Stage 3 Winglets Intergrate 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 Protectors

Cone Washers Protect Splitter Bottom

http://netwelding.com/Splitter_Protectors.pdf



May Be Of Interest:

Engineering a ProStreet Rod

*How Our '34 ProStreet Rod Was Designed and Built
8.2 Liter Engine, 4 Wheel Disk Brakes & Coilover*

<http://netwelding.com/Engineering%20Street%20Rod%203-08.pdf>

