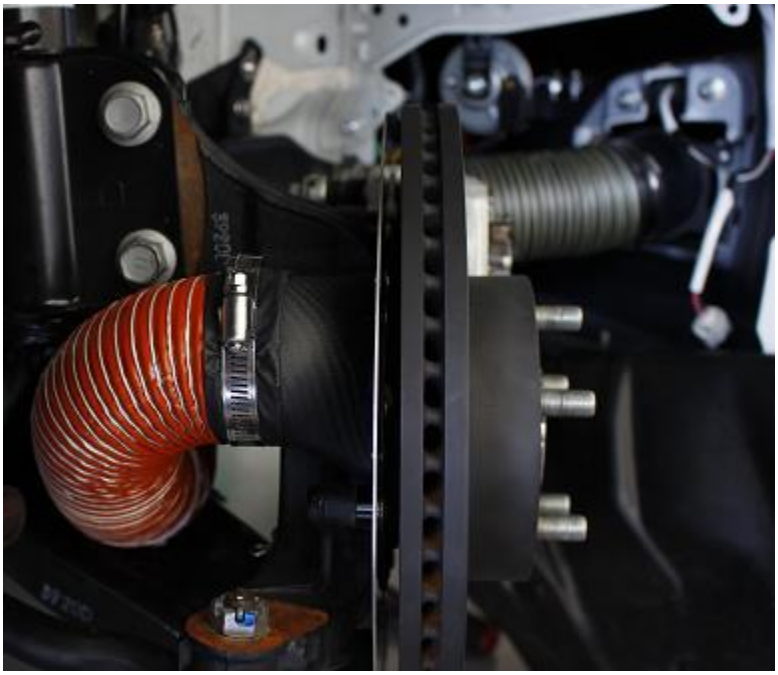
FRS BRZ GT86 Brake Cooling Kit

Installation Manual



Author: E. Hazen
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Approvals: P. Lucas

Document Revisions

Rev	Date	Author	Description
01	05/03/2016	E. Hazen	Issued for Release
02	08/17/2017	P. Lucas	New template, Company name change from Velox to Verus

CONTENTS

1.1. **Overview:** Detailed instructions on installing the brake cooling kits for the FRS BRZ GT86.

1.2. **Difficulty:** Beginner to Novice

1.3. **Time Required:** 60 – 240 minutes

1.4. **Tools Needed:**

- Drill
- 3/8” drill bit
- 8mm socket
- 10mm socket
- Ratchet
- Screw drivers
- Plastic rivet pulling tool
- 9/16 wrench
- 12mm socket
- 14mm socket
- 17mm socket
- 2.5mm allen wrench
- 4mm hex socket
- 5mm hex socket
- Side cuts
- Jack and jack stands

1.5. **Assembly Components**

1.5.1. Backing plate only:

- (2) Backing Plates with carbon ducts riveted on
- Hardware Bag
  - (6) M8x1.25 Flanged Button Head Cap Screw (BHCS)
  - (6) Hard anodized aluminum spacers
  - (2) Small pieces of foam with adhesive

1.5.2. Full Kit, all of the above and:

- (2) Inside fender plastic duct
- (2) Fog Light plastic duct
- (2) 2.5” High Temp Silicone Hose cut to length
- (2) 3.0” Neoprene Hose cut to length
- (1) Hardware Bag
  - (2) Fog Light Duct Bracket
  - (2) Fender Duct Bracket
  - (2) 3.0” Hose Clamps
  - (2) 2.5” Hose Clamps
  - (4) 21.5” Cable Ties
  - (1) Steering rack limiter kit
    - (6) Nylon limiting spacers
    - (2) Hose Clamps
  - (1) Bolt/Washer/Nut Hardware Bag
    - (1) M6x1.0 rivet nut installer tool
    - (2) M6x1.0 rivet nuts for sheet metal
    - (4) M5x0.8 x 16mm length SS BHCS
    - (6) M5x0.8 SS Serrated Nut
    - (4) M5 SS Washer
    - (2) M6x1.0 x 16mm SS BHCS
    - (2) M6 SS Washers


HOSE CLAMPS
FENDER BRACKET
FOG LIGHT BRACKET
FOG LIGHT AND FENDER DUCT HARDWARE
ZIP TIES
STEERING LIMITER KIT
BACKING PLATE HARDWARE

2. Install

2.1. We are not responsible for damage to you or your vehicle by following this manual and installing Verus Engineering products.

2.2. Begin with disconnecting the battery, negative first, if this makes you feel more comfortable working on the car. It is always a good idea to disconnect the battery anytime when working on the car.

2.3. Break the lug nuts loose on the front two wheels.

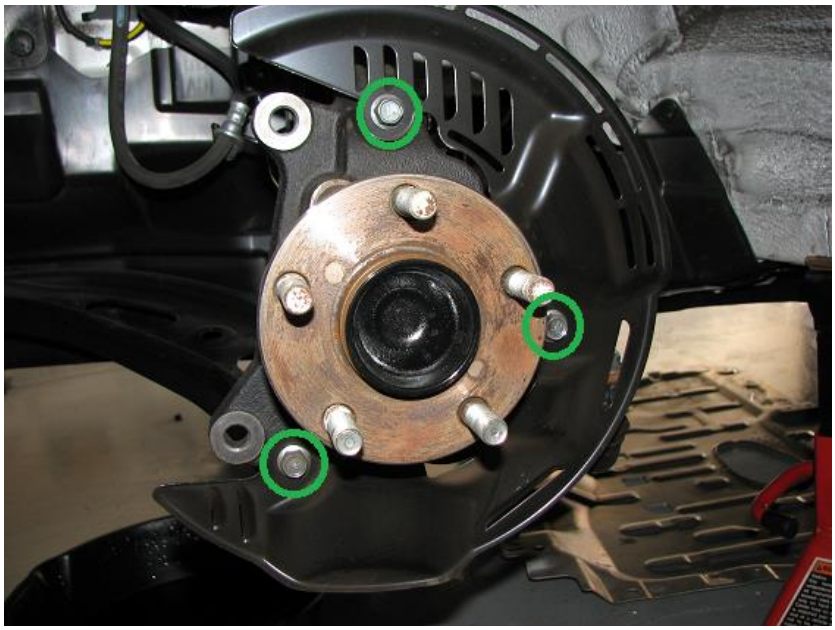
2.4. Jack the front of the car up enough to fully remove front two wheels and comfortably work on the knuckle area of the car. Place the car on jack stands at appropriate locations, the pinch weld works as does the frame rail behind the front wheel well.

2.5. Remove the front two wheels.

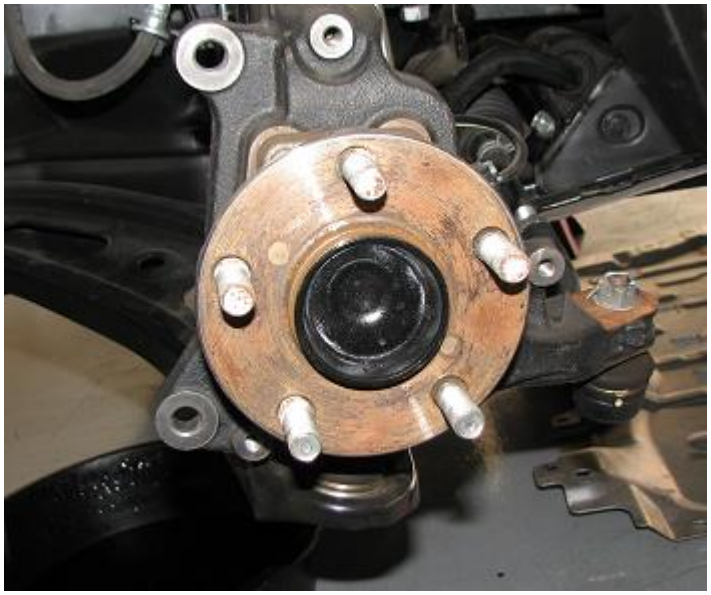
2.6. Remove the caliper first by unbolting the two 14mm bolts (circled in red). Place the caliper on the LCA.

2.7. Then remove the brake pad bracket by unbolting the 17mm bolts (circled in blue above). Below is what it will look like with both bracket and caliper removed.

2.8. Remove the rotor. Dependent on how long the car has sat, if it sees snow/salt, the rotor may need to be forcibly removed. You can do this with a rubber mallet or the bolt holes on the rotor surface. Below is a photo of the rotor removed.

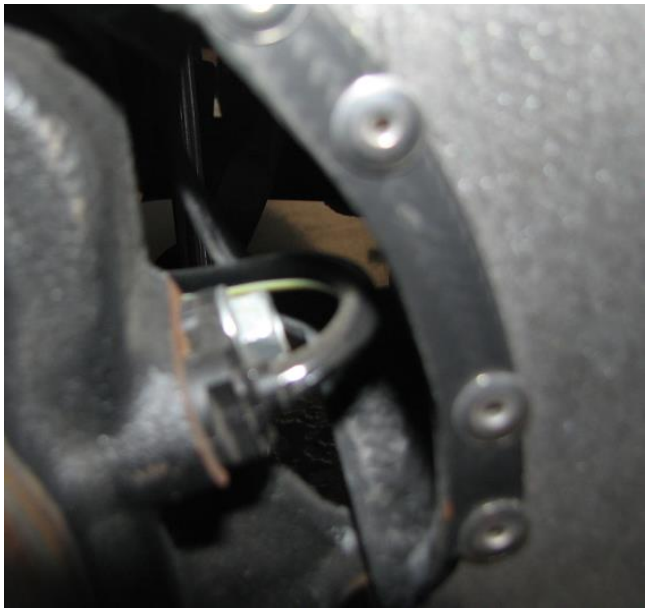


2.9. Remove the OEM backing plate by unbolting the (3) 12mm bolts circled in green above. Below is a photo with the backing plate removed.

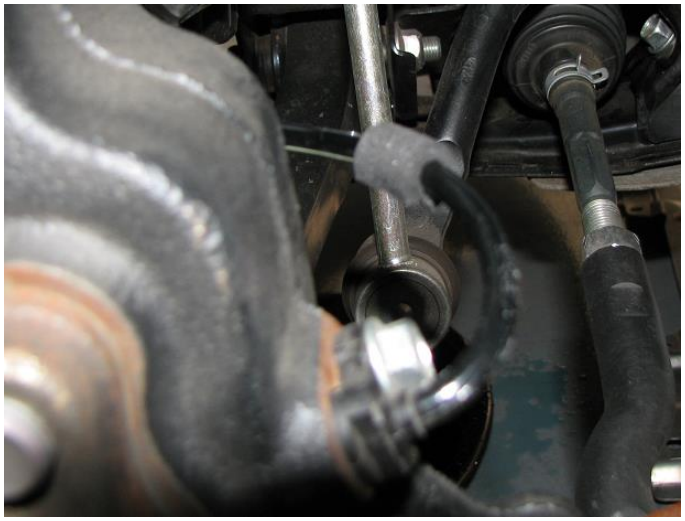


2.10. Loosely install the new Verus Engineering backing plate on the knuckle. Place the hard anodized spacers behind the backing plate. The wheel speed sensor should remain installed and will be placed between the knuckle and the carbon duct.

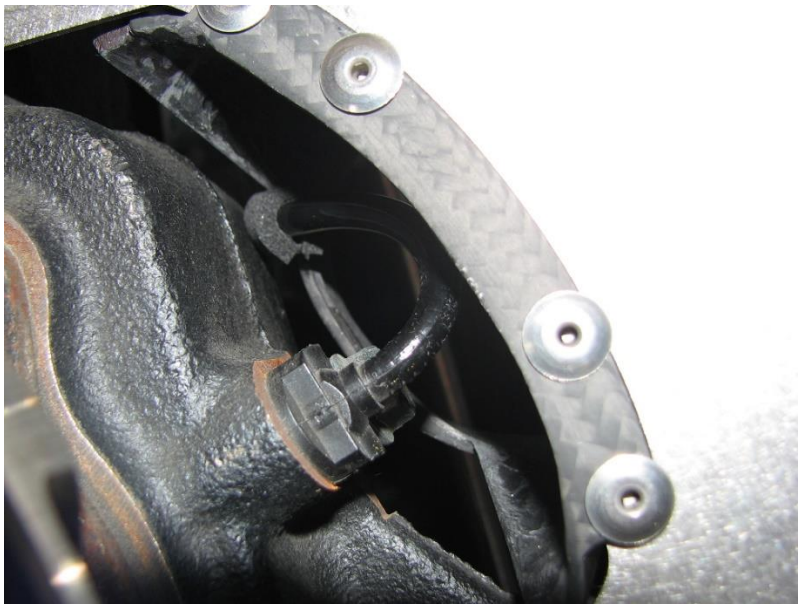
2.11. As you can see below, the wheel speed sensor wire is slightly rubbing on the carbon duct and the knuckle. Mark this location and remove the backing plate.



2.12. Using your mark as a guideline and one of the two strips of foam, wrap the wire to protect it against damage.



2.13. Re-install the backing plate with the supplied hardware and position the wire so that it is safely and nicely squeezed between the knuckle and the duct. The goal here is to have no movement and a snug fit to ensure the wire does not get abraded over time.



2.14. Fully tighten the (3) 5mm hex flanged BHCS.

2.15. Re-install your rotor and tighten it down fully with (2) of the lug nuts. Spin the rotor and ensure no contact between the rotor and the backing plate takes place.

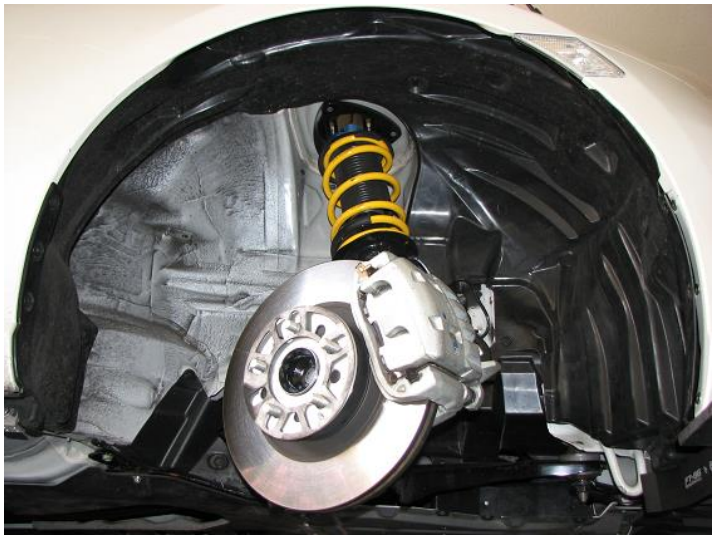
2.16. Repeat this test at full lock both ways. If by chance the backing plate does hit the rotor, make note of where on the backing plate and gently bend the backing plate away from the rotor. The backing plate is stainless steel so bending it will not be detrimental to its life. In some severe cases it may be necessary to cut the backing plate, (IE: AP Sprint with Whiteline Roll Center Adjusters) but most installs require slight tweaking and nothing else.

2.17. Reinstall pad holding bracket and caliper. Torque bracket (blue circled bolts) to 59 ft-lbs and the caliper (red circled bolts) to 19 ft-lbs.

2.18. ***At this point, the backing plate install is concluded. Reinstall wheels, torque to factory spec, and enjoy your freshly installed backing plates which except 2.5" brake duct hose. Full kit installation continues below!***

2.19. **Note: For the full install, it is necessary to have an OEM style fog light bezel! This is used for the inlet. Subaru fog light bezels can be purchased from the factory for $20 each and Scion's can purchase from the factory or use Winjet bezels which are ~$20 for both off FT-86SpeedFactory.**

2.20. Starting from where we left off, we have the view below. We need to remove the fender liner from the shock area to under the bumper.

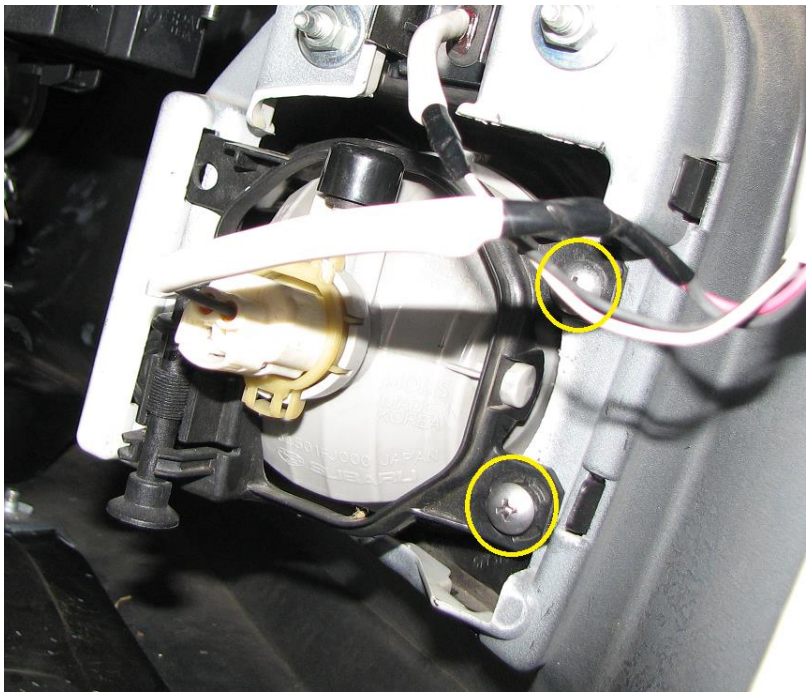


2.21. Due to the splitter and front wheel deflectors, we opted to remove it from the rear and fold it forward. The fender liner is removed with various styles of plastic rivets and push pins, using your best judgement and the plastic removal tool, remove these.

2.22. Remove the engine bay plastic piece by removing a few more plastic rivets from the inner fender and from the bottom of the car. This plastic shroud piece is circled below.

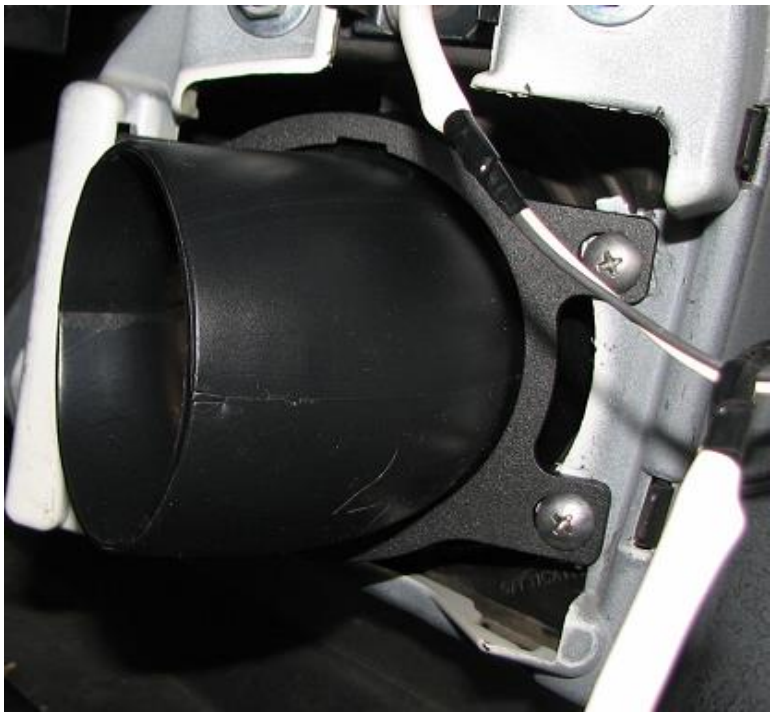
2.23. If you have fog lights installed, you're in luck! The install is a bit easier for those with fog lights already installed. ***If you do not, please skip to step 29.***

2.24. With fog lights installed, we need to remove the two Philips head screws circled in yellow below and unplug the connector from the fog light.



2.25. We used electrical tape on the fog light plug to do our best at keeping the water out of the connector for possible future use.

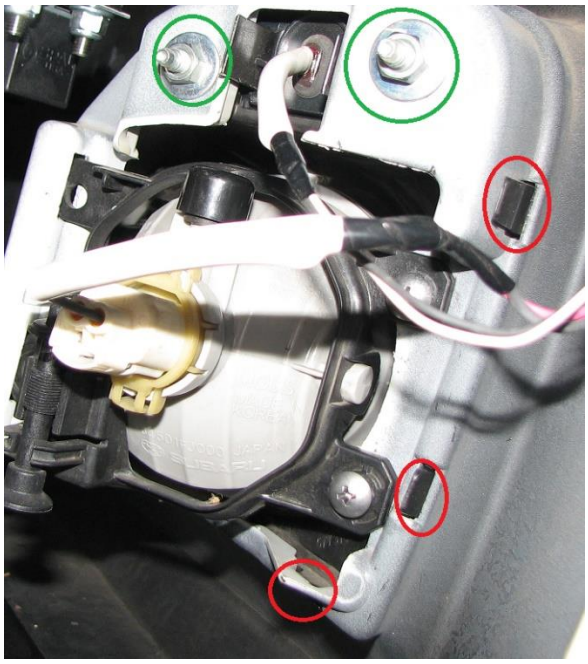
2.26. Place the fog light bracket around the duct and then the duct/bracket assembly into the hole where the fog light used to reside. Using the OEM screws, tighten the bracket down. The plastic fog light should have a little play but not a lot.



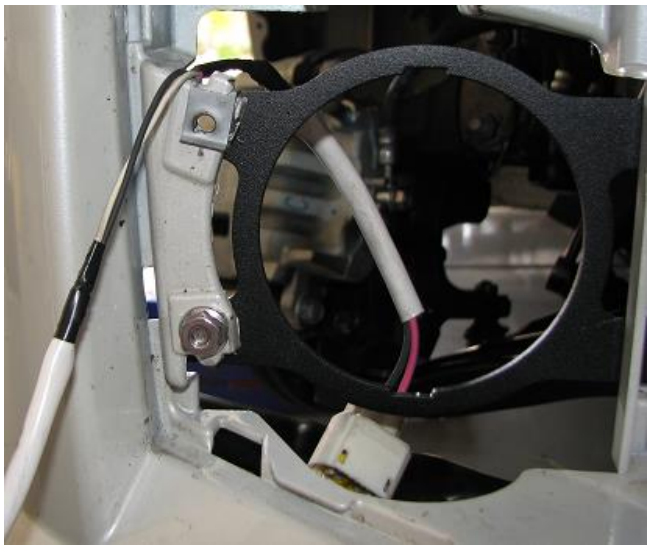
2.27. The tabs on the bracket should line up with the tabs on the plastic to help keep it at the correct orientation. Sometimes the plastic gets a bit deformed, this is normal and will become round again with heat cycles and time away from being packaged tightly.

2.28. ***If you have OEM fog lights and the duct is bolted up, skip to step #34.***

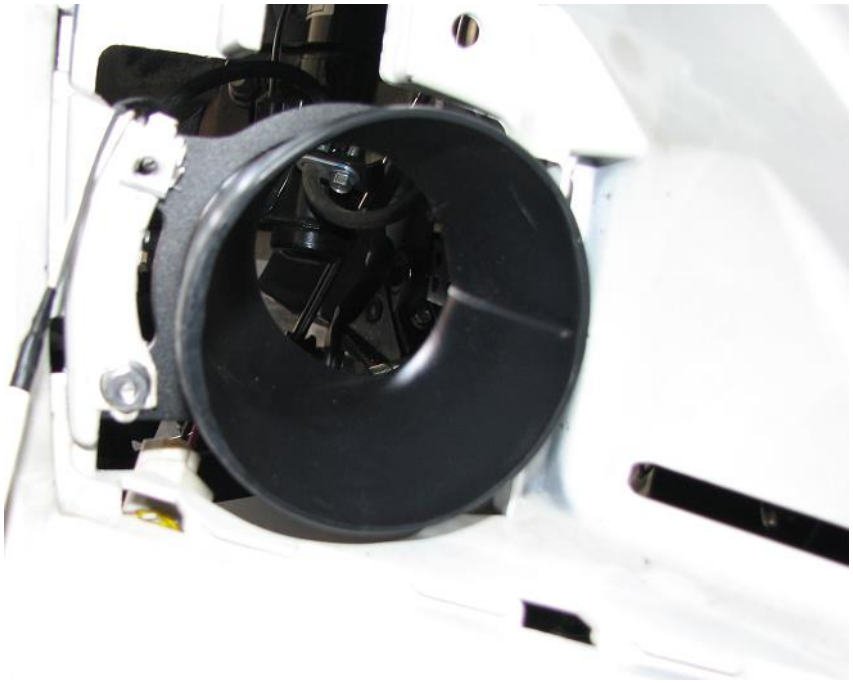
2.29. If you do not have OEM fog lights installed, you will have to remove the bezel and re-install new OEM or OEM-like bezels. To do this you need to unbolt the two 10mm nuts (circled in green) holding on the light. Forcefully remove the plastic bezel from the front of the bumper by carefully working your way around as the plastic clips (some are circled in red below) hold it on very well.



2.30. With the bezel removed, we can install the fog light bracket with the supplied M5 BHCS and serrated nut hardware. In the below picture, you can see the OEM clip on the top, and the supplied hardware loosely installed on the bottom. We recommend using OEM clips if your car has them, but those without fog lights likely do not. Install an M5 bolt and washer on the back side, with the serrated nut on the front and tighten.

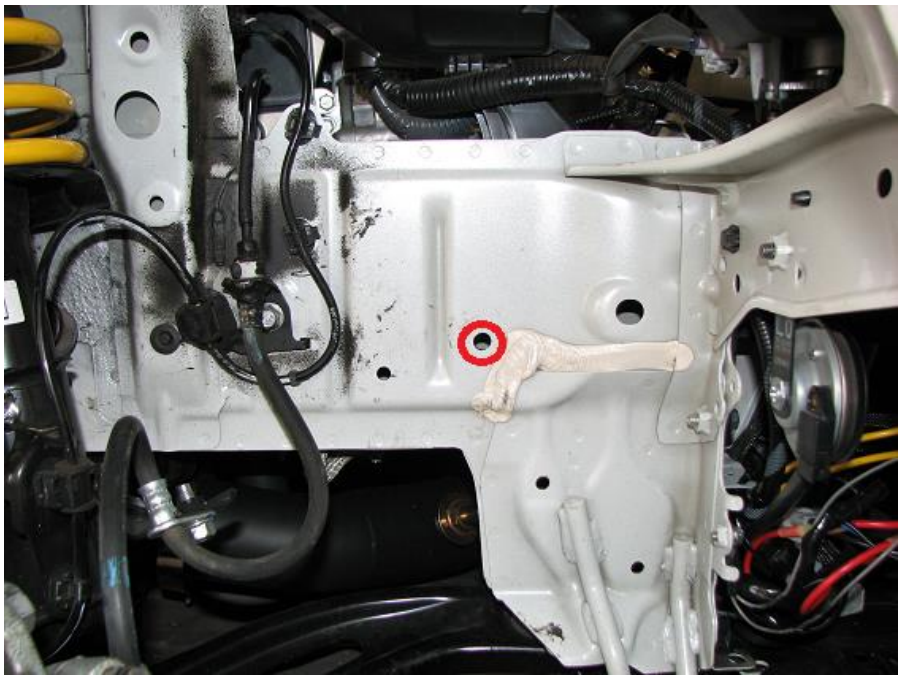


2.31. Slide the fog light duct into the bracket paying attention to the locating tabs (the duct should exit towards the middle of the car). Shown below is the duct installed into the bracket.



2.32. Install the fog light bezel back onto the car and bolt the nuts on from behind.

2.33. Moving back to the inner fender, you should see a view similar to the below picture. Using the drill and 3/8 drill bit, enlarge the circled hole below.



2.34. We recommend using a shop vac and trying to suck out all metal filling before they drop into the frame. We also recommend painting this hole or using sealant when installing the rivet nut to reduce the chances of rust.

2.35. Using the 9/16 wrench and 10mm on a ratchet, install a rivet nut into the drilled, cleaned, and painted hole. Right to tighten, left to loosen. Use the wrench to steady the nut while you put forward pressure on the 10mm from the ratchet as you tighten the rivet nut.

2.36. You will feel it get significantly harder to tighten, this is a sign the rivet nut is fully installed. Below is a picture of a properly installed rivet nut of this style.

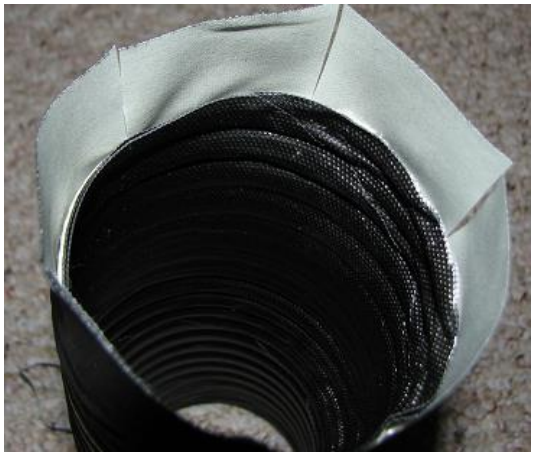
2.37. Moving back to the engine bay plastic shroud piece that we removed, we need to cut a slight relief hole in it to allow the fender liner duct to sit as flush with the fender as possible. Below is where we started with the cut, we used a razor blade and steady hands to cut this out. It's better to start small and then work your way larger, the below picture is a good starting point. *Note: This is the passenger side!!! Driver's side is mirrored to this.*

2.38. Install the fender duct bracket and the fender duct as shown below. The inlet (right side of below picture) should nearly be touching the front pinch weld and installed as low as it can fit.

2.39. With the duct installed, we can better judge how the relief cut needs to change. Below is where we finalized the cutting of the duct at.

2.40. Before installing the hoses, it is not a bad idea to tape the edges of the hoses to ensure they live a longer life. This ensure the hose does not come unraveled or that the wire inside pokes anything. This is not a necessity, more a nice way to finish off the cuts we made to make the kits. We use gaff tape but other tape can be used as well. *This is not necessary!*

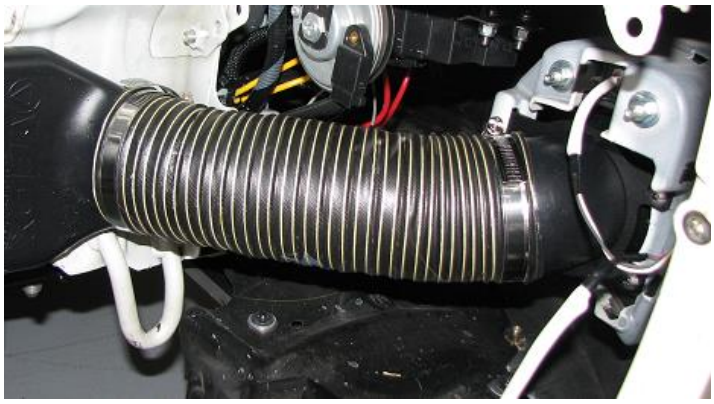
2.41. Cut slits vertically to make 5-6 segments.



2.42. Fold over each slit pressing firmly against the hose.

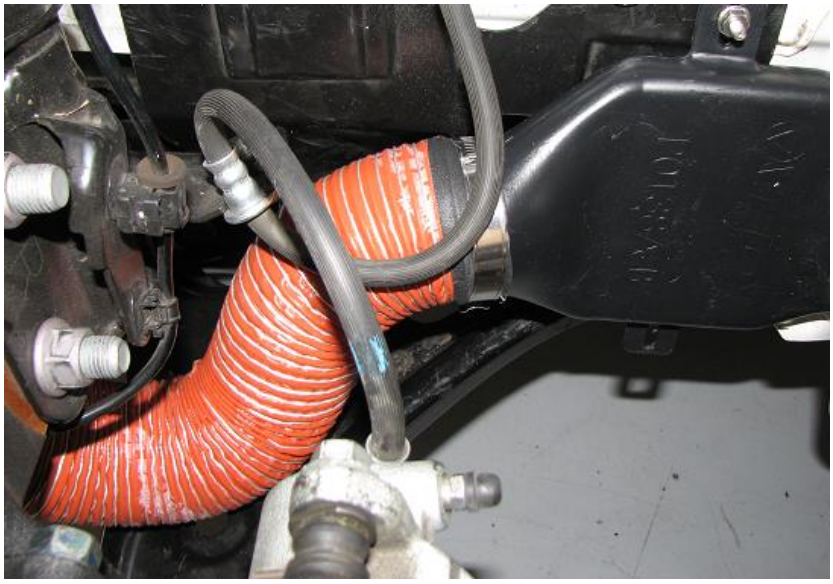
2.43. A fully finished duct is pictured below. The tape may not stick well to the hose due to the silicone/neoprene; however, once clamped it will hold well.

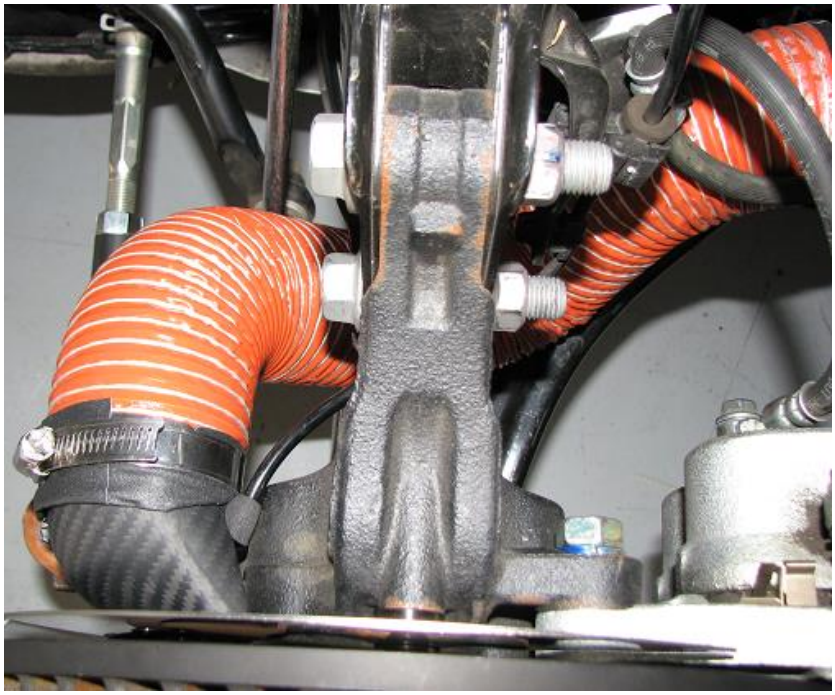
2.44. Grab two of the four larger hose clamps and one of the 3” neoprene brake duct hoses. Ensure the neoprene is well worked as we have found these to be quite stiff until you bend and compress them. So compress them, bend them, and expand them till it has a bit more play. Place this hose between the fender duct and the fog light duct as shown below.



2.45. *If you are going to run mesh to keep debris out of the kit, we recommend running it here. Either between the fog light duct and the hose or the hose and the fender duct. You’ll want to put the mesh over top of the plastic duct, then tighten the hose on top of the mesh with the hose clamp.

2.46. Moving rearward, grab two of the four smaller hose clamps and the 2.5” orange silicone high temp brake duct. One end goes on the fender duct, the other on the carbon backing plate.





2.47. Utilizing the supplied zip ties, secure the silicone hose to the LCA. We only used one zip tie but install it however you see fit.

2.48. Full kit installed below.

2.49. Reinstall the fender liner with all the OEM plastic rivets, push pins, etc. The 3" neoprene hose will push the liner slightly rearward, this is okay and the wheel should not have issues clearing this.

2.50. When reinstalling, you will notice that the fender duct and the liner don't mesh the best. With a razor blade, cut out reliefs for the bracket and the vent to slide through. Keep the cut as small as possible.

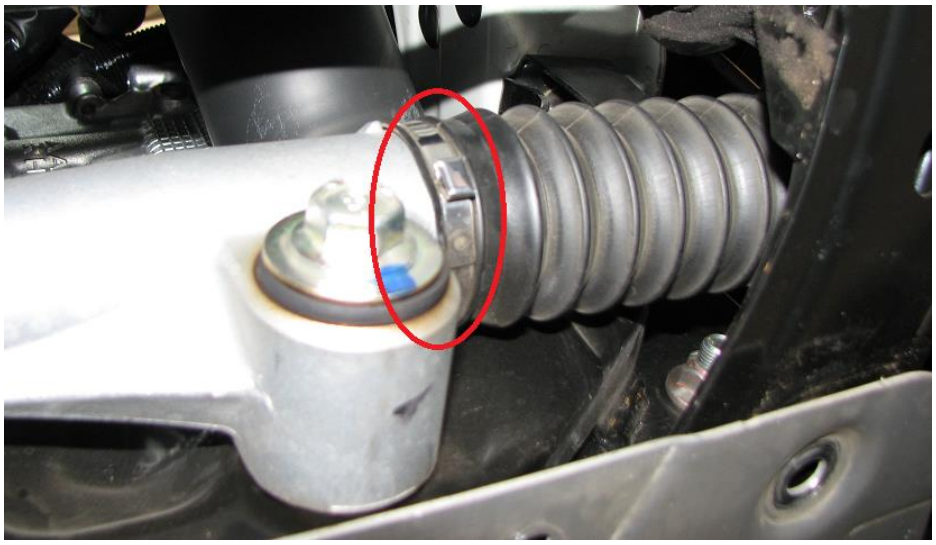
2.51. With the wheel still off, turn the wheels full left and full right to ensure the ducts avoid moving components and that the hose is properly routed.

2.52. Place the wheels back on the hub and tighten the wheels down. We do not recommend testing fender duct to wheel clearance until the car is ***on the ground*** as suspension geometry changes when the wheels are on the ground and increases clearance.

2.53. When on the ground, rotate wheels to full lock and check tire to duct clearance with a flash light, mirror, and crawling around underneath your car. If clearance is an issue, we have two solutions for this. One would be to remove the fender duct between events, use the brake kits when it is needed and remove them for daily use. The other is our steering rack limiter kit, which is included in the kit. Below are install directions on how to install steering rack limiter kit.

2.54. Lift the front of the car up and place it on jack stands. We need to get access to the transmission cover, which is the fiberglass felt piece that covers the transmission. Remove this by removing the 12mm and 10mm bolts shown below as well as a few other 10mm further rearward.

2.55. When you get the black cover off you will see the steering rack. On each side, there is a boot and clamps that hold the boot on. We will be removing the inboard clamp to gain access to the rack. Using side cuts, remove the OEM clamp (circled in red). We will not be re-using this for install, it is not easy to remove.

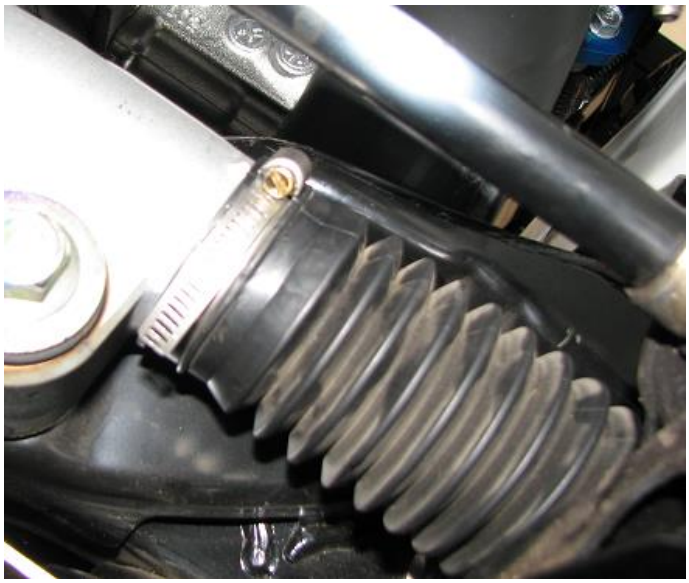


2.56. Once the strap is removed, pull the boot off towards the outside of the car, and slip one or more of the steering rack limits onto the rack. The open end should face forward as shown below.

2.57. The Verus shop BRZ had wheels and tires on the car that just barely kissed the inner fender well at full lock with 1 inch of drop. We found we needed (2) spacers to clear the brake duct. Each wheel/tire combo, suspension drop, setup will require a different number of limiters.

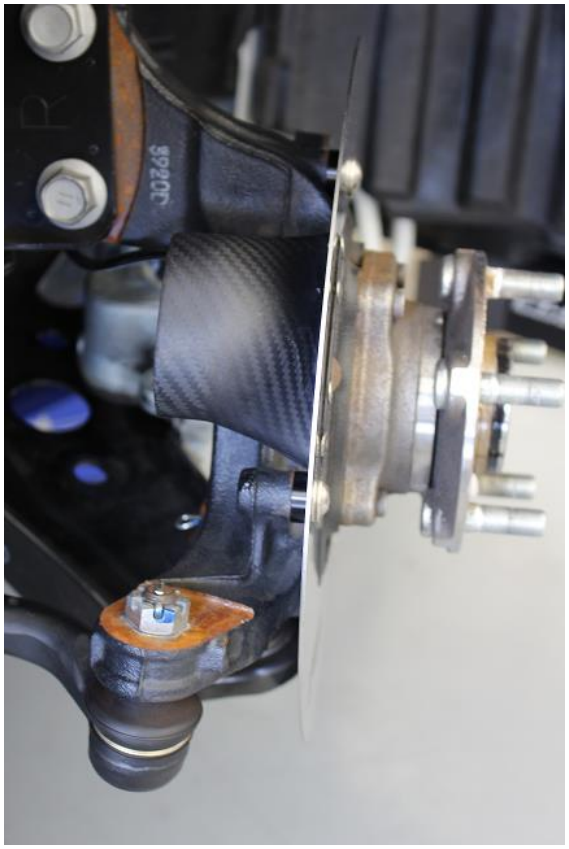
2.58. **Each limiter reduces turning diameter by approximately 1-1.5 fee**t**.**

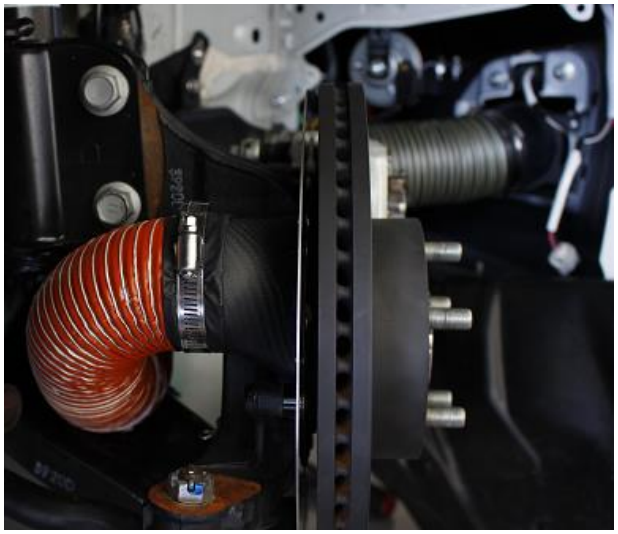
2.59. Slip the boot back onto the steering rack and clamp it down with the supplied worm drive clamp.

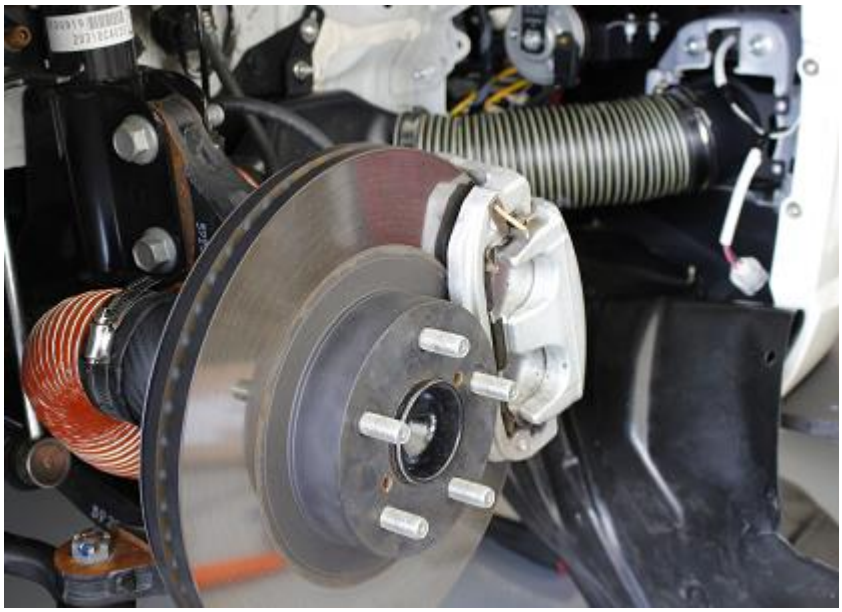


2.60. Reinstall the transmission cover and lower the car back down. Double check duct clearance at full lock, hose clearance, and that the wheels are fully torqued down.

2.61. Below are photos of the full kit installed.







2.62. Enjoy your brake cooling kit! Please contact Verus Engineering with any concerns, comments, or feedback. We continually strive to bring the highest quality components to the FRS/BRZ crowd and appreciate the feedback. E-mails can be directed to sales@verus-engineering.com