



**2010-2013 Corvette C6  
Grand Sport (LS3)  
Instruction Manual**

**STS2004 – 2010-2013 Corvette Grand Sport (LS3)  
STS2004T – 2010-2013 Corvette Grand Sport (LS3)**



## Installation Instructions - 2010-2013 C6 LS3 Corvette:

### **IMPORTANT!**

It is the responsibility of the owner of the turbo system to make any necessary upgrades to the vehicle's fuel system, engine, and drive-train components, etc. to ensure optimal performance and reliability, and to prevent damage to engine and drive-train components. **By installing this turbocharger system, the installer and vehicle owner understands and acknowledges the severity of the vehicle damage that may occur by turbocharging an improperly modified and tuned vehicle and accepts ALL risk and responsibility.**

Our systems are designed for vehicles in good mechanical condition only. Installation on worn or damaged engines is not recommended and may result in engine failure, for which we cannot be held responsible. STS Turbo is NOT responsible for the engine or consequential damages. **By proceeding with this install, you accept full responsibility for any damage that may occur.**

**It is also the responsibility of the owner to comply with all emissions laws in their state.**

**The STS tune supplied with the Diablosport i3 Tuner is intended as a base tune only and may require additional tune adjustments for your specific combination of parts.**

# 2010-2013 C6 LS3 Corvette

Thank you for making STS your choice in a high-performance Turbo Systems. The installation while not complex, will take a certain amount of time and patience. However, the additional horsepower and improved performance will more than justify your efforts. Proper installation and maintenance will ensure long life and maximum performance from your STS Turbo system.

## **BEFORE STARTING:**

Your vehicle must be raised a minimum of 18 inches. A floor hoist is ideal and recommended. If no hoist is available, we strongly urge the use of axle stands as a safety measure. **Please read and understand these instructions and disclaimer in their entirety before attempting installation. CAUTION! WORK ONLY ON A LEVEL SURFACE. USE JACKS /JACK STANDS OF SUFFICIENT CAPACITY TO LIFT AND SUPPORT YOUR VEHICLE. NEVER WORK UNDER A VEHICLE SUPPORTED BY A FLOOR OR BUMPER JACK.**

The installation is a straight-forward process, but it is critical that you read through ALL of the instructions carefully. If you do have any issues during the installation process, please contact your local STS dealer where you purchased the system.

We encourage you to read this manual completely for a couple reasons:

Verify the parts list to make certain your kit is complete before starting the installation (See the kits Parts and Hardware Inventory List of this manual).

Review the tools list to be sure you have the basic tools required to perform this installation. STS Engineers have compiled a list of the minimum tools required but you may find additional tool are

All STS Turbo Systems are protected by US patent # 7,134,282 and # 6,745,568. Any infringement of patent will be pursued to the fullest effect of the US patent law.

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## Before You Start!

### Pre-installation check list

Inventory the kits components and accessory packs to ensure all the necessary parts and hardware have been included and report discrepancies.

- Review the Tools List and make sure you have the required tools to complete the installation before you start.
- Read and understand this installation manual completely before you start the installation process.
- Inspect the vehicle mechanically and be sure it is capable of handling the increased power and torque that is common with turbo charging any vehicle.
  1. **No engine oil leaks**
  2. **Compression test passed - 125-150 PSI minimum**
  3. **Engine not smoking, consuming oil, or making noise**
  4. **Cooling system is in excellent working order with no leaks or overheating issues**
  5. **Fuel system is in excellent working order with no leaks and a fresh fuel filter**
  6. **Transmission is in excellent working order with no slipping or unusual noises**
  7. **Drive line is in excellent working order**
- The vehicles exhaust system **MUST** be free of leaks from the manifolds to the rear of the H-pipe, exhaust leaks will reduce the efficiency of the turbos.
- Verify vehicle ECU has the most recent GM calibration updates (if using STS tuner kit)
- Update and register the ST3000 Diablosport i3 tuner on the Diablosport website before the tuning process is attempted (if using STS tuner kit)
- Be sure you have 4 jack stands of the correct load rating to support the vehicle while work is being performed. **A Floor hoist is preferred and recommended**

**\*\*\*Never lift or support a vehicle with a bumper Jack**

# Parts and Hardware Inventory List:

## Component Parts

Part Number	Description	Quantity	Visual Reference Location Page 5
<b>740R149W</b>	<b>KIT, TURBO COMPONENTS STS2004 (T)</b>		
740R11	Intercooler	1	
740R1	TC38 Turbo	2	
740R14	38mm Wastage 7PSI	2	
740R17	52mm Blow Off Valve	1	
80R155	Air Filter	2	
740R106	Wire Harness	1	
740R125	Alarm Buzzer	1	
0524-4	Accel Spark Plugs 4 pack	2	
740R145W	Dual Oil Pump hose and fitting kit	1	
740R123W	Bolt Kit	1	
740R72W	PCV Switch Valve Assembly	1	
740R85W	Moulded PCV Check Valve Hose Assembly	1	
740R88	Double Wall Tips w/ STS Logo	4	
<b>740R130W</b>	<b>Oil Supply Adapter Kit</b>	1	
740R127	M6x50mm Flange Bolt	2	
740R128	M6x40mm Flange Bolt	2	
740R103	Adapter Plate Gasket	1	
740R38	½" Adaptor Plate	1	
740R129	-6 Male 90 Degree Fitting	1	
740R90W	Oil Pump Assembly	2	
<b>740R126W</b>	<b>Accessory Pack</b>	1	
740R141W	Radiator Mounting Grommet	2	
740R142	Turbo Oil Outlet Adapter 2 Bolt 3/8" NPT	2	
740R104	Air Filter Dry Cover	2	
740R107	Vinyl High Temp Cap	1	
740R109	¼" NPT Tap	1	
740R110	7/16" Drill Bit	1	
740R111	M6 x 1.0 Tap	1	
740R112	5mm Drill Bit	1	
740R113	4 Way Vacuum Tee Fitting		
740R115	12" Cable Ties -10 pack	1	
740R116	Anti-Seize Packet	1	
740R117	PTFE Sealing Tape	1	
740R119	Quick Tap - Wire Tap	1	
740R120	STS Decal 4.5 x 1.5	2	
740R21	C.A.R.B. E.O Decal *		
740R35	3 PSI Pressure Switch	1	
740R36	1 PSI Pressure Switch	2	
740R37	Pressure Switch Cover	3	
740R86	Oil Supply Check Valve (5psi)	2	
740R284	Optional 10 lb. Wastage Springs	2	

\* IF APPLICABLE

## Parts Inventory Continued:

Part Number	Description	Quantity	Visual Reference Location Page 8
<b>740R133W</b>	<b>Clamp Kit</b> (Contains the following)	<b>1</b>	
740R73	#4 Hose Clamp	10	
740R74	#6 Hose Clamp	2	
740R75	2" Hose Clamp	16	
740R76	2 1/4" Hose Clamp	4	
740R78	3.0" Hose Clamp	8	
740R79	3.5" Hose Clamp	4	
740R80	4.0" Hose Clamp	3	
740R82	4.5" Hose Clamp	1	

Part Number	Description	Quantity	Visual reference Location Page 8
<b>740R134W</b>	<b>Silicone Coupler kit</b> (Contains the following)	<b>1</b>	
740R44	1.75" ID x 3.0" Long Straight	6	
740R47	1.75" ID x 9" Long Straight	1	
740R48	1.75" ID x 10" Long Straight	1	
740R49	2.0" ID X 3.0" Long Straight	2	
740R57	2.5" ID x 3.0" Long Straight	4	
740R58	2.75"ID x 3.0" Long Straight	2	
740R64	3.5"ID x 3.0" Long Straight	1	
740R70	4 x3.75 Silicone Hump Coupler with PCV port	1	

Part Number	Description	Quantity	Visual reference Location
	<b>Kits with tuner contain the following:</b>		
ST-3000	Diablosport GM i3 Intune w/STS Tuning	1	
740R39	8 Pack 65 lb./hr. Injectors	1	
740R282	LS9 MAP Sensor (STS2004T Kits only)	1	

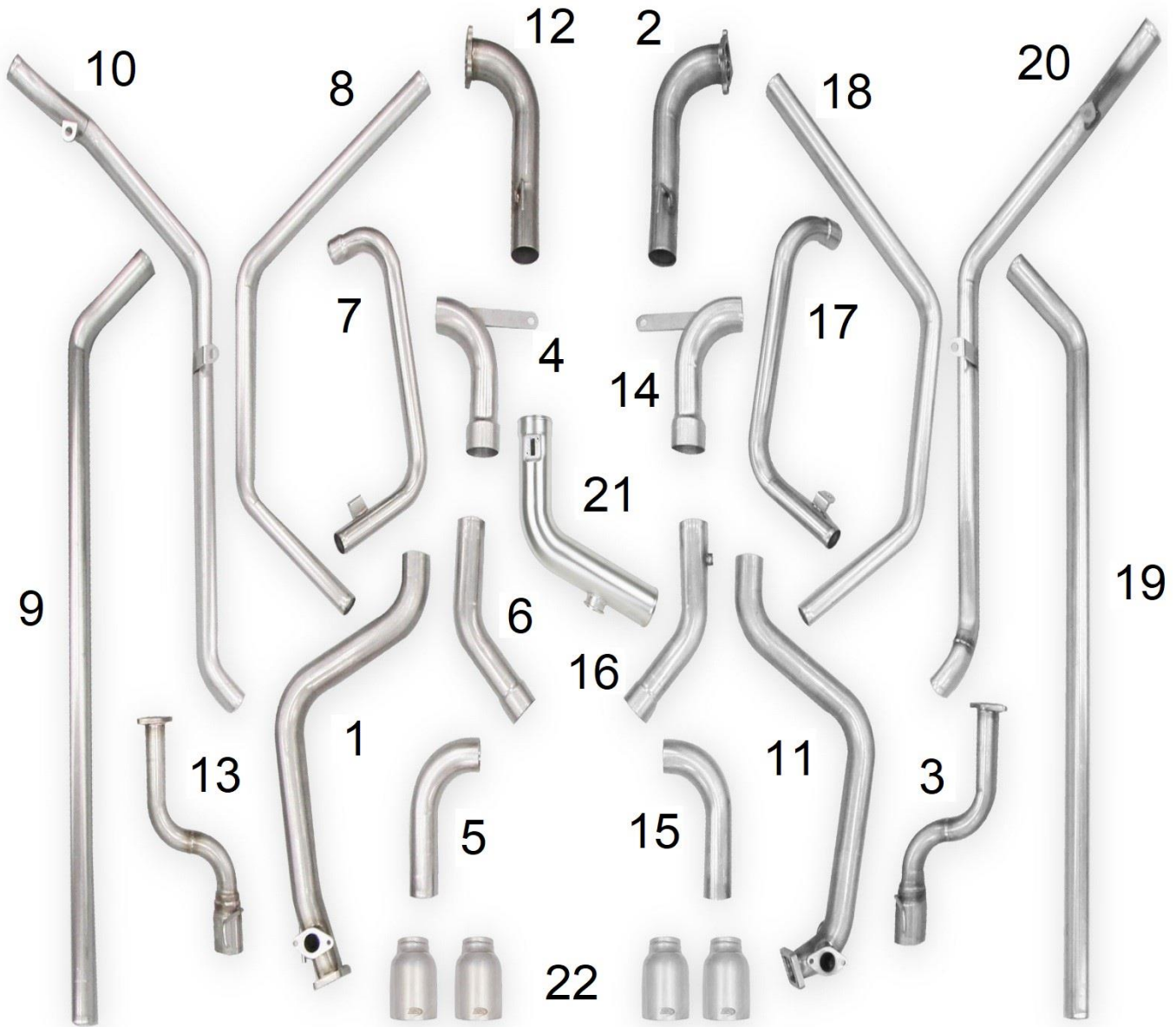
Part Number	Description	Quantity	Visual reference Page 9
<b>STS2004 SSPK</b>	<b>304ss Pipe Kit</b> (contains the following) Photo may vary from actual parts	<b>1</b>	<b>Page 9 Visual location #</b>
STS2000 SS01	Left Turbo Air Intake #1	1	4
STS2000 SS02	Right Turbo Air Intake #1	1	14
STS2000 SS03	Left and Right Turbo Air Intake #2	2	5,15
STS2000 SS04	Left Turbo Air Intake #3	1	6
STS2000 SS05	Left Intake Charge Pipe #1	1	7
STS2000 SS07	Left and Right Intake Charge Pipe #2	2	8,18
STS2000 SS08	Left and Right Intake Charge Pipe #3	2	9,19
STS2000 SS09	Left Intake Charge Pipe #4	1	10
STS2001 SS01	Right Intake Charge Pipe #1	1	17
STS2001 SS02	Right Intake Charge Pipe #4	1	20
STS2000 SS18	Right Turbo Air Intake #3 W/PCV Port	1	16
SS2002 AL01	Aluminium Intake Pipe w/ MAF & BOV Ports	1	21
STS2001 SS08	Left Wastegate Tailpipe	1	13
STS2001 SS09	Right Wastegate Tailpipe	1	3
STS2003 SS01	Left Turbo Exhaust Feed Pipe 09-13	1	1
STS2003 SS02	Right Turbo Exhaust Feed Pipe 09-13	1	11
STS2000 SS14	Left Turbo Exhaust Tailpipe	1	2
STS2000 SS15	Right Turbo Exhaust Tailpipe	1	12

## Parts and Hardware Inventory:

**NOTE:** This guide is for reference only and some parts may be different or not listed for your application.



# 2010-2013 C6 LS3 CORVETTE TURBO SYSTEM PIPE KIT



**NOTE:** This guide is for reference only and some parts may look different from the parts shipped with the kit. Identify the part numbers on the pipe when completing inventory of the kit components.

**Recommended Tools List****Not all tools may be required or you may find additional tools will be required for your application.**

3/8" Metric Socket Set Standard and Deep Well Sockets to 21mm

1/4" Drive Metric Socket Set (optional)

3/8" Drive Universal

3/8" Drive Metric Swivel Socket Set (optional)

6" - 3/8" Drive Extension

12" - 3/8" Drive Extension

Metric Wrenches 8mm - 21mm

Standard Flat Blade Screwdrivers

Phillips Head Screwdrivers

-25 Torx Bit or Screwdriver (taillight screws)

5/16" Nut Driver

1/4" Nut Driver

Tin Snips

Saws All

Abrasive Cut Off Wheel (pneumatic or electric)

Sanding roll with 1/4" arbour

36 / 40 grit sanding rolls

Small Hammer

Large Hammer

Large Brass Hammer (optional to separate rear lower Ball Joint)

Large Pry Bar

Ball Joint Separator (refer to corvette service manual for best practice on this operation)

Wire Cutters

Soldering Gun

Solder

Heat Shrink 3/16 w/ glue

90 Degree Drill (electric or pneumatic) REQUIRED to drill intercooler and oil pump mounting holes

Small TAP Handle or 12 Point Sockets

Utility Knife

Hose Cutters

Centre Punch

Torque Wrench to 110 ft. lbs

# AVOID THESE COMMON MISTAKES!!

**IMPORTANT:** The installation of a turbocharger system on your vehicle is a major modification and should be taken very seriously. It is critical that each step in this installation manual be performed in order and exactly as the manual shows. This will help you avoid installation problems, as well as problems that arise after the installation is complete. There are many steps to the installation that may seem obvious, but require a step or procedure that may not seem like the obvious thing to do. Skipping steps and/or just installing the system by looking at the pictures in the manual typically will end up taking you more time and cause frustration. Please follow this manual exactly and contact STS Customer Support if you need assistance or have questions. Below is a list of the most common mistakes that our Customer Support department receives technical calls about – all of which could be avoided if the instruction manual was followed carefully.

## **Avoid these common installation mistakes and save yourself time and frustration:**

- Read the instruction manual completely before starting the installation.
- Disconnect the battery before working on or welding on the vehicle.
- Inventory all components to make sure you have everything before starting the installation. Follow the instruction manual during the installation process.
- Account for all components, parts, and tools necessary before starting the installation.
- If STS tuning was purchased, start the tuning process as per instructions BEFORE installing turbocharger.
- Failure to have the vehicle's Engine Control Unit updated with the most current calibration version at the Dealer prior to attempting to install the Diablosport i3 and STS base turbo tune, may result in the i3 not communicating with the vehicle.
- Failure to update the i3 Tuner with Diablosport prior to attempting to tune the vehicle, may result in the i3 not communicating with the vehicle or loading incomplete file information.
- DO NOT ATTEMPT TO BOOST THE VEHICLE WITHOUT PROPER TUNING!!!
- Follow instructions exactly to connect the wastegate(s) properly.
- Make sure electrical system tests are performed and that oiling, PCV, and alarm systems are working properly.
- Follow instructions EXACTLY when making electrical connections at the oil pump (oil pump is reversible!)
- Follow oil pump break-in and electrical system test procedures.
- Use caution when routing electrical harness and hoses to prevent damage from hot and/or sharp objects.
- Align and carefully install all silicone connections, then retighten after first few heat cycles to avoid boost leaks.
- Test WOT air/fuel ratios using a wideband O2 meter (11.5:1 recommended).
- Monitor the air/fuel ratio and boost level with a wideband AFR meter and a vacuum/boost gauge.
- Use extreme caution when cutting and welding on the exhaust system to avoid debris that will damage the turbo.



## Installation:

### IMPORTANT NOTE:

This is a high level installation and should only be performed by individuals with strong mechanical abilities and a solid understanding of automotive electrical and fuel systems. If you are not confident in your abilities or lack the tools to perform this installation correctly, please allow a professional to perform the installation for you. Be sure you allow adequate time to perform the installation in its entirety. Once the installation is started, the vehicle will be inoperable until the installation is completed.

### Please remember to follow all common safety rules that apply when working, including but not limited to the following:

- Wear eye protection.
- Do not work on a hot engine.
- Keep sparks and flames away from your work area - **fuel is highly flammable.**
- Use lifting equipment of suitable capacity to raise and support the vehicle.
- Never lift or support a vehicle with a bumper jack.
- Always support a vehicle with jack stands of rated capacity for the vehicle weight.
- Support a vehicle at all 4 manufacturer designated lift points.
- Always support the vehicle on a solid level surface.
- **Never work under a vehicle that is supported by a floor or bumper jack.**

## Finding the Key on 12v Power Wire Prior to Beginning Work:

### Key on 12v power

- Locate the #2 cylinder Fuel Injector Plug (front passenger's side), as shown in **Figure 2**.
- Use a test light or volt meter to find the 12v power wire with the ignition turned on. This is usually the pink wire or the wire color that is common to all the injectors.
- The wire will only have power for a few seconds after the ignition is turned on and the engine is not running. Cycle the ignition several times to verify that you have the correct wire. **NOTE:** 12v will be present and constant when the engine is running.
- Mark this wire with tape for use later in the installation.

## Kits with Diablosport Tuner Installations “Only”:

**NOTE:** It is required that the factory PCM be updated at the dealership with the latest factory updates to be certain you have the latest Factory calibration prior to the installation of the STS Turbo Base Tune. In some cases, older calibrations may not be compatible with the Diablosport tuner and there may be critical factory updates that need to be applied to your vehicle. You may be able to contact your dealer with the Vehicle Identification number and have them check to see if the vehicle has the latest updates to the PCM. It is recommended that the STS Turbo Base Tune be installed onto the vehicle prior to starting the installation process. The STS Turbo Base Tune and the upgraded STS fuel injectors must be installed together. Do not attempt to start the vehicle with the STS tune and the stock injectors or with the STS injectors and the stock tune.

### Registering the Diablosport i3:

Before starting the tuning process, open your DiabloSport i3 and read through all of the DiabloSport instructions. Once you understand the operation of the i3, proceed with the tuning process.

Connect your DiabloSport i3 to your PC using the supplied USB cable. Once connected, the i3 will boot up and create a new "i3" folder on your PC. Open the "Updater" folder and the appropriate "Windows" or "MAC" folder and click on the "Updater.exe" file or the "IgnitionInstaller.cmd" file. This will run the updater program and load the latest updates onto your i3. When finished, press the "CONTINUE" button on the i3 to reboot the i3. When the i3 has rebooted, disconnect the i3 from your PC.

### Backing Up the OEM Calibrations and Installing the “STS Turbo Base Tune”:

Once updated, connect your i3 to your vehicle's OBD2 port, located under the driver's side of the dash (**Figure 1**). Turn your ignition to the "RUN" position with the engine "OFF". Do NOT start the engine. Follow the on-screen prompts as per the DiabloSport instructions and select "YES" to agree to the Diablosport Terms and Conditions. Select "TUNE VEHICLE" and follow the on-screen prompts. Select "ADVANCED TUNE" and then "INSTALL STANDARD TUNE". Select the "STS Turbo Base Tune" and follow the on-screen prompts and select "YES" to install the STS Turbo Base Tune. Follow the on-screen prompts and the device will read, **store, and export your factory tune**. Once the factory backup process is complete, select "APPLY TUNE" to install the STS Turbo Base Tune. Once complete, turn the ignition "OFF" and follow the on-screen prompts to reboot the i3. **DO NOT START THE VEHICLE AFTER THE REBOOT PROCESS**

**CAUTION:** Do not do anything that would disrupt the voltage of the vehicle during the tune writing process or severe damage may occur to the PCM. Do NOT attempt to start the vehicle with the STS Turbo Base Tune installed until the STS fuel injectors have been installed.

**(IMPORTANT: DO NOT INSTALL THE DIABLOSPORT TUNING FOR NON TURBOCHARGED VEHICLES** as these are tunes for a STOCK naturally aspirated vehicle and not a TURBOCHARGED vehicle.

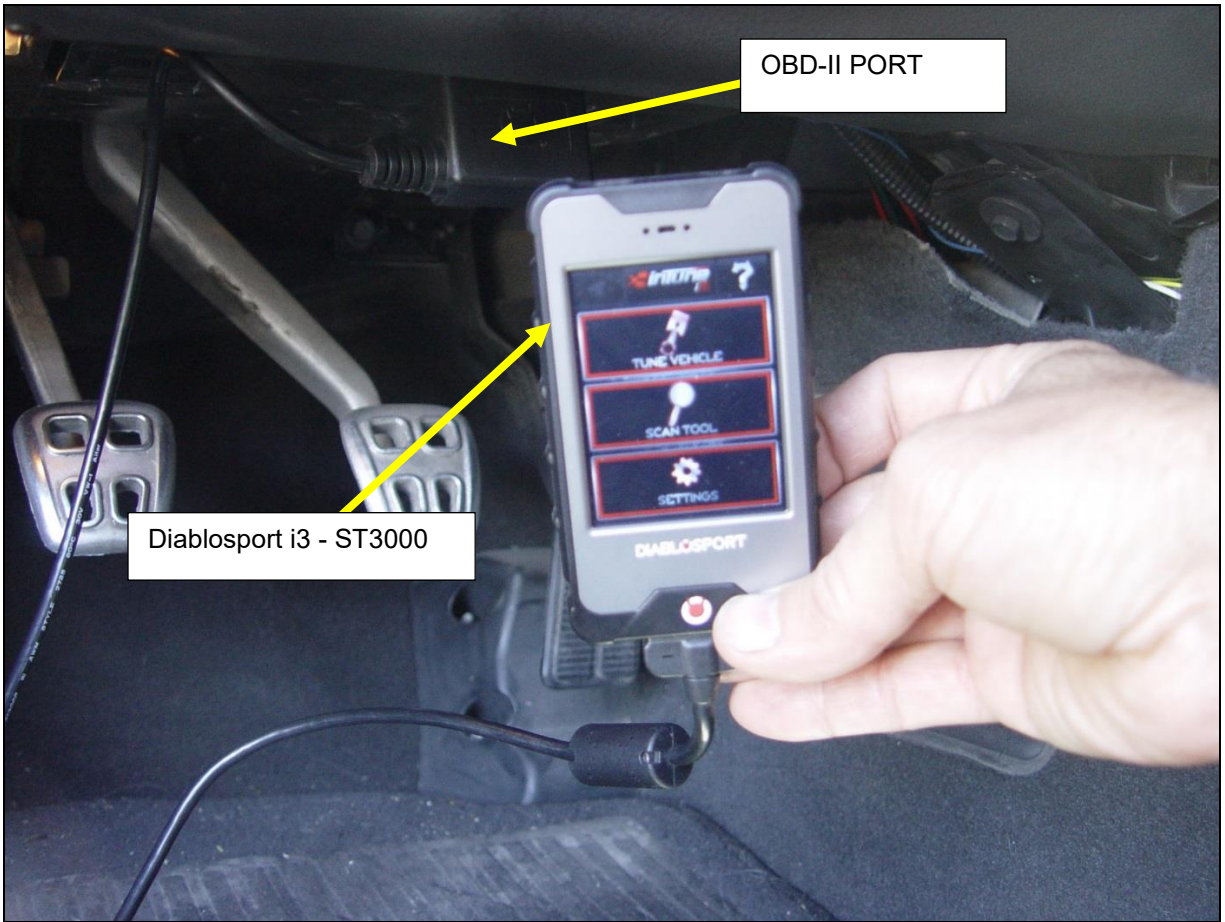


Figure 1

## Installing the STS Fuel Injectors:

**WARNING: Any fire or smoking is absolutely prohibited during this process. Use extreme caution as fuel hoses and lines are pressurized and will leak when disconnected. Take all necessary precautions when servicing pressurized fuel lines and working with open fuel containers!**

1. Remove the decorative engine covers.
2. Depressurize the fuel system by removing the cap on the front of the driver's side fuel rail and depressing the Schrader valve at the fuel pressure port (**Figure 2**). Drain the pressurized fuel in to a suitable container. Once the pressure is out of the fuel system, replace the protective cap on the fuel rail.
3. Make sure that the intake manifold is clean around the fuel injectors so that no debris can fall into the intake manifold. Any debris that gets into the intake manifold could cause immediate SEVERE engine damage!
4. Remove the wiring harness mounting connectors from the LH fuel rail studs. Disconnect the (x8) fuel injector harness electrical connectors from the fuel injectors. Remove the bolts from the rear fuel rail brackets. The brackets can be swivelled out of the way to access the fuel rails and fuel rail bolts (**Figure 2**).
5. Remove the (x4) fuel rail mounting bolts/studs. Remove the fuel rails and (x8) injectors from the intake manifold, taking care that no debris falls into the holes in the intake manifold.
6. Remove the metal fuel injector retaining clips from each of the injectors. Using a small container to catch the fuel, remove each fuel injector one by one and drain the fuel into the container. Make sure that the O-ring seals come out of the manifold and the rail with the injectors (**Figure 3**).
7. Install the metal retaining clips onto the new fuel injectors at the same location where they came off the factory injectors. Lubricate the upper and lower seals on the new injectors with silicone grease provided and carefully insert the injectors into the fuel rails until the metal retaining clips lock onto the rail.
8. Clean each of the injector ports in the rails to prevent any dirt or debris from entering the manifold or damaging the O-ring. Reinstall the fuel rails onto the intake manifold, making sure not to damage the injector seals as the injectors fit into the manifold ports. Reinstall the fuel rail bolts and the fuel rail brackets and torque hardware to factory specifications. Reconnect the injector electrical harness connectors. Re-check all connection points and O-rings, double check all hardware.

### **CAUTION:**

The Injector's O-rings will be a snug fit (NOT TIGHT) into the intake manifold and will require proper alignment of ALL injectors to allow the assembly to fully seat into the intake manifold. DO NOT force the injectors into the manifold or attempt to pull injectors into the manifold with the fuel rail mounting bolts. Forcing the injectors into place will damage the O-ring and/or manifold.

**NOTE: Once the injectors have been installed, the STS Tune must be loaded onto the vehicle prior to starting the engine. Do NOT attempt to start the engine until the STS Turbo Base Tune has been installed and ALL FUEL LINES HAVE BEEN RECONNECTED AND DOUBLE CHECKED FOR LEAKS.**



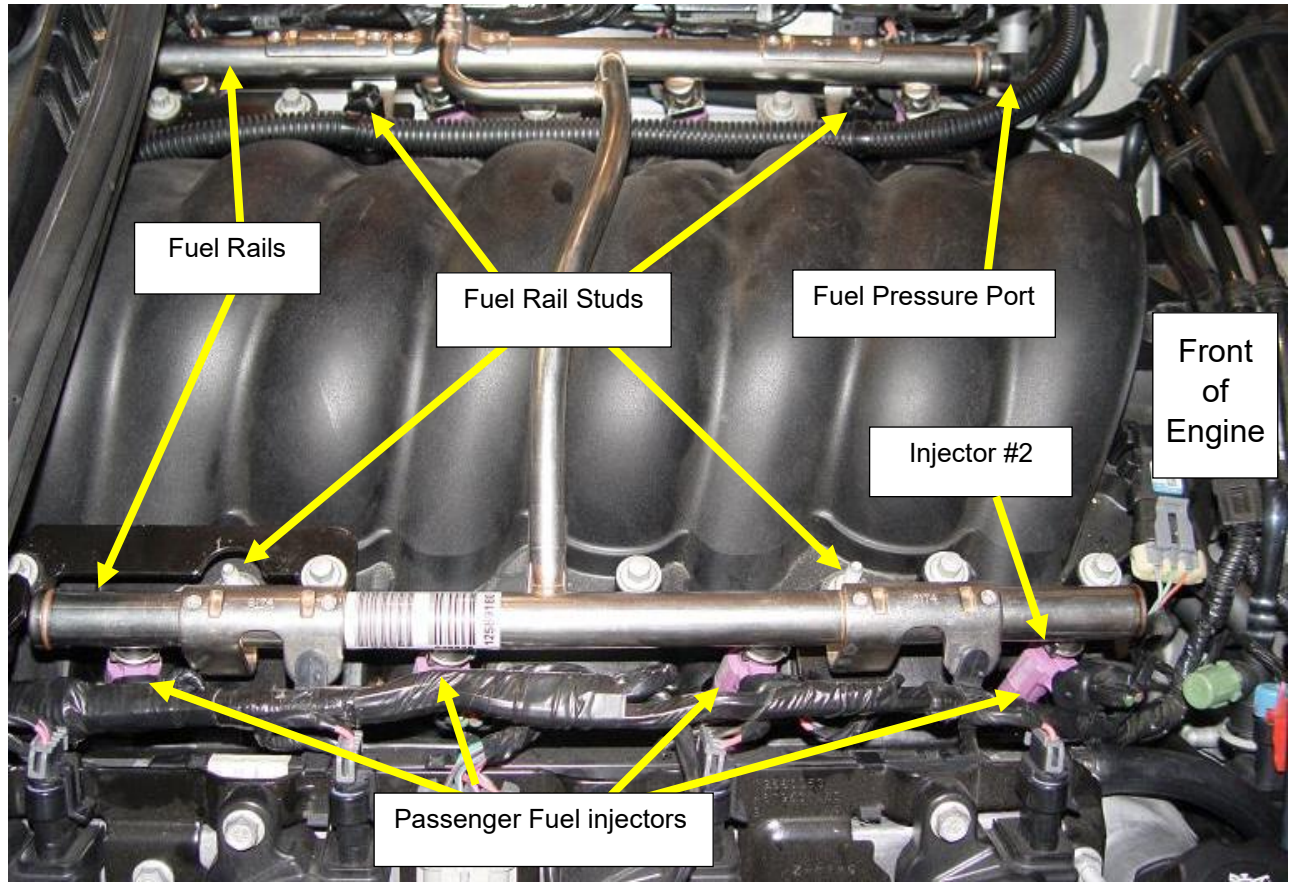


Figure 2

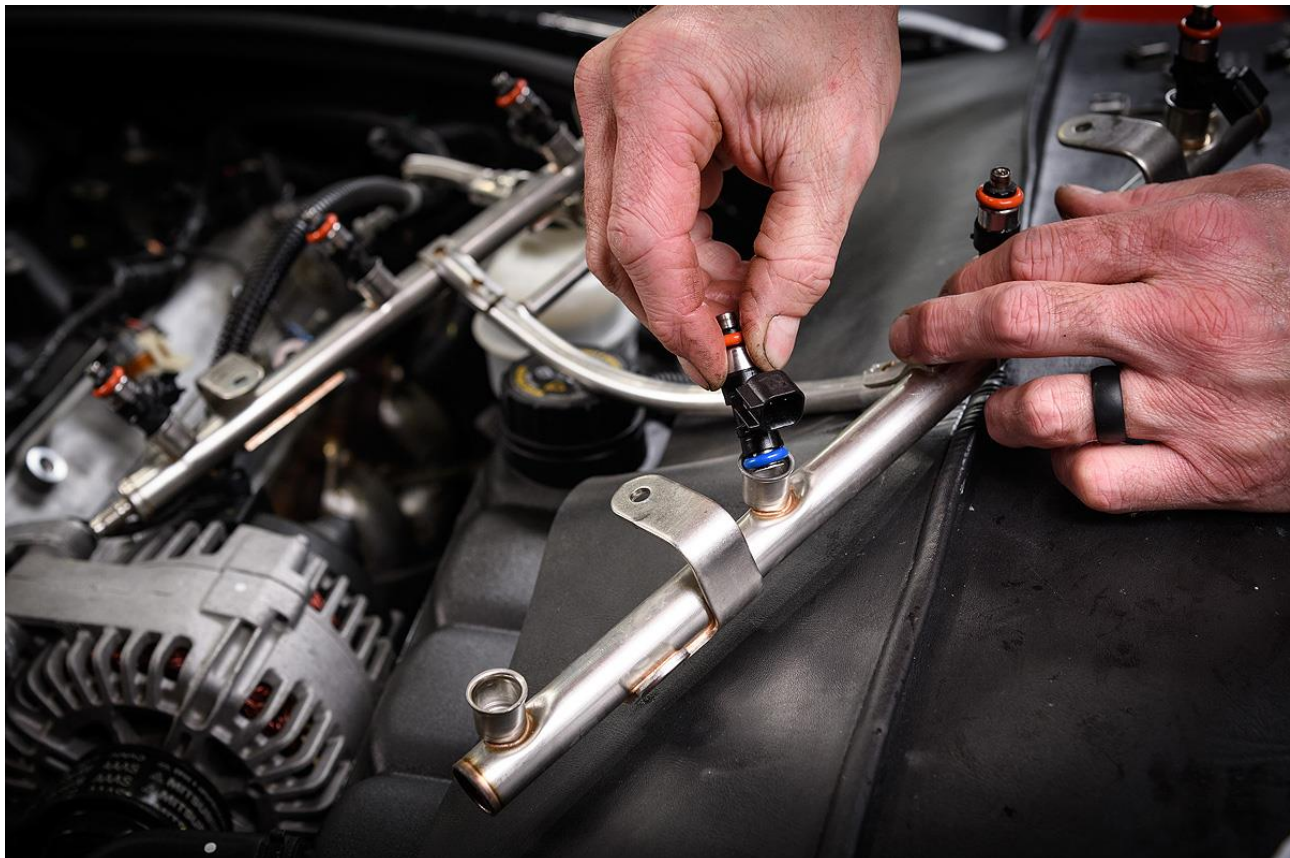


Figure 3

## Installing the Oil Return Fittings and Valve Cover Baffle Modifications:

It will be necessary to install a -6 AN fitting into each valve cover to allow the return oil from the turbo to be introduced back into the engine. The internal PCV oil separator baffles will also need to be modified to install the fittings and prevent return oil from entering the PCV system.

1. Remove the intake piping and air filter assembly
2. Remove the (x5) coil pack mounting bolts from each coil pack mounting bracket on top of the valve cover. Unplug the coil wiring harness connector from the engine harness and remove coil packs and spark plug wires (**Figure 4**).
3. Remove the driver's side and passenger's side valve cover bolts and valve covers (**Figure 5**). Cover the rocker assemblies with a clean rag to prevent anything from falling into the engine while the valve covers are off the engine.

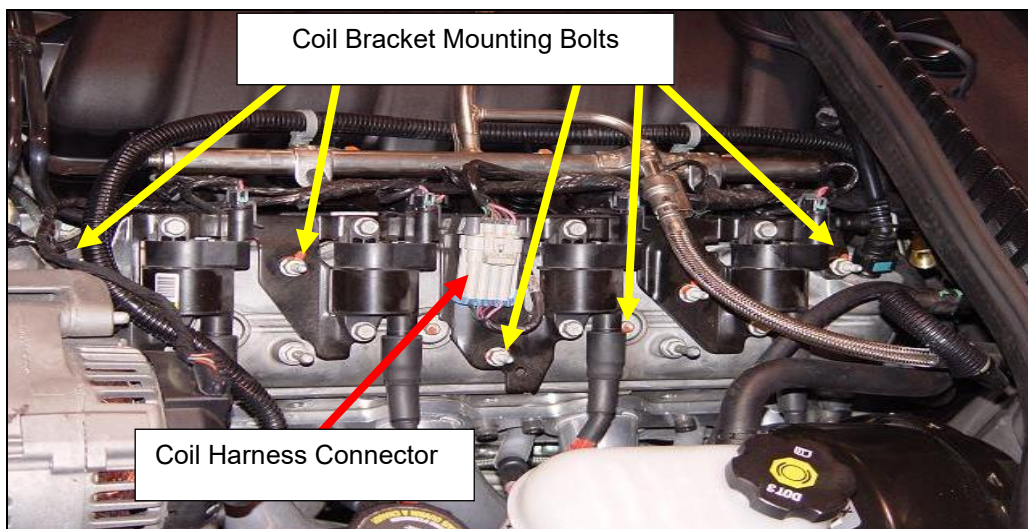


Figure 4

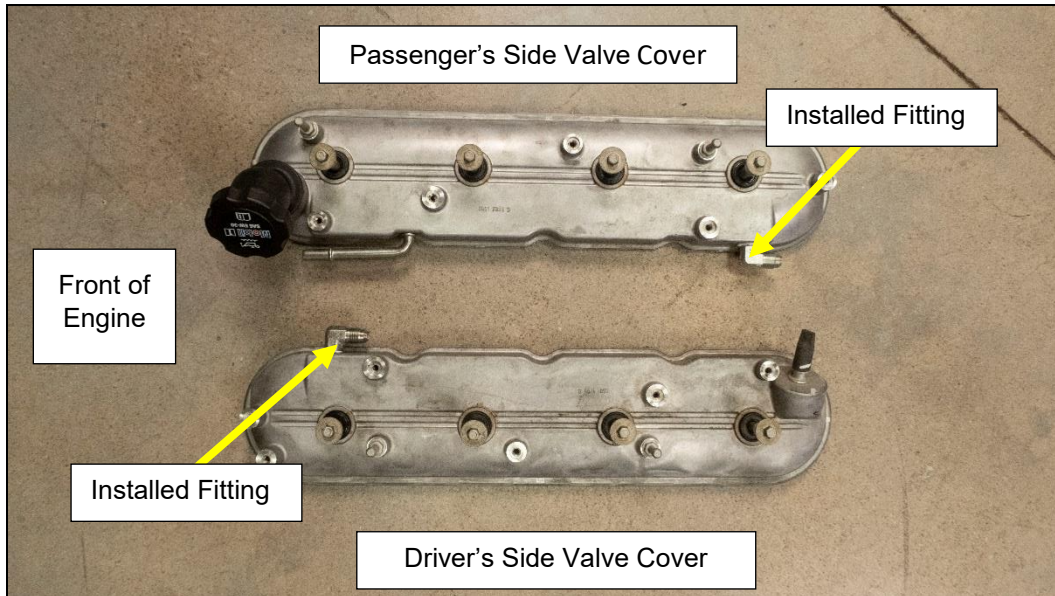


Figure 5

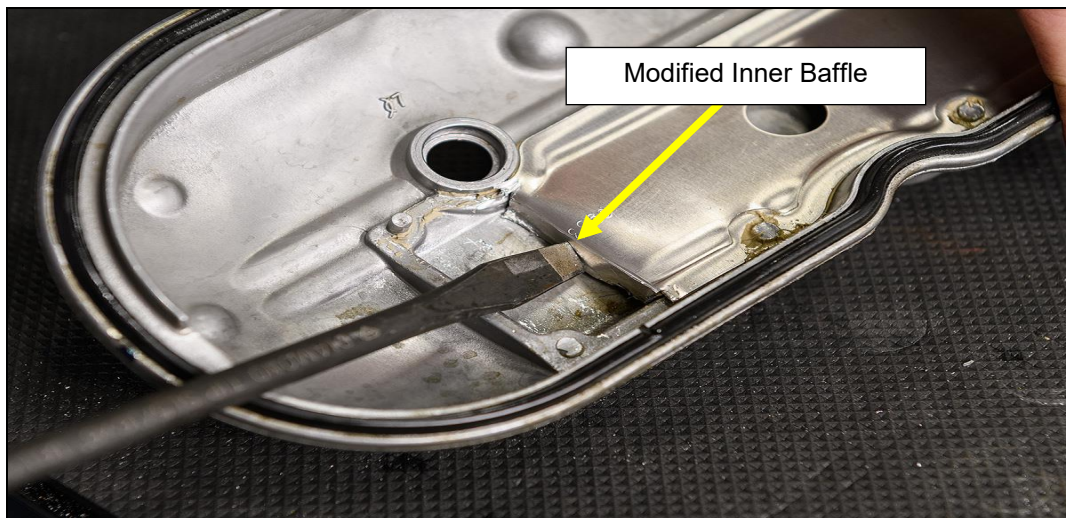


## Valve Cover Modifications:

The valve covers will be modified to accept the oil drain back fittings and internal baffle modifications as shown in **Figures 6 & 7**. Note the location and orientation of the installed drain back fitting when installed. The baffle modifications will be at the same location inside the valve cover for each fitting installed.



**Figure 6**



**Figure 7**

## Modifying the Inside Baffles:

1. Measure from the edge of the baffle plate towards the center of the valve cover and make a reference mark at 1/8" past center of the bolt hole in the top of the valve cover (reference mark **A** – **Figure 8**).
2. Measure from the reference line **A** back towards the edge of the baffle plate 1/4" and make a mark on the top edge of the baffle plate closest to the bolt hole (**Figure 8**).
3. Measure from the reference line **A** back towards the edge of the baffle plate 1/2" and make a mark at the lower edge of the baffle plate near the outer edge of the valve cover.
4. Scribe a line between the marks to create reference line **A** and **B** on the baffle plate creating a wedged shaped area between the lines (reference **C**).
5. Measure 1/2" up from the bottom edge of the valve cover and draw a line between reference lines **A** & **B**. This will create reference line **D**.
6. Use a utility knife and score reference lines **B** & **D** (only) with a few deep cuts into the material. Do not score into reference line **A**.
7. Drill or grind out rivets at the leading edge of the baffle plate.
8. Use a small flat blade screwdriver or small chisel and work the baffle plate up and away from the valve cover at the rivets. The soft aluminum plate will bend at reference mark **B** and break off – use caution not to allow the plate to bend at reference **A**.

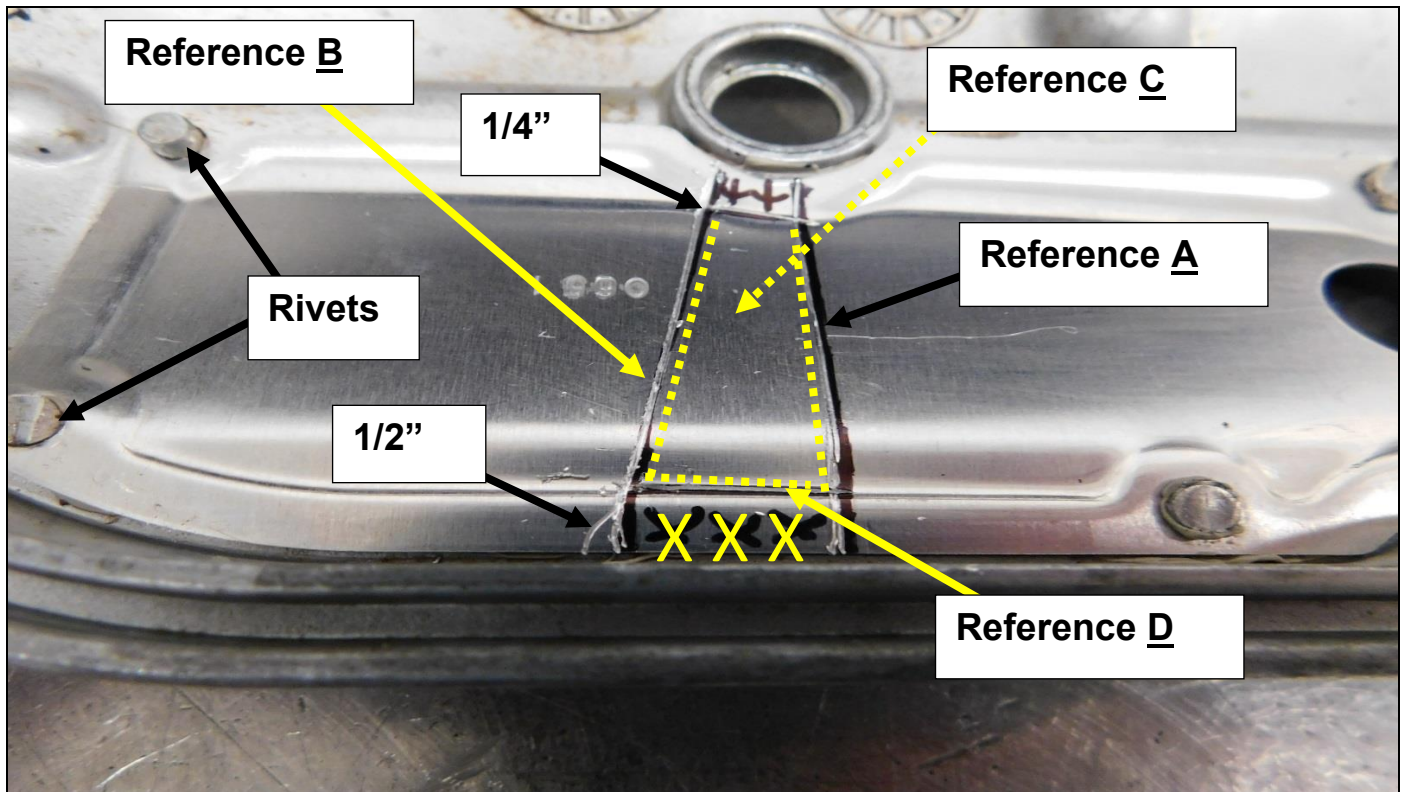


Figure 8



## Modifying the Inside Baffles (continued):

9. Use a screw driver and a small hammer to bend the wedge shape down at reference line **A** to create a block off wall at the end of the baffle plate. The material is very soft and works easily (**Figure 9**).

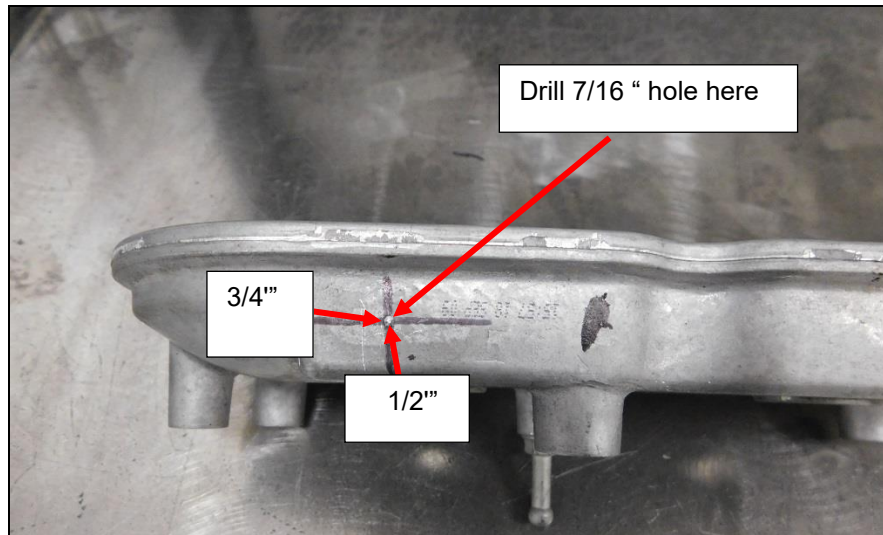
**NOTE:** The material will break away at reference lines **D** when the plate is bent. The small pieces that are marked with “XXX” will be removed.



Figure 9

## Installing the Oil Return Fitting:

1. Use a center punch and mark the location shown in **Figure 10**.



**Figure 10**

2. Drill a 7/16 hole at the location marked, using the 7/16” drill bit provided in the accessory pack.
3. Thread the valve cover to accept the oil return fitting using the provided 1/4” NPT pipe tap in the accessory pack.
4. **IMPORTANT:** Do not run the 1/4” tap too deep into the valve cover. Test fit the fitting into the valve cover until the fitting is hand tight with 3-4 threads remaining outside the valve cover.
5. Thoroughly clean the valve covers after the holes are threaded to remove any metal chips or shavings that could fall into the engine after the valve covers are re-installed.
6. Apply the sealing tape provided on to the threads of the -6 x 1/4” NPT 90 degree fitting. Install the fitting into each valve cover and tighten approximately 1/2 turn past hand tight (**Figure 11**). Align the fitting to face the rear of the engine as seen in **Figure 6** on page 18.



**Figure 11**

## Lifting and Supporting the Vehicle and Removing the Tires:

1. The vehicle must be raised a minimum of 18". A floor hoist is ideal. If no floor hoist is available, we strongly urge the use of axle stands as a safety measure.
2. Support the vehicle at each factory designated lift location at all (x4) points on the vehicle chassis. Refer to service manual for exact location of lift points. Use Corvette lift blocks to avoid damaging the rocker panel.
3. Do not block access to the ends of the rocker panels. These areas will need to be accessed later for the installation of the charge pipes.
4. **Remove all 4 tires.**
5. **NEVER USE A BUMPER JACK TO LIFT OR SUPPORT A VEHICLE.**
6. **NEVER WORK UNDER A VEHICLE SUPPORTED BY A FLOOR OR BUMPER JACK.**
7. **ALWAYS WORK ON A SOLID LEVEL SURFACE.**

Lift and support the vehicle from the factory lift points locations shown below for the best stability and access to critical areas while working.

Use caution when lifting the vehicle with a floor jack, lift the vehicle a minimum and support one side at a time. Working side to side or front to back in small progressions to minimize the lean angle of the vehicle, raise the axle stands as you lift the vehicle. Do not work under the vehicle until all four points on the vehicle are level and supported with an axle stand of sufficient capacity to support the weight of the vehicle.

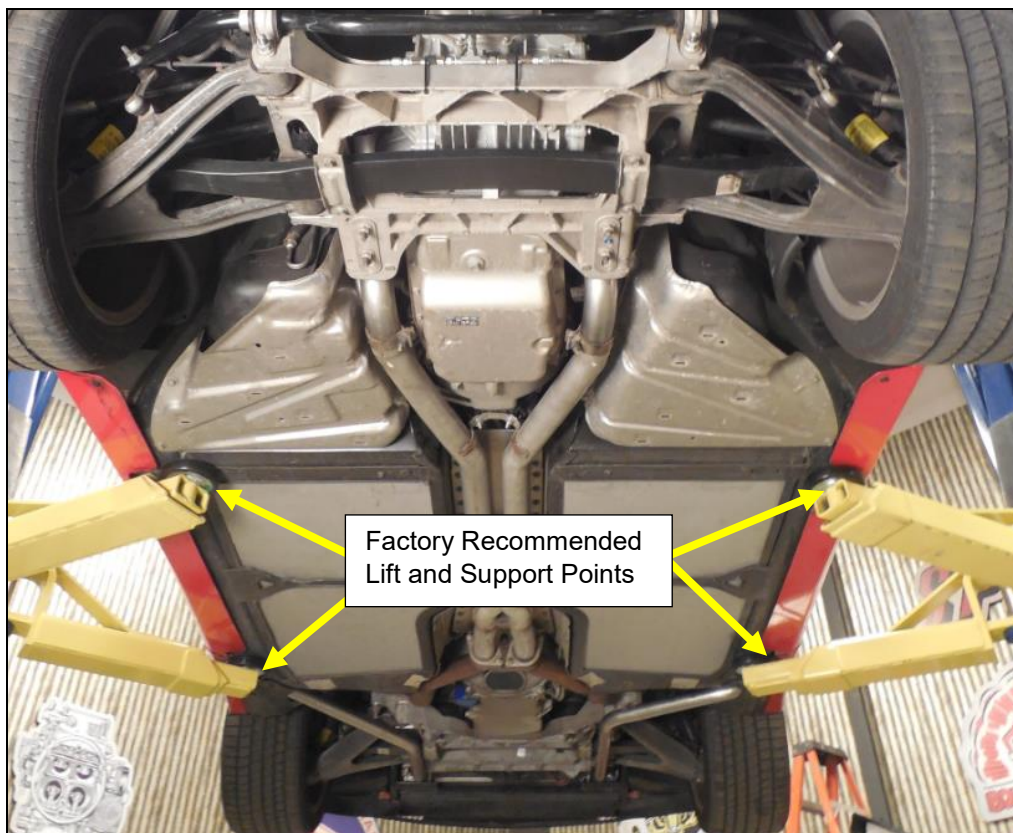
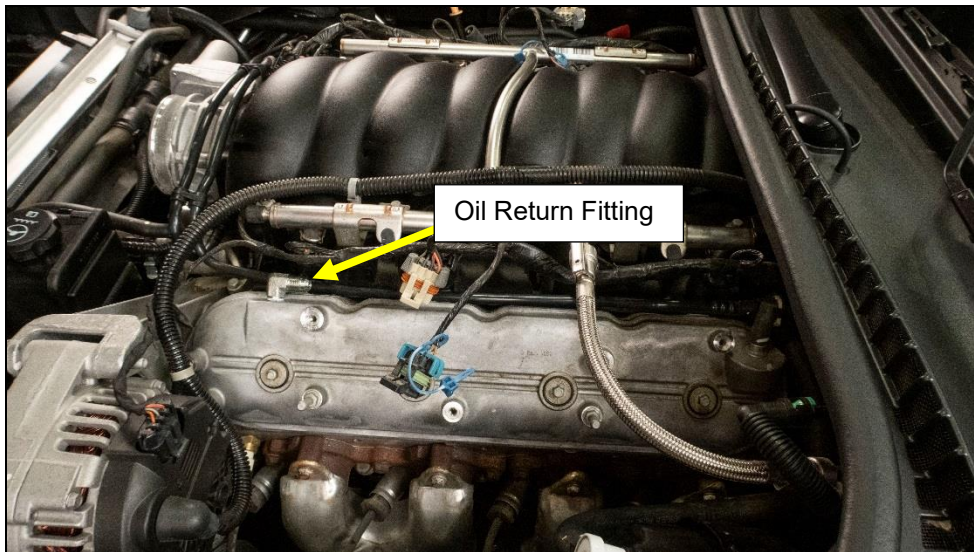


Figure 12

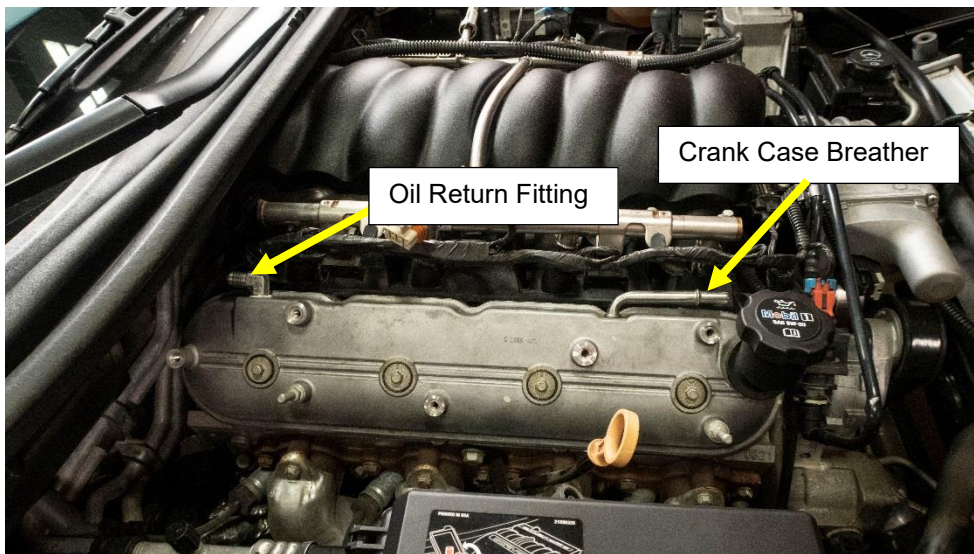


## Installing the Valve Covers and Running Oil Lines:

1. Reinstall the valve covers on to the left and right side of the engine. The valve cover gaskets are re-usable, but should be replaced if the gasket is damaged or brittle – Mr. Gasket P/N: 61040G.



**Driver's Side Valve Cover Installed**



**Passenger's Side Valve Cover Installed**

2. Install the supplied -6 pushlock hose ends into each of the 150" long 3/8" lines supplied in the hose kit. Cover the opposite end of the hose with electrical tape to prevent dirt and debris from getting into the hoses while they are being routed to the back of the car. **Mark the hoses Left and Right for reference later.**
3. Route the passenger's side hose across the back of the engine and down the driver's side along the bell housing to the ground. Pull out excess slack and connect the hose to the fitting on the valve cover.
4. Connect the driver's side hose to the fitting on the valve cover. Route the hose along the top of the valve cover and down the back of the engine with the passenger's side hose. Route the hoses away from any potential heat sources or rotating parts that could damage the lines during normal operation of the vehicle.
5. Install the 8" long 3/8 hose to the crank case breather on the right valve cover and run to the front of the engine. Secure the hose with a provided #6 hose clamp.

## Installing Spark Plugs, Coils, and Plug Wires:

1. Remove the factory spark plugs from the engine.
2. Remove the ACCEL spark plugs from the packaging and **Gap to .035 in.**
3. Apply a small amount of anti-seize to the threads of each plug and install as per the service manual.
4. Apply a small amount of dielectric grease to each spark plug isolator to simplify the installation of the spark plug boots and prevent the boots from popping off during heat build up.
5. Install the coil packs in the reverse order they were removed. Install the spark plug wires on to the new ACCEL spark plugs. Plug in the coil harness connector to the engine harness. Reinstall all the harness clips and retainers.



**New ACCEL Spark plugs compared to the OEM projected tip plugs**



## Installing PCV Hoses and Switching Valve:

1. Install the PCV switching valve on to the right front cylinder head using the supplied M10 x 25mm bolt. It will be necessary to remove the evaporative emissions canister Purge Control Solenoid (PCS) from the cylinder head and remove the metal mounting bracket from the PCS to make room for the PCV switching valve.
2. Install the 3/8" hose previously connected to the PCV vent on the passenger's side valve cover to the single port on the switching valve (marked PUMP). Install #6 hose clamp (**Figure 12**).
3. Wrap the threads of the 1 PSI pressure switch and (x2) 1/8" NPT x 3/8" 90 degree hose barb fittings with sealing tape. DO NOT cover the hole in the end of the threads.
4. Pre-assemble the 1 psi pressure switch into the side port of the three way 1/8" NPT tee. Install the 90 degree hose barb fittings into the end ports of the TEE (**Figure 12**).
5. Install the 24" piece of 3/8 hose to the bottom port on the 3 way tee and the 1" long 3/8 hose to the top port of the three way tee. Install #6 hose clamps .
6. Install a hose clamp on to the other end of the 1" hose. Install the pressure switch with the 1" hose to the bottom port on the PCV switching valves 2 port side (**Figure 12**).
7. The top port on the switching valves 2 port side will be connected to the right side turbo intake pipe if the installation is CARB Certified. Use the 180" long 3/8" hose and run along the rear of the engine with the oil return hoses. Mark the end of the hose that will connect to the turbo intake pipe for identification later. **NOTE:** A small catch can with oil separator can also be connected to this port and vented to atmosphere if the application is RACE ONLY.
8. Run the 24" hose along the cylinder head and under the throttle body to be connected to the throttle body bellows connection later.

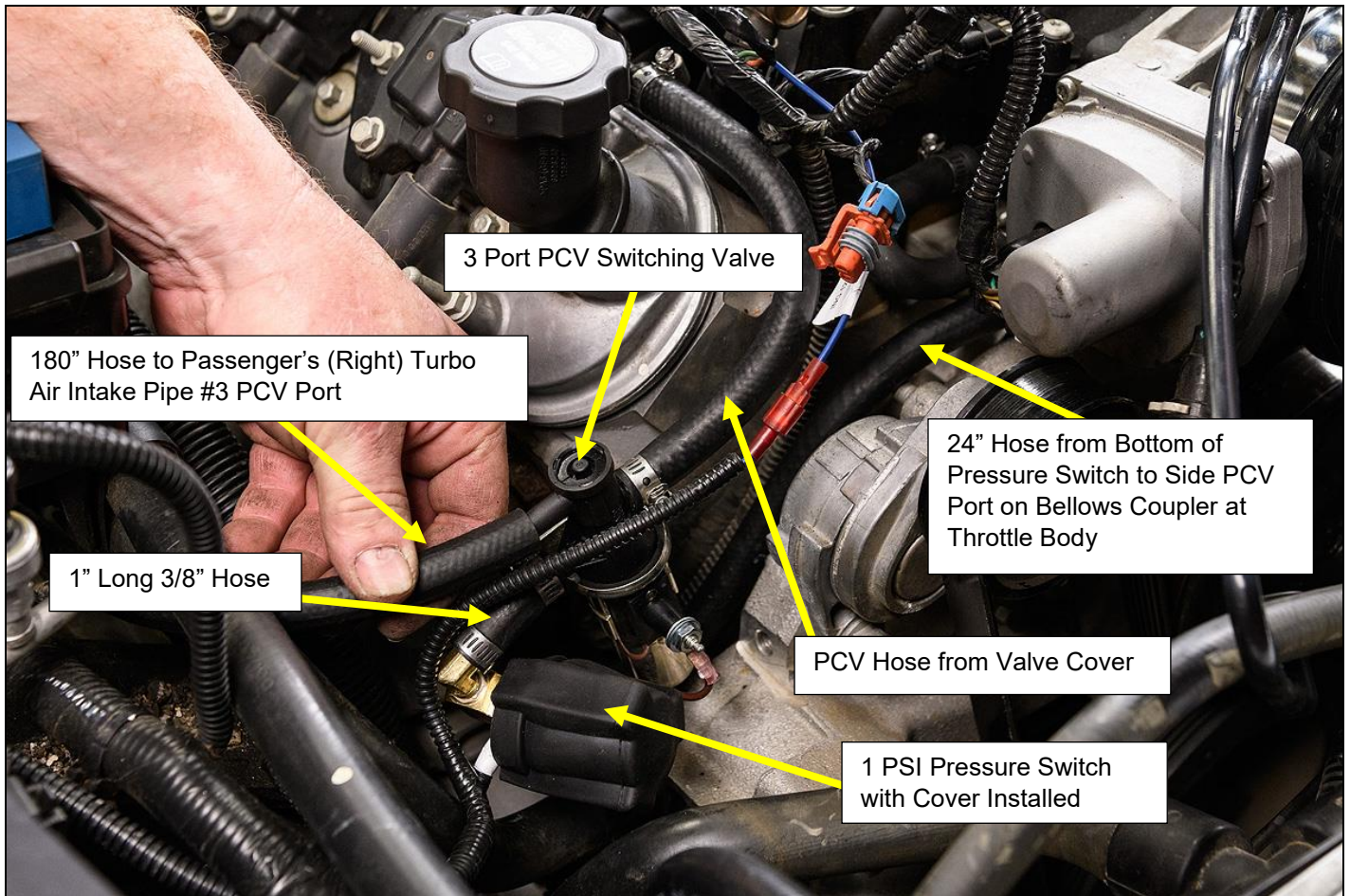


Figure 12

## Installing the PCV Check Valve:

1. Remove the molded corrugated plastic PCV hose from behind the throttle body. The PCV hose is connected from the manifold vacuum port directly to the crankcase ventilation port on the valley cover. Release the locking retainers on both ends to remove the hose.
2. Install the STS molded check valve hose into place (**Figures 13 & 14**).
3. Double check that the check valve is installed in the correct direction and preventing flow boost from the intake manifold to the engine.

**NOTE:** The purpose of the check valve is to prevent boost from entering the engine from the intake manifold, but will still allow proper venting of the crankcase gases into the intake manifold under vacuum.

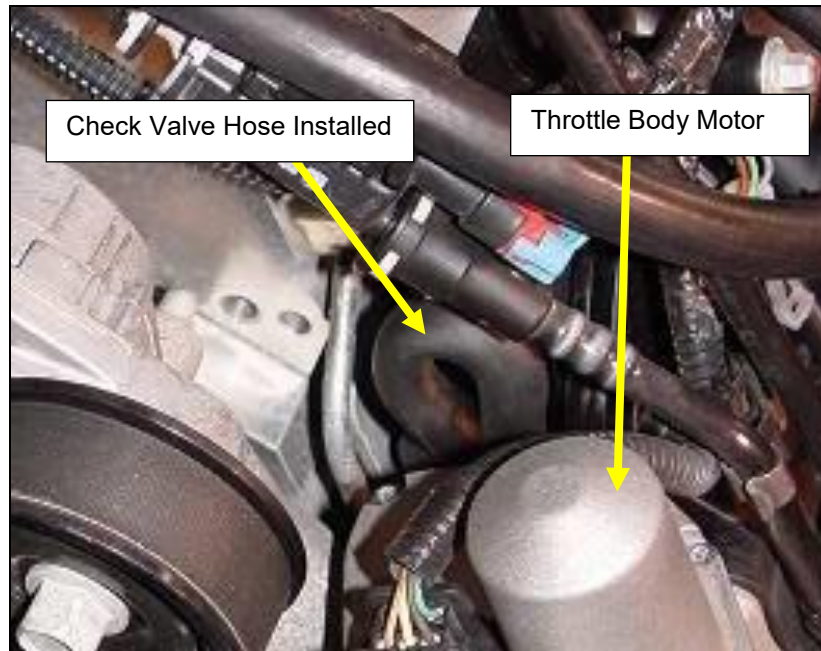


Figure 13

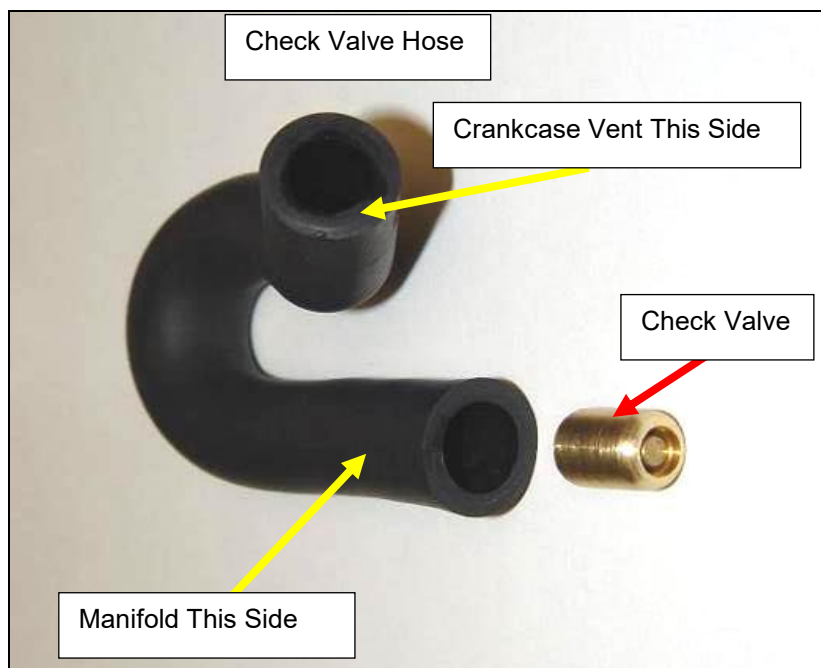


Figure 14



## Installing the 4-Way Vacuum /Boost Reference Tee:

1. Remove the brake booster vacuum line from the brake booster.
2. Cut the booster vacuum hose after the 90 degree bend in the vacuum hose and in the center of the first straight section.
3. Install the 4-way tee into the vacuum hose and tighten the clamps.
4. Install the 124" long 1/4" wastegate boost reference line to one of the 1/4" ports on the 4-way tee.
5. Install the 60" long 1/4" blow off valve vacuum/boost reference line to the remaining 1/4" port on the 4-way tee and tighten the clamps. Route the line towards the front of the car to be connected to the blow off valve later.
6. Tape the end of the 124" wastegate line and route down the back of the engine and along the previously installed oil return lines.

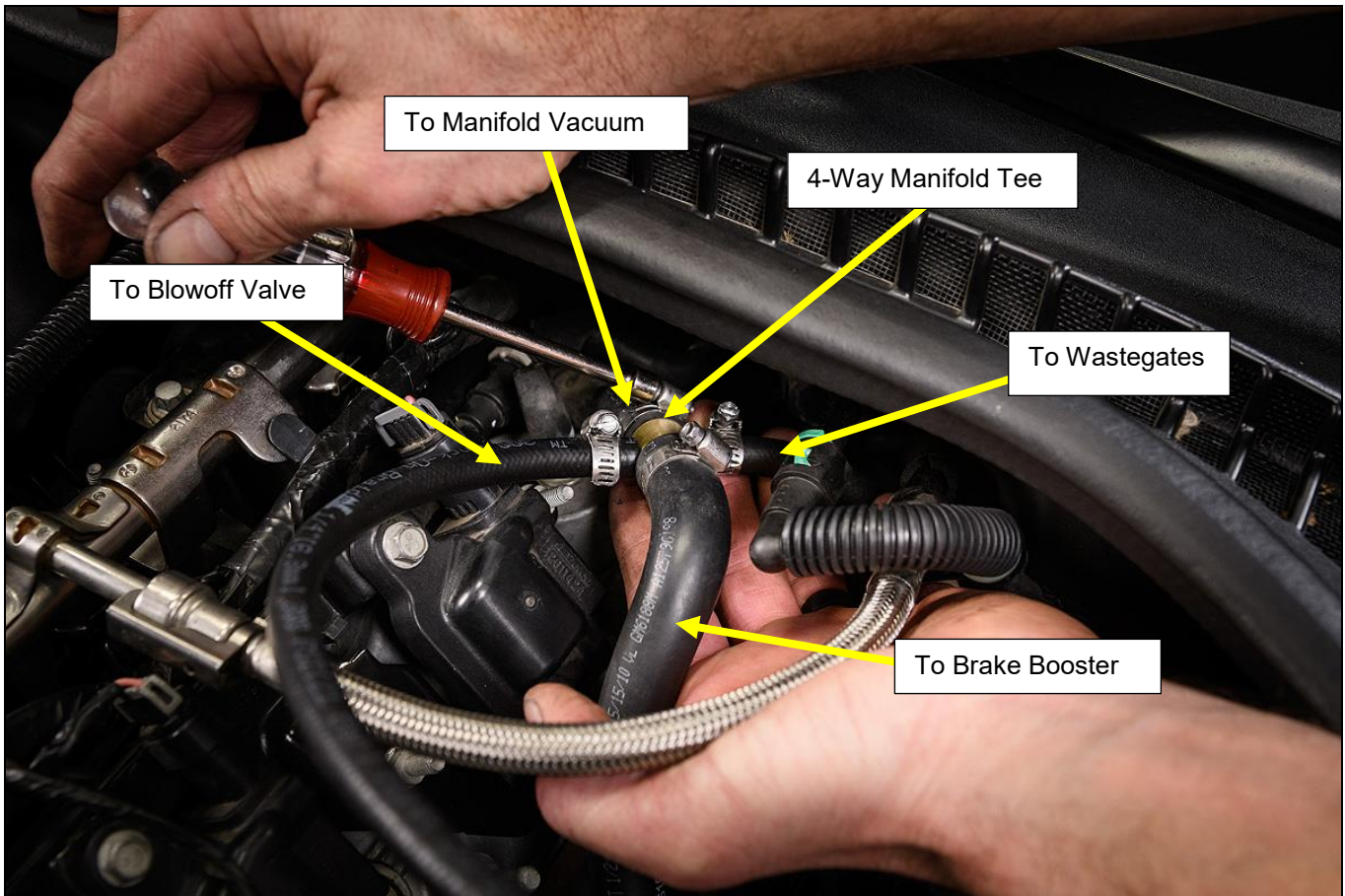


Figure 15



## Installing the Wiring Harness:

### Injector 12 Volt Power Connection

1. Remove the battery.
2. Remove the cover from the power distribution box on the right front fender.
3. Remove the connector from the #2 injector (passenger's side front cylinder of the engine).
4. Strip back the wire loom and electrical tape from the harness approximately 3 inches back from the connector.
5. Strip approximately 1/2" of insulation from the 12v power wire you located and marked earlier.
6. Solder the short Blue power wire from the STS wiring harness on to the injector 12v power wire.
7. Tape the connection with quality electrical tape. Re-tape the injector harness.

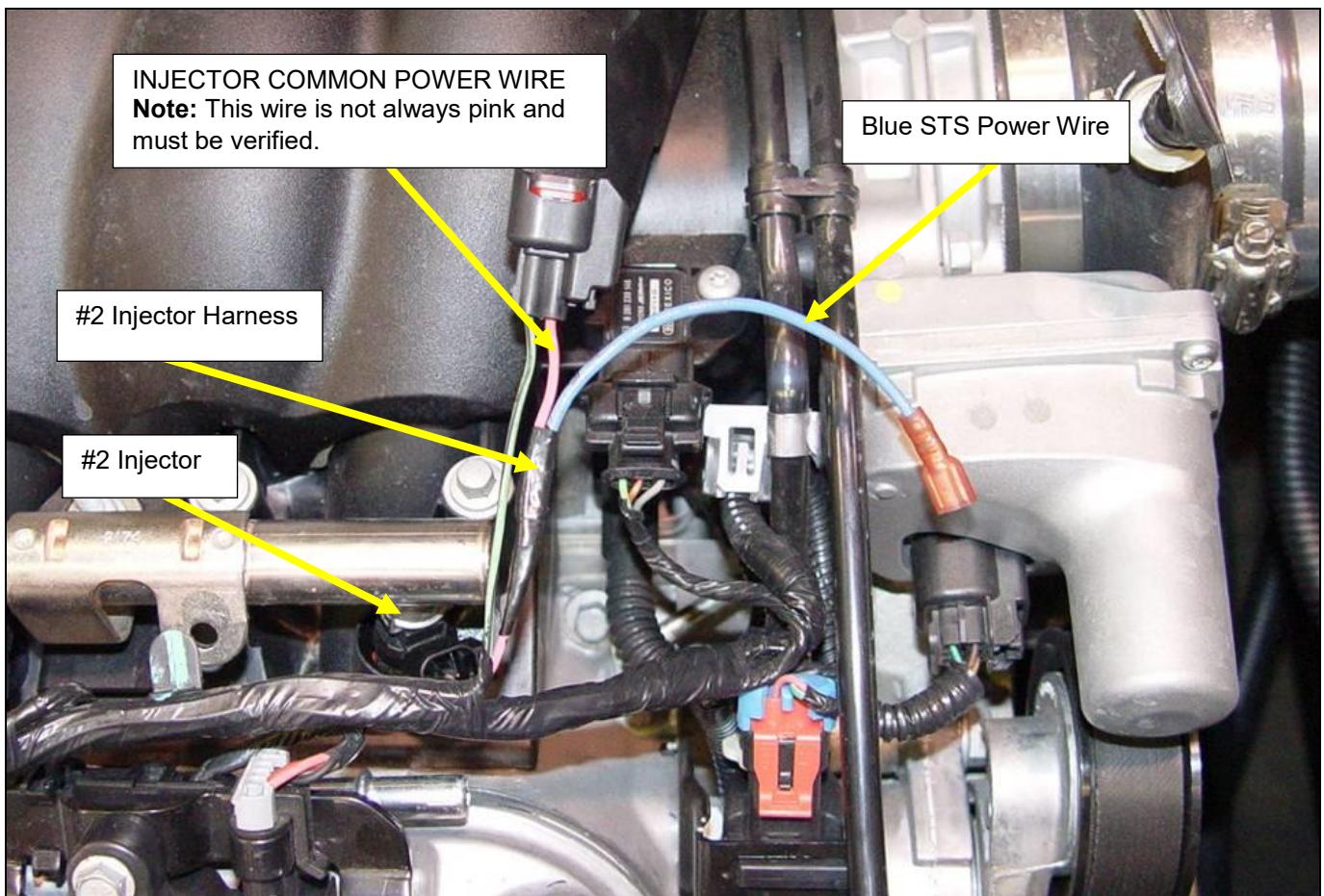


Figure 16

# Installing the Wiring Harness:

## Connecting Battery Power, Ground, and PCV Pressure Switch

1. Remove the 13mm nut from the remote battery power terminal on the power distribution box.
2. Connect the two red wires coming from the STS harness fuse holders to the remote battery terminal on the power distribution box (12v BATT).
3. Mount the relays under the hood latch and secure with the supplied wire ties to the factory harness.

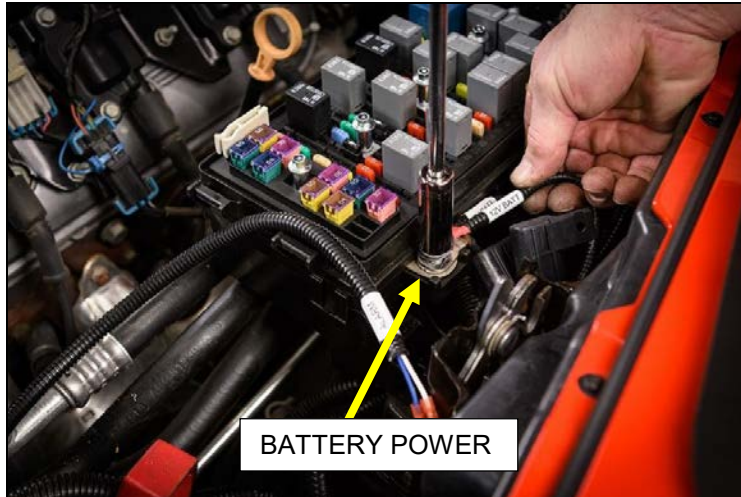


Figure 17

4. Run short section of the STS harness with the ground wire, blue injector power wire, and short pigtail for the PVC pressure switch. Route this section of harness under the power distribution box towards the front of the car.
5. Connect the STS ground wire to the ground lug on the frame rail just before the radiator support.
6. Route the PCV pressure switch wire and connect to one terminal of the pressure switch, connect one side of the short brown jumper wire to the 2nd terminal of the pressure switch and the other end of the brown jumper wire to the single terminal on the side of the 3 port PCV switching valve. **Do not overtighten this connection!**
7. Route the STS blue wire to the pigtail spliced into the injector harness. **Do not connect at this time.**
8. Route the long oil pump harness with the (x2) 4 pin connectors along the back of the engine and down the driver's side of the engine with the oil return lines. Keep the harness away from potential heat sources and moving parts.

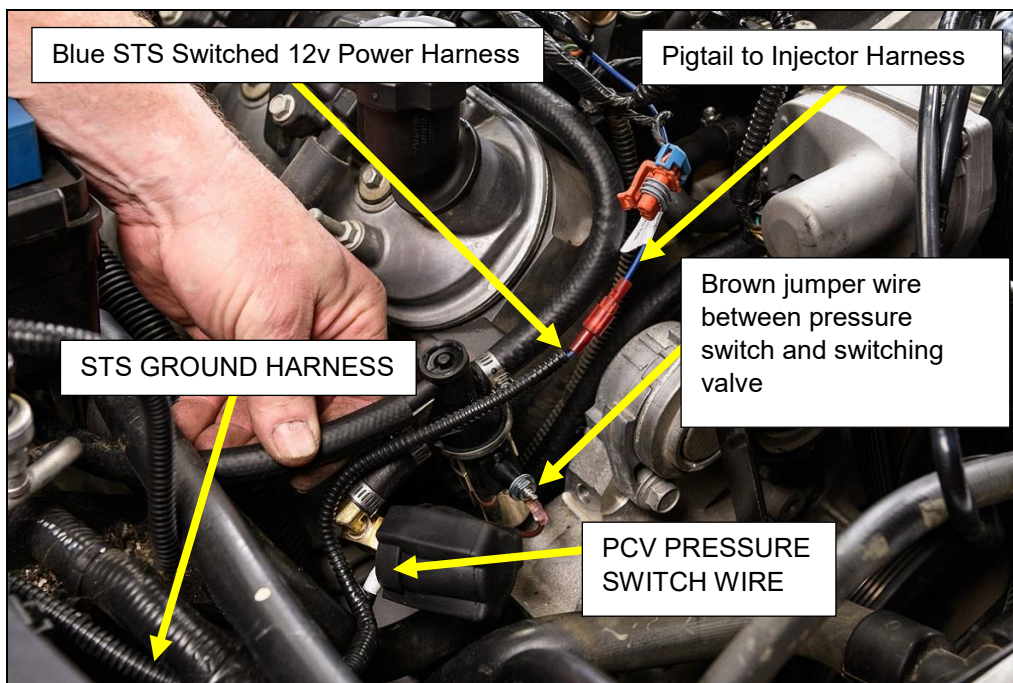


Figure 18



# Installing the Wiring Harness:

## Oil Pump Alarm Buzzer Harness

1. From inside the passenger's side of the vehicle, pull back the top of the floor mat and remove the kick panel below the glove box to allow access to the firewall. Pull back the rubber-backed insulation to expose where the factory wiring harness goes through the firewall grommet. Carefully cut a U shaped slot in the lower portion of the outer grommet just below where the factory harness goes through the firewall. Replace the outer grommet back into the firewall if removed.
2. From the engine bay, remove the ALARM buzzer from the STS harness and route the ALARM section of the harness through the hole in the firewall grommet and into the passenger's compartment as shown in **Figure 19**. Use a fish or coat hanger to feed the wires through the grommet.
3. From inside the passenger's compartment, install the alarm buzzer back onto the white and blue ALARM wires with the white wire on the negative side and the blue wire on the positive side (the positive terminal is coated RED). Use the provided nylon tie to secure the alarm buzzer under the dash in a location that allows the buzzer to be unobstructed so the driver can hear the alarm, while making sure that it clears any sharp and/or moving objects.

**NOTE:** This is also a good place to route the vacuum/boost hose through for a boost gauge. This is a good time to install any gauges or accessories that require routing through the firewall. It is recommended to install a vacuum/boost gauge in ALL turbocharged vehicles so that the boost level can be constantly monitored to prevent any over-boost conditions. A wideband air fuel ratio gauge is also recommended to be able to constantly monitor the air fuel ratio to prevent lean conditions under boost. An over-boost or lean condition can cause IMMEDIATE SEVERE ENGINE DAMAGE! It is the responsibility of the owner/operator to constantly monitor boost, air fuel ratio, and tuning parameters to prevent engine damage.

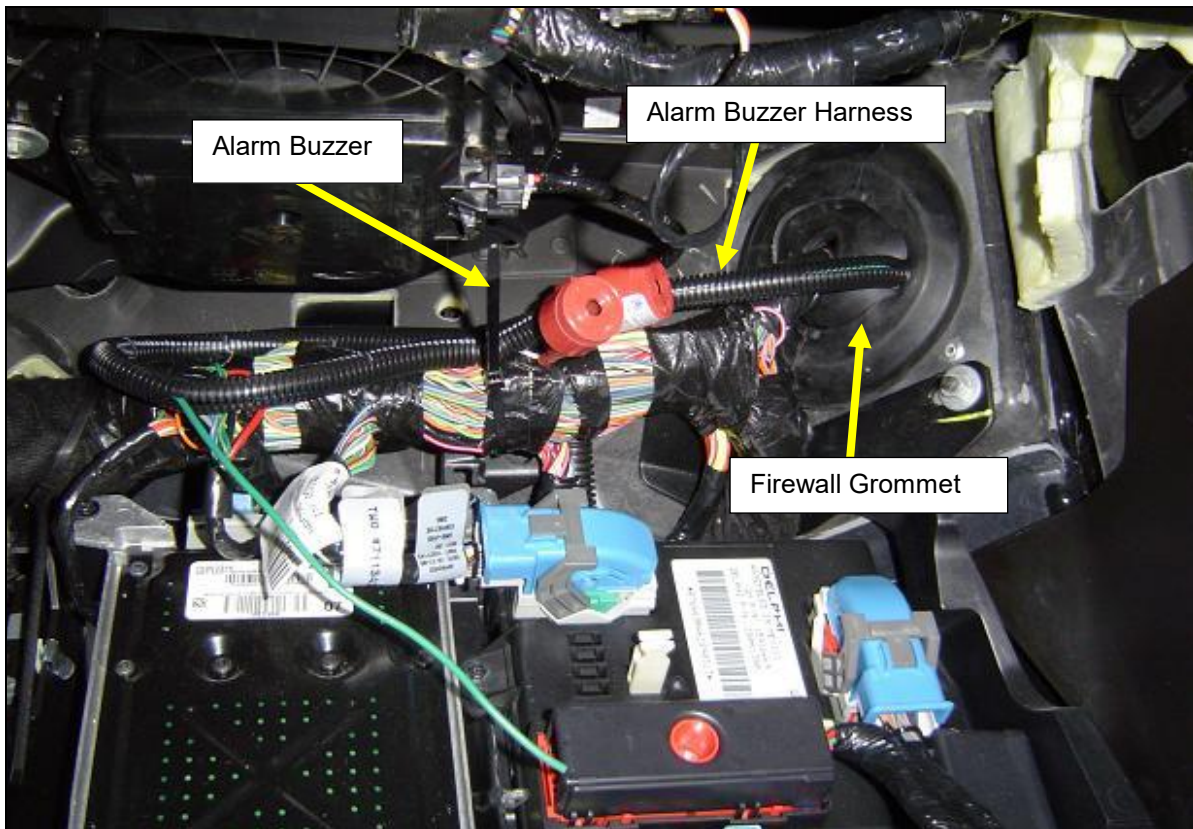


Figure 19

## Installing the Intercooler:

### Upper Radiator Support and Shroud Removal

1. Remove the (x4) 10mm bolts that secure the upper radiator support to the frame rails and remove the upper radiator support.
2. Unplug the hood light and external air temperature sensor plugs.
3. Remove the plastic push connectors that secure the radiator shroud to the A/C condenser on each side.
4. Remove the hood light connector from the radiator shroud.

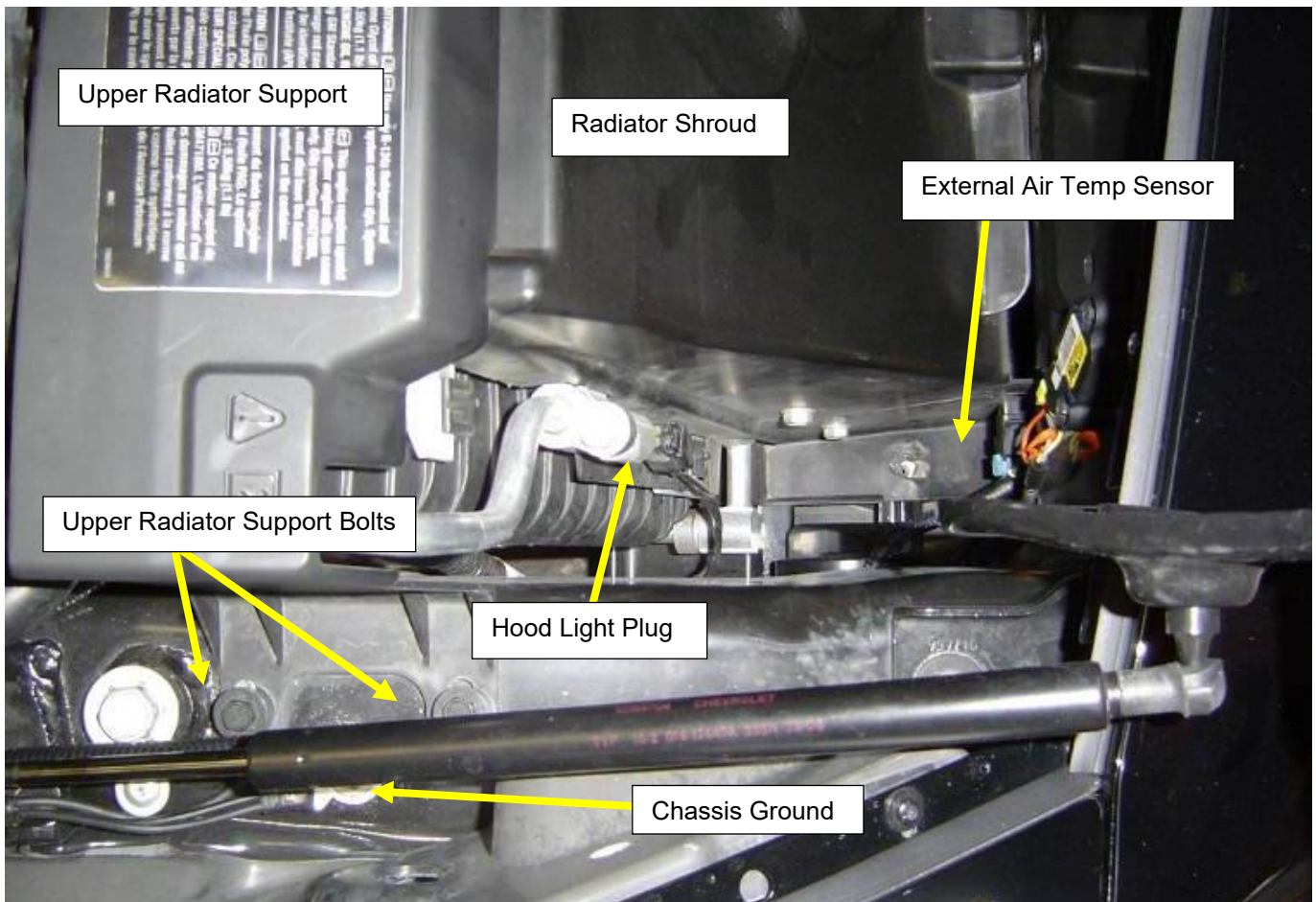


Figure 20



## Installing the Intercooler:

1. Remove the passenger's air dam section first, then the center section, and finally the driver's air dam sections
2. Remove the left and right brake duct inlets and lower air dam as one piece.
3. Remove the (x2) lower valance bolts and screws in the lower valance around the center panel.
4. Remove the center panel plastic rivets from under the valance and remove the center panel.
5. Remove the horn assembly.
6. Remove the radiator shroud.

**NOTE: The center panel will not be reinstalled.**

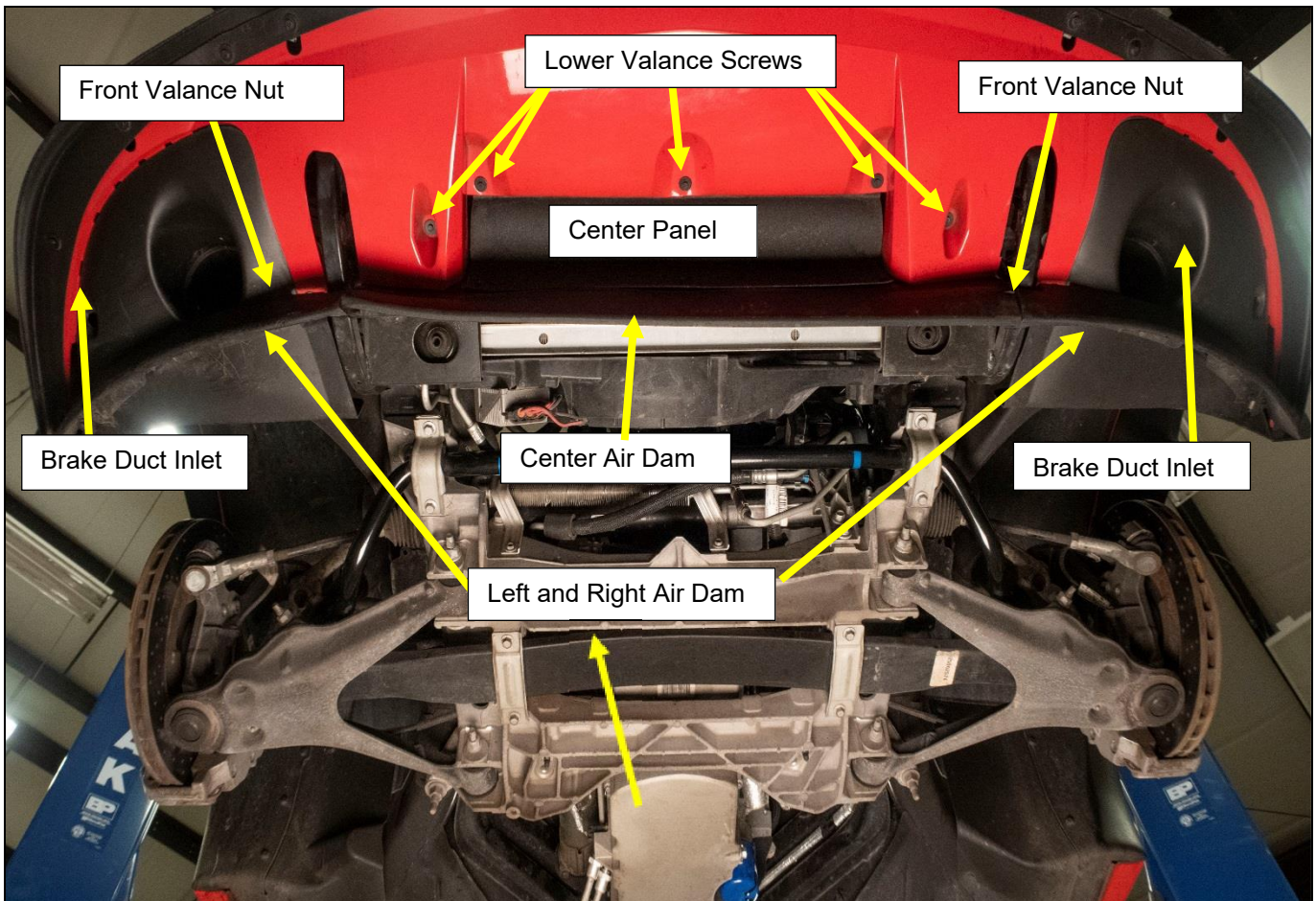


Figure 21

## Installing the Intercooler:

### Relocating the Horn Assembly

1. Unplug and remove the horn assembly from the lower radiator support.
2. Flip the horn bracket over and reassemble the horn assembly.
3. Drill a 1/8" drain hole in the left hand horn to allow water to drain from the body.
4. Install the horn assembly to the opposite side of the lower radiator support using the M6 x 35mm bolt. Plug in the horn assembly.
5. Remount the temp sensor.

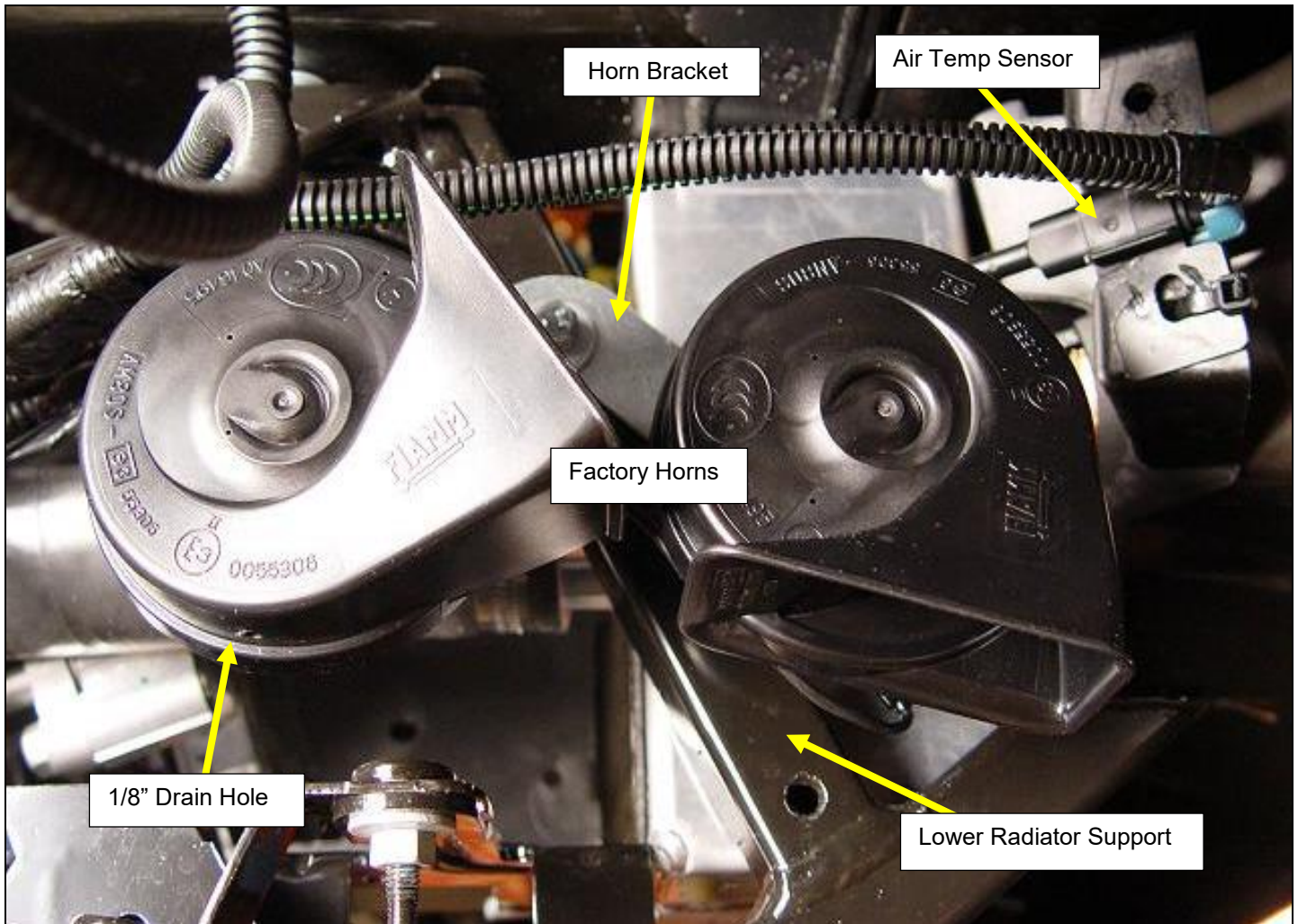


Figure 22



## Installing the Intercooler:

1. Loosen the (x4) bolts on the lower radiator support. Remove the bolts one at a time.
2. Install (x4) 3/8 flat washers between the bracket and the frame on the (x2) rearward bolts and loosely reinstall the bolts.
3. Install (x2) 3/8 flat washers between the bracket and the frame on the (x2) forward bolts and loosely reinstall the bolts.
4. Tighten the bolts evenly, making sure the flat washer on the bolts stay centered in the channel on the bracket to prevent the bolt from cross threading into the frame.

**NOTE:** This will lower the radiator approximately 1/4" to make room for the intake pipe to clear the top of the radiator flange when installed.

5. Pull back the lower valance and install the intercooler assembly between the valance and the lower radiator support.
6. Install the 9" and 10" long silicone hoses on to the 2-intercooler inlets. This will help line up the intercooler and provide clearance at the oil cooler lines and radiator support.
7. Hold the intercooler up firmly against the bottom of the front crossmember. Check clearance at the silicone hoses.
8. Have a second person mark the location of the mounting holes using the holes in the mounting bracket as a guide. A small scribe or center punch can be used to trace the inside of the mounting bracket holes.
9. Remove the intercooler from the car.
10. Center punch the exact location marked through the intercooler mounting bracket holes.
11. Use the provided 5mm drill bit and a 90 degree drill to drill the hole in the marked location.
12. Use the provided 6mm tap to thread the holes for the mounting bolts.
13. Reinstall the intercooler, apply Loctite® to (x2) M6 x 20mm bolts and install the bolts and a flat washer at each intercooler bracket location. Tighten the bolts to no more than **45 in./lbs.** as the threads can strip easily.
14. **Cover the intercooler outlet to prevent debris from entering the intercooler while additional work is performed**

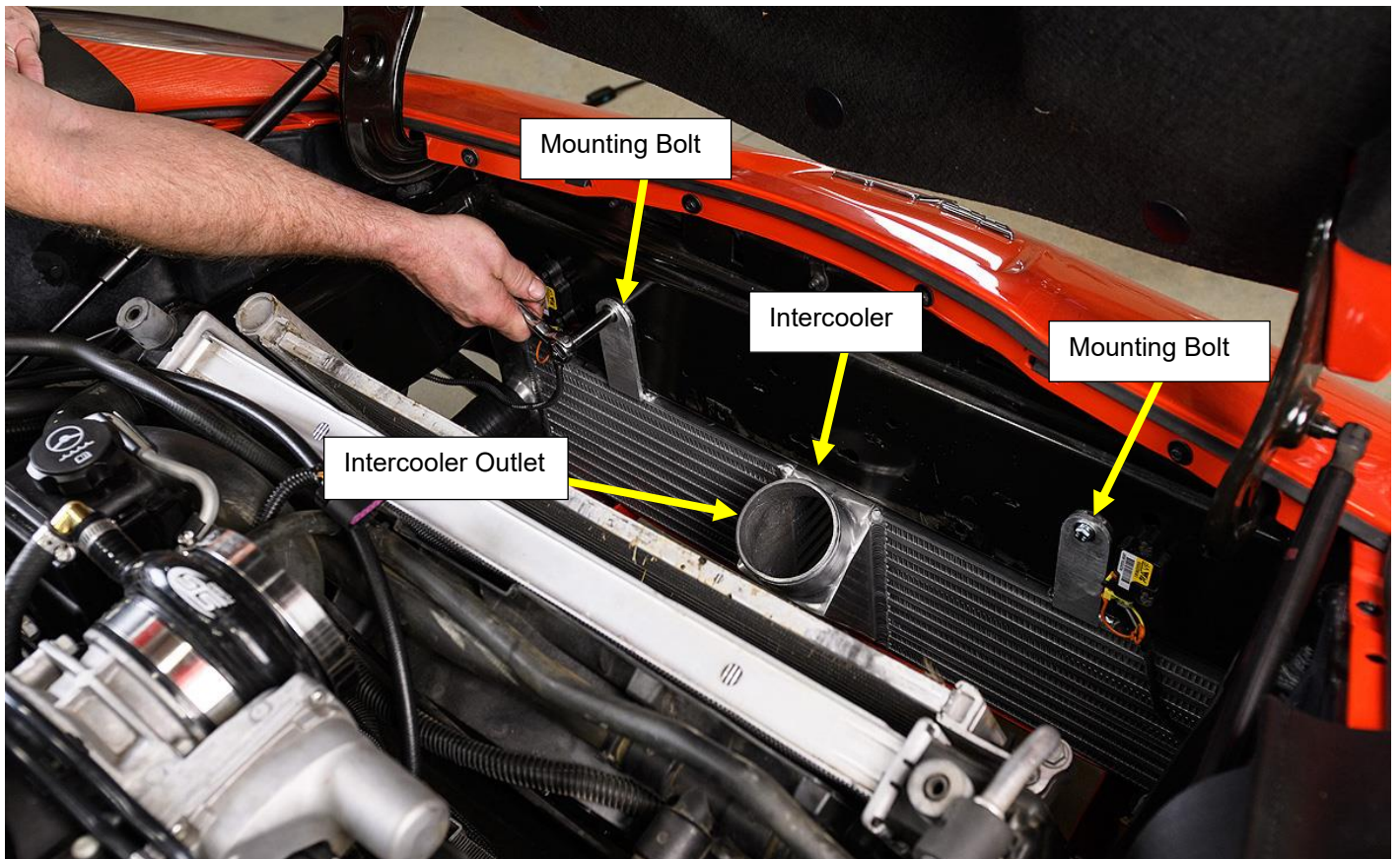


Figure 23

# INTERCOOLER INSTALLATION WARNING!

The installation of an intercooler is a great addition to any turbocharger system and can dramatically increase the efficiency, power, and reliability of your turbocharger system by lowering intake temperatures and creating a denser intake charge. There is, however, a slight possibility that under some very specific conditions that water may accumulate in the bottom of the intercooler. Because of the cooling and condensing effect of the intercooler on the air inside the cooler during some driving conditions as well as after the engine has been shut off, accumulation of liquid inside the intercooler can occur. Due to the airflow characteristics of an intercooler, the airflow through the bottom of the core may not be enough to keep this liquid cleared out and could allow it to build to a substantial level. If this occurs, this liquid could be pulled up into the engine during a high airflow demand. A large amount of liquid can cause a hydra-lock condition that will cause IMMEDIATE SEVERE damage to the engine as the engine will not be able to compress the liquid during the compression stroke which will cause a mechanical failure of the engine components. Conditions that could cause this problem would be extreme wet driving conditions, submerging the air intake system in water, high humidity and/or extreme temperatures.

The possibility of this rare condition can be greatly reduced and/or prevented. It is highly recommended that you perform one of the following methods:

1. Regularly inspect the intake system and intercooler for signs of water accumulation and clean out any water and/or oil (fluid) that is found inside the intake system.
2. Drill a 1/8" hole in the rear-bottom corner of the center intercooler tank and install a small sheet metal screw that can be removed on a regular basis to inspect for liquid accumulation inside the intercooler and allow that fluid to be drained from the cooler. (NOTE: The cooler will only drain when you physically remove this screw. If left unchecked, it could accumulate enough liquid inside the cooler to cause engine damage.)
3. Drill a small 1/16" hole in the rear-bottom corner of the center intercooler which will allow the boost pressure within the intercooler to automatically purge any liquid from the system through the hole.

**NOTE:** This small hole will not allow enough airflow to pass through it to affect performance, but should allow any fluid in the system to automatically drain. There is a risk that the hole could become plugged, so it is recommended that the hole be checked to make sure it remains clear periodically.

**NOTE:** There is a remote possibility that this condition could occur in the intake tubing of the turbocharger system without an intercooler. The above precautions could be taken by drilling a small hole in the lowest point of the turbocharger intake tubing as described in step 2 or 3.



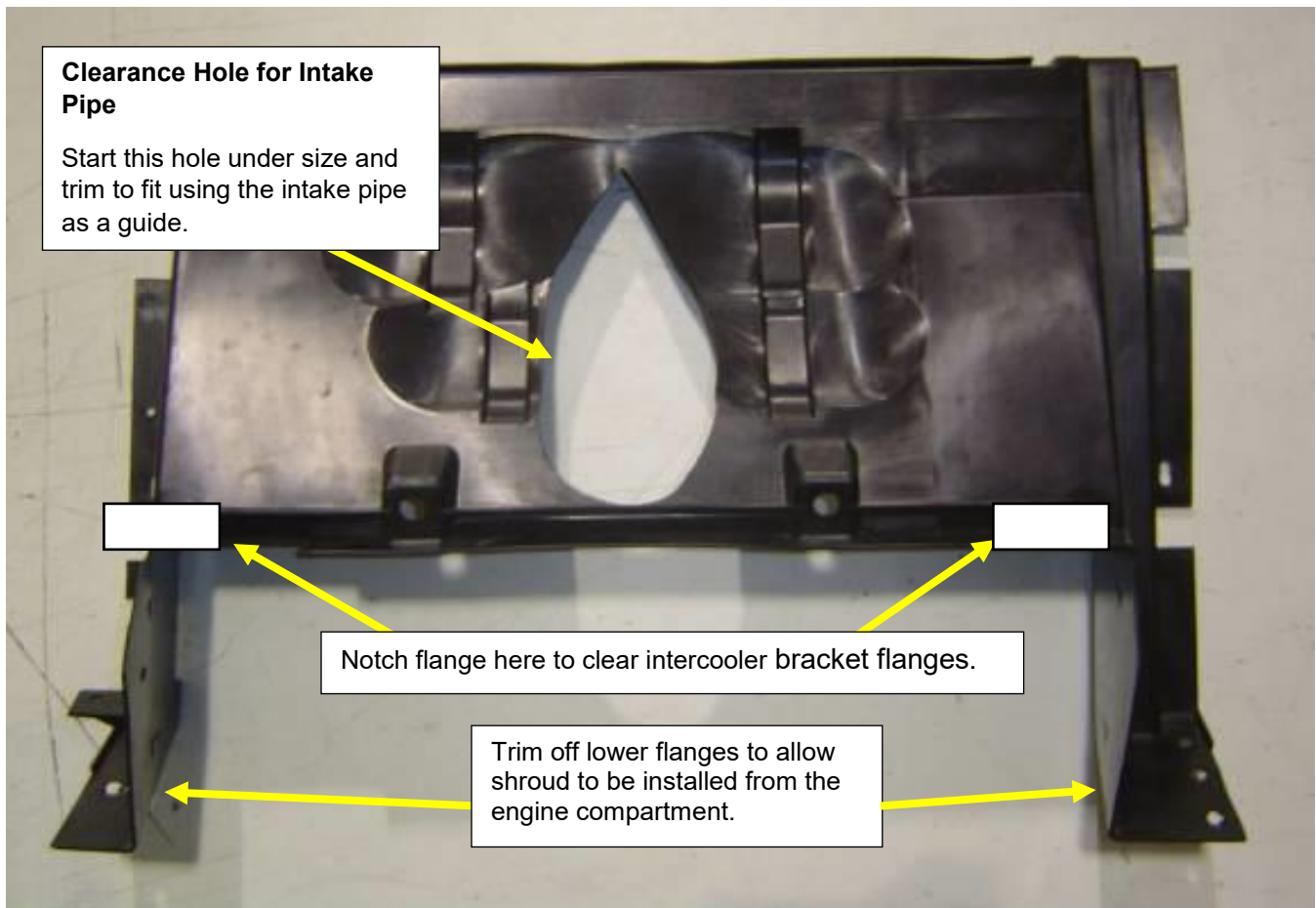
## Installing the Intercooler:

### Plastic Shroud Modifications

1. Trim the upper radiator shroud (**Figure 24**).
2. Install the radiator shroud from the top.
3. Make small trim adjustments as needed to fit the upper radiator shroud over the intercooler and on to the radiator.
4. Do not install the fasteners at this time.
5. Trim the center hole for the intake pipe after the shroud fits easily in place. Start the center hole at the intercooler outlet. Trim the shroud upward towards the throttle body. Using the intake pipe as a guide as you work, place the intake tube into the car and align the tube ends to the intercooler outlet and the throttle body. Trim small amounts of material at a time. The closer the tube is too fitting, the smaller the amount of material will need to be removed.
6. **Do not rush this process!** Trim the shroud to fit with as little air gap around the intake pipe as possible. This will not just look better, but will also keep the airflow through the radiator as high as possible.

**NOTE:** Use a small Dremel® tool or sanding roll in a drill to shape the plastic shroud once the basic cut out is achieved.

7. Install the plastic push clips.



**Figure 24**

## Installing the Intercooler:

### Upper Radiator Support

1. Install the blue plastic spacers under the OEM upper radiator support bushings. This will take up the 1/4" space left when the lower radiator support was lowered to allow better clearance between the intake pipe and radiator.
2. Install the plastic upper radiator support and install the (x4) bolts.

**NOTE:** Some modifications to the radiator support may be needed to clear the intake pipe.

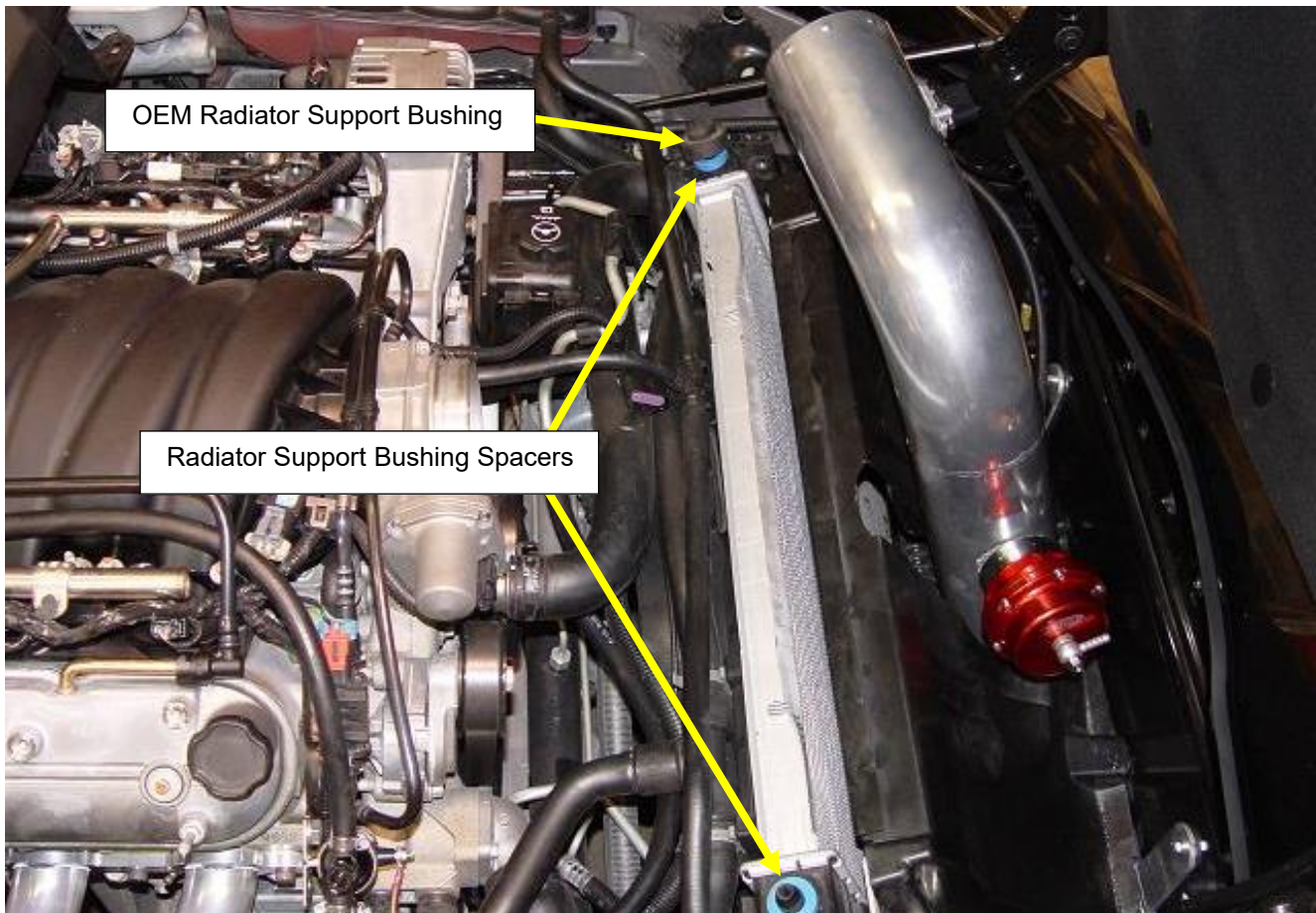


Figure 25

# Installing the Intake Pipe:

## Blow Off Valve

1. Remove the V-band clamp from the blow off valve and install it on to the intake pipe (**Figure 26**).
2. Install the O-ring supplied with the blow off valve into the blow off valve flange (**Figure 27**).
3. Install the blow off valve on to the intake pipe, expand the clamp, and install onto the blow off valve and intake pipe evenly while keeping pressure on the valve. **Be sure the O-ring is in place.**
4. Install the bolt and tighten to allow the valve to be adjusted.
5. Apply sealing tape to the threads of the supplied hose port fitting and the pipe plug.
6. Install the hose port fitting into the driver's side port and install the plug into the second port of the top cover. Tighten both fittings to a snug condition. **DO NOT OVER TIGHTEN (Figure 28).**

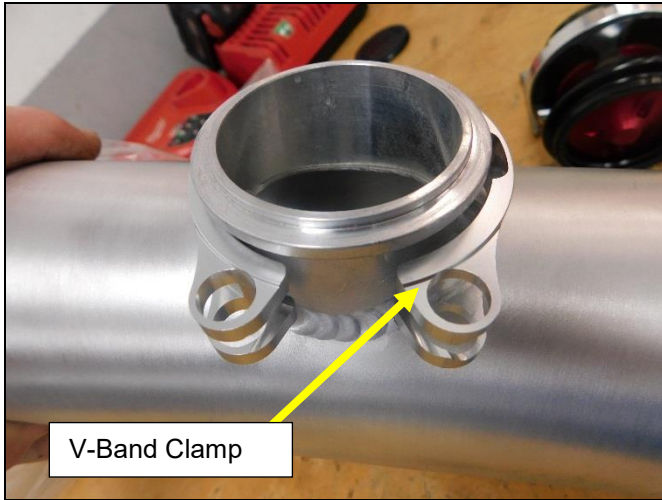


Figure 26



Figure 27

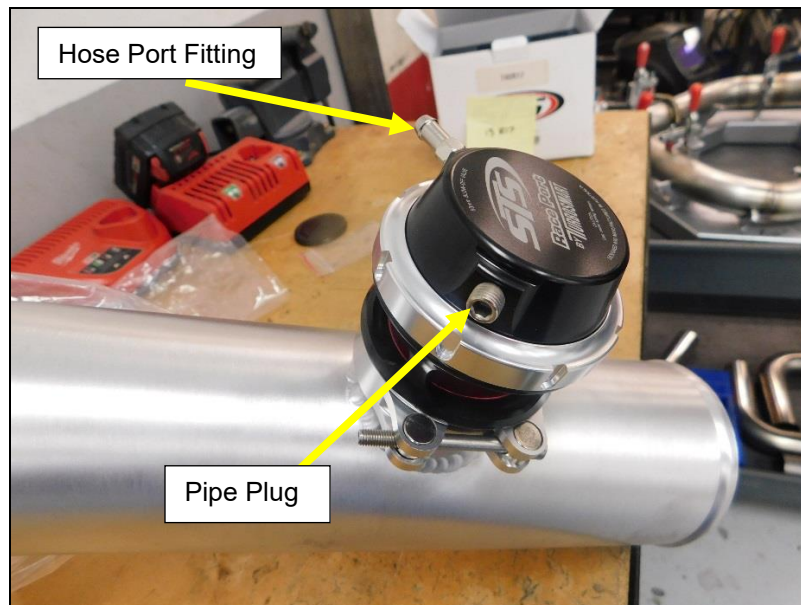


Figure 28



# Installing the Intake Pipe:

## Intake Pipe

1. Install the 3.5" x 3" silicone couplers fully on to the intake pipe at the intercooler end (long leg).
2. Install (x2) 4" hose clamps on to the 3.5" couplers.
3. Install a 4" hose clamp on to the smaller side of the humped coupler.
4. Install the 4" silicone hump coupler on to the intake pipe throttle body end (short leg) with the larger opening of the coupler to the throttle body side.
5. Install the 4.5" hose clamp on to the throttle body side of the coupler.
6. Install the intake pipe in to the vehicle. Align the intake pipe with the intercooler and throttle body.
7. Slide the 3.5" coupler down on to the intercooler 3.5" outlet port.
8. Slide the humped coupler on to the throttle body and rotate the side port to the driver's side and stop at approximately the 3 o'clock position.
9. Align the couplers and tighten the hose clamps.
10. Install the 3/8" 90 degree hose barb into the side PCV port of the bellows coupler and install a hose clamp. Trim the hose previously run from the bottom port of the PCV pressure switch to the hose barb for a correct fit. Install a hose clamp, connect the PCV hose to the hose barb installed in to the side PCV port, and tighten the hose clamp (**Figures 29 & 30**).
11. Install the 1/4" boost/vacuum line from the 4-way tee installed in the brake booster hose to the hose port on the blow off valve. Install the hose clamp.

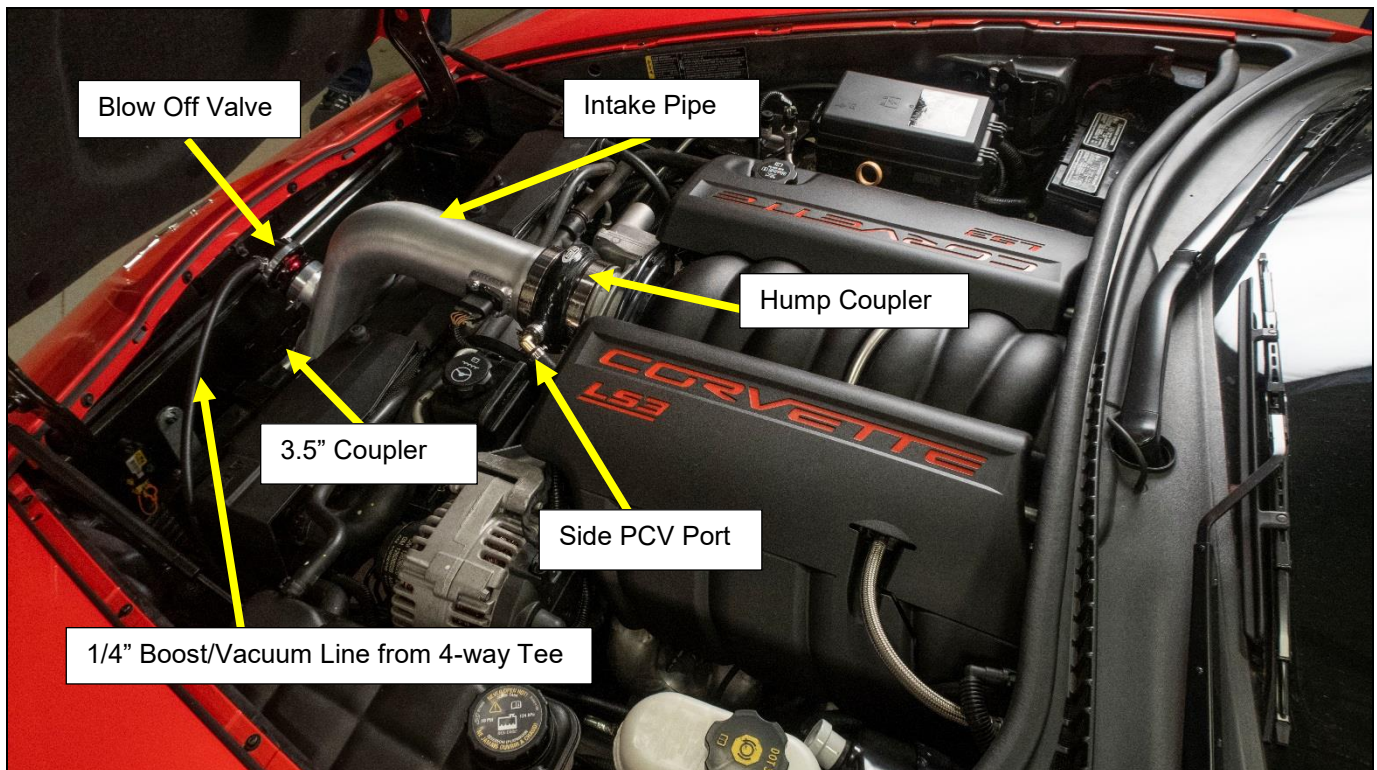


Figure 29

## Installing the Intake Pipe:

### Mass Air Flow Sensor

**IMPORTANT:** The Mass Air Flow (MAF) sensor should be handled with care. Be careful not to drop or bang the sensor. If necessary, clean the sensor with **ONLY** cleaning agents designed for MAF sensors. Never clean a MAF sensor with carburetor cleaner or brake cleaner.

1. Remove the MAF Sensor from the OEM intake pipe.
2. Inspect the sensor for excessive oil or dirt build up on the sensor head. Clean or replace as required.
3. Using the supplied screws, install the MAF Sensor into the STS intake pipe as shown.  
**NOTE: the MAF Sensor is directional and will only install correctly in one direction**
4. Plug in the MAF Sensor connector and secure the lock.

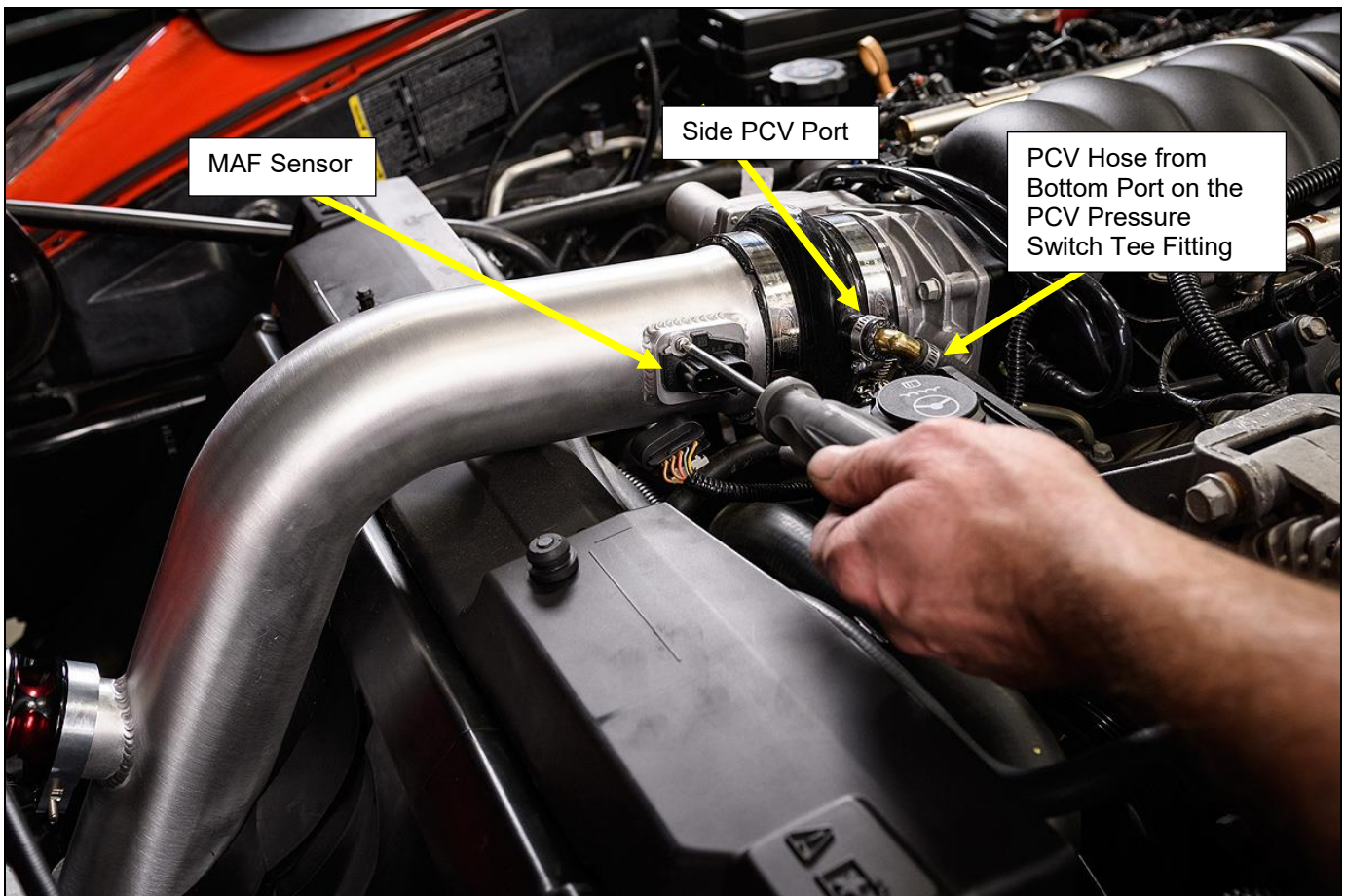


Figure 30



## Installing the Oil Supply Adapter and Routing Hoses:

### Removing the Mufflers

1. Remove the rear sway bar center mounts and allow the sway bar to rotate down.
2. Loosen the band clamps at the H-pipe to muffler over axle pipe connections.
3. Remove the muffler hanger mounting bolts from the rear bumper support.
4. Remove the driver's side muffler assembly first.
5. Remove the passenger's side muffler assembly.

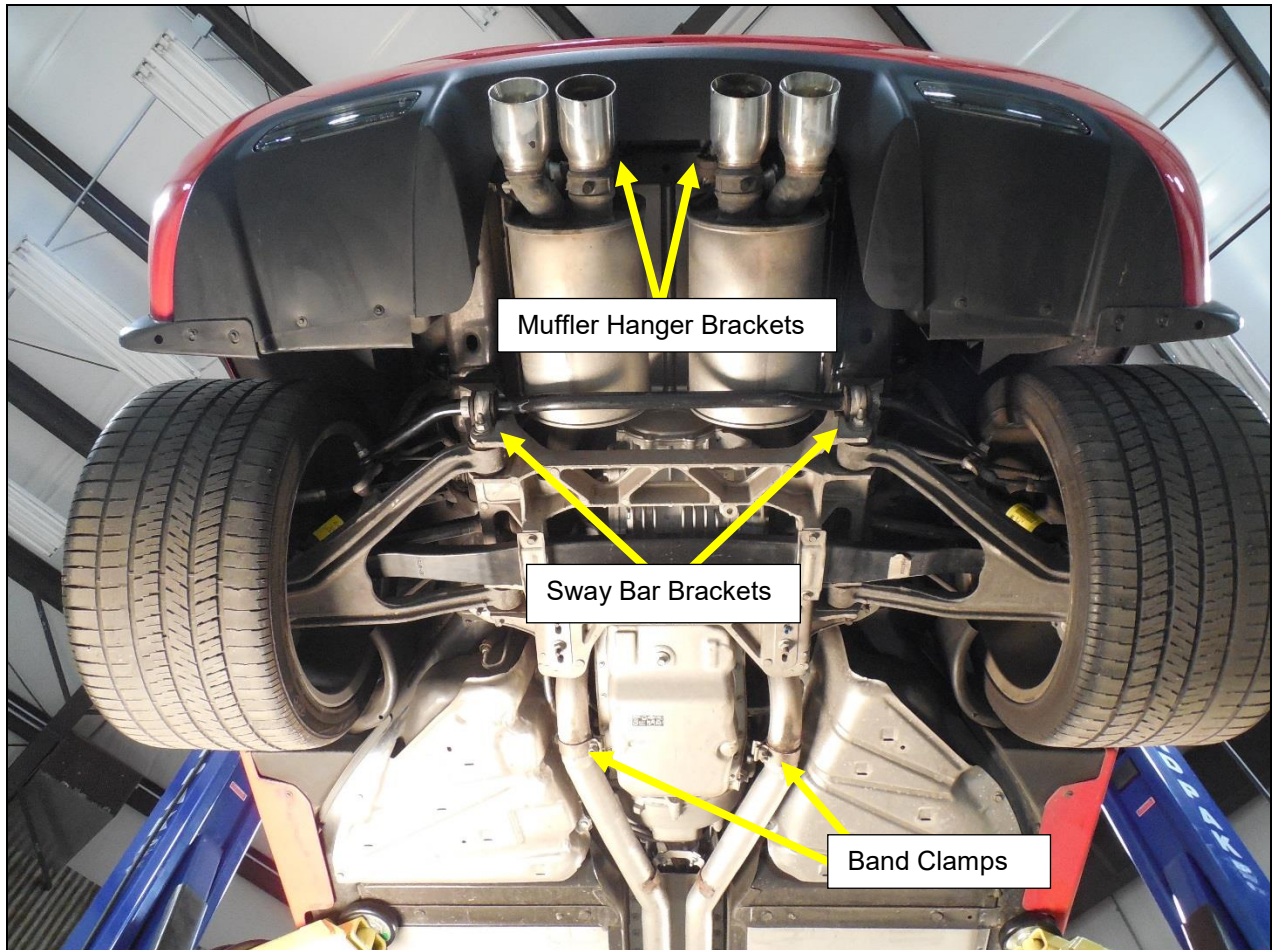


Figure 31

# Installing the Oil Supply Adapter and Routing Hoses:

## Removing the H-Pipe and Catalytic Converters

### H-Pipe

1. Remove the bolts at the flanges between the catalytic converters and H-pipe.
2. Remove the 13mm nuts at the spring hangers on the H-pipe.
3. Remove the H-pipe from the vehicle.

### Catalytic Converters

1. Unplug the pre and post catalytic converter O2 sensors.
2. Remove the (x2) 15mm bolts at the inlet flange of the catalytic converters.
3. Remove the left and right catalytic converters.

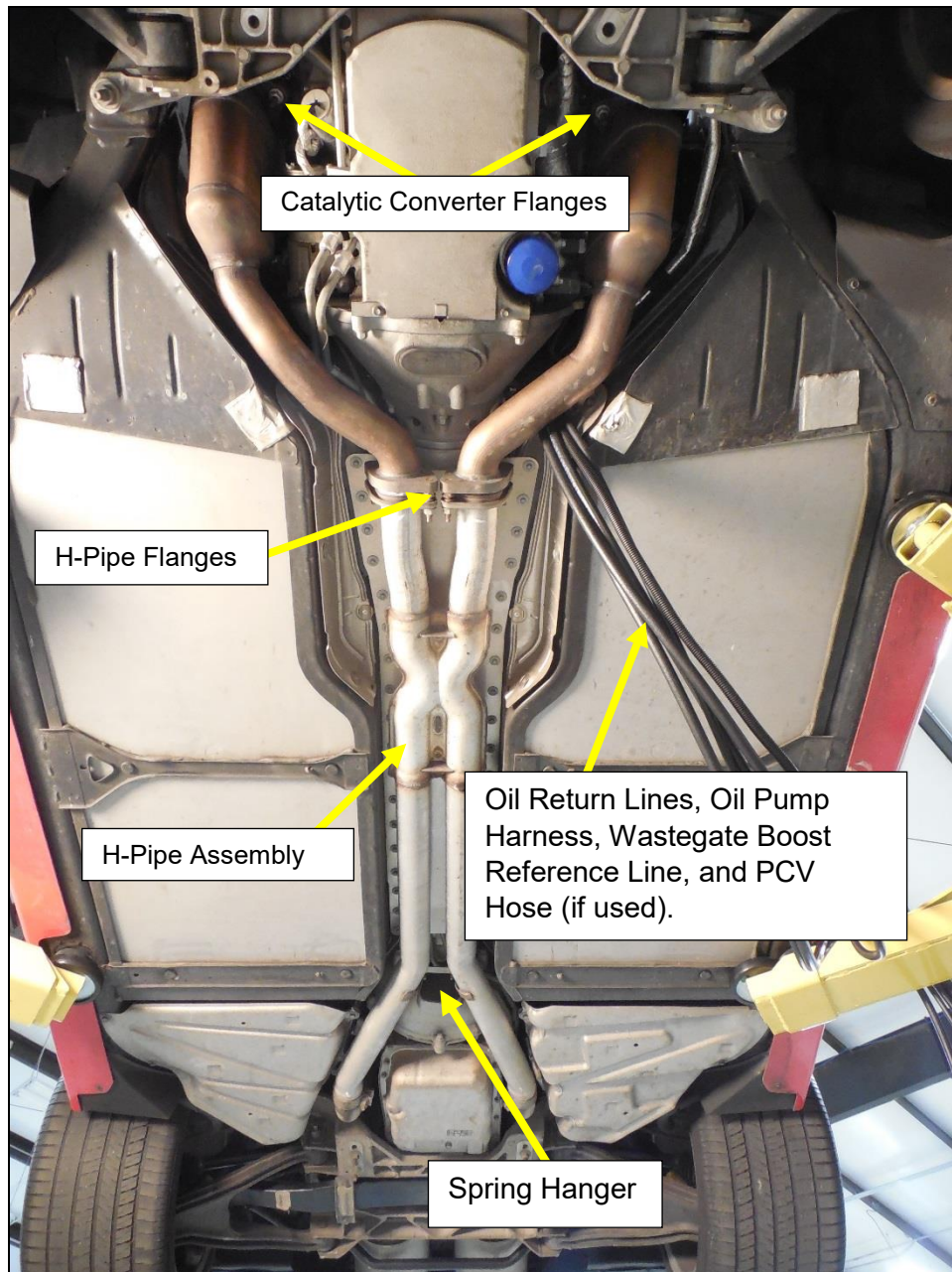


Figure 32



## Installing the Oil Supply Adapter and Oil Supply Line:

1. Remove the 6mm bolts from the oil cooler adapter block-off cover or oil cooler adapter at the oil filter housing (**Figure 33**).
2. Carefully remove the gasket and set aside for reuse later. **NOTE: Replace this gasket if damaged.**
3. Apply sealing tape to the threads of a -6 x 1/8"NPT 90° fitting.
4. Install the -6 x 1/8" NPT 90° fitting into the oil supply adapter fitting with the fitting facing the front of the car (**Figure 34**).
5. Blow compressed air through the -6 braided hose to clear any debris that might be inside the hose.
6. Install the -6 steel braided oil supply line on to the fitting and tighten.
7. Locate the adapter plate at the oil filter housing. Cover the open end of the hose. Route the -6 steel braided line behind the shielded harness and back towards the rear of the car (**Figure 35**).
8. Install the supplied M6 x 40mm flanged bolts into the oil cooler block-off cover, if used.

### OR

- Install the supplied M6 x 50mm flanged bolts into the OEM oil cooler adapter plate, if used.
9. Install the OEM gasket on to the bolts. **NOTE: Replace this gasket if damaged.**
  10. Install the STS oil supply adapter plate on to the bolts.
  11. Install the supplied 2 hole gasket on to the bolts.
  12. Install the assembly on to the oil filter housing with the -6 fitting facing the front of the car.
  13. Torque the bolts to 18 ft./lbs.

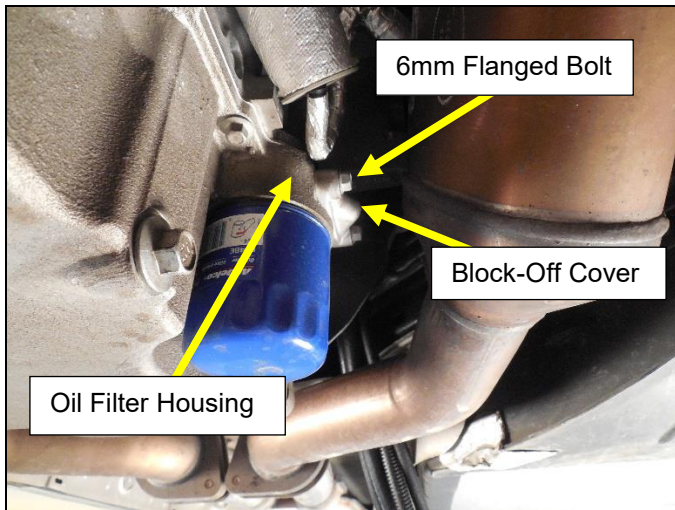


Figure 33

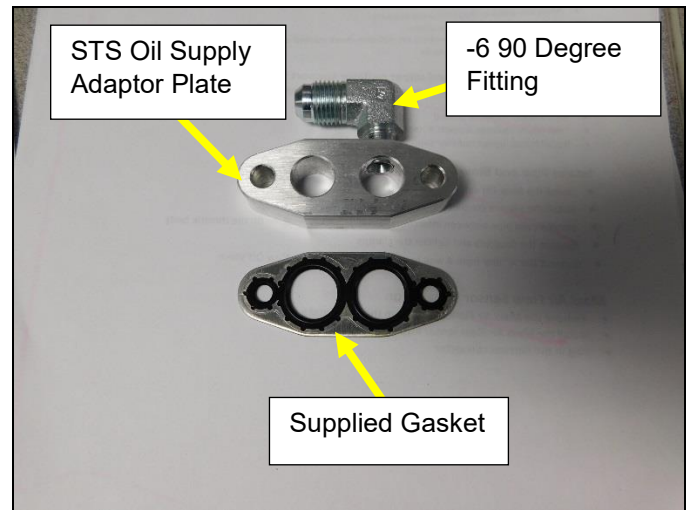


Figure 34

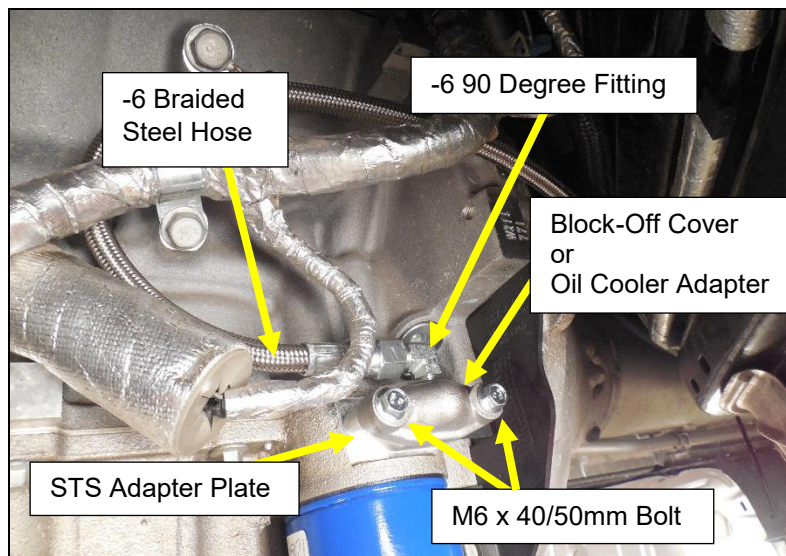


Figure 35



## Routing the Oil Lines and Oil Pump Harness:

1. Remove the 36 torque tube cover plate bolts and remove the cover plate.
2. Route the oil return hoses, oil pump harness, wastegate boost line, PCV vent line (if being used for CARB certified applications), and the oil supply line. Route hoses and lines down the torque tube tunnel along existing hard lines clamped to the body. Use the supplied cable ties to secure the lines as you go (**Figure 36**).  
**CAUTION:** Take extra time to be sure the lines are not routed close to any hot or rotating components or pinched between the engine and firewall. Be aware of components that could burn or damage the lines under normal driving conditions. This is particularly critical where the lines come down the back of the engine and past the catalytic converters.
3. Terminate all the lines and oil pump harness to the center of the muffler box directly over the differential (**Figure 37**).
4. Re install the torque tube cover.

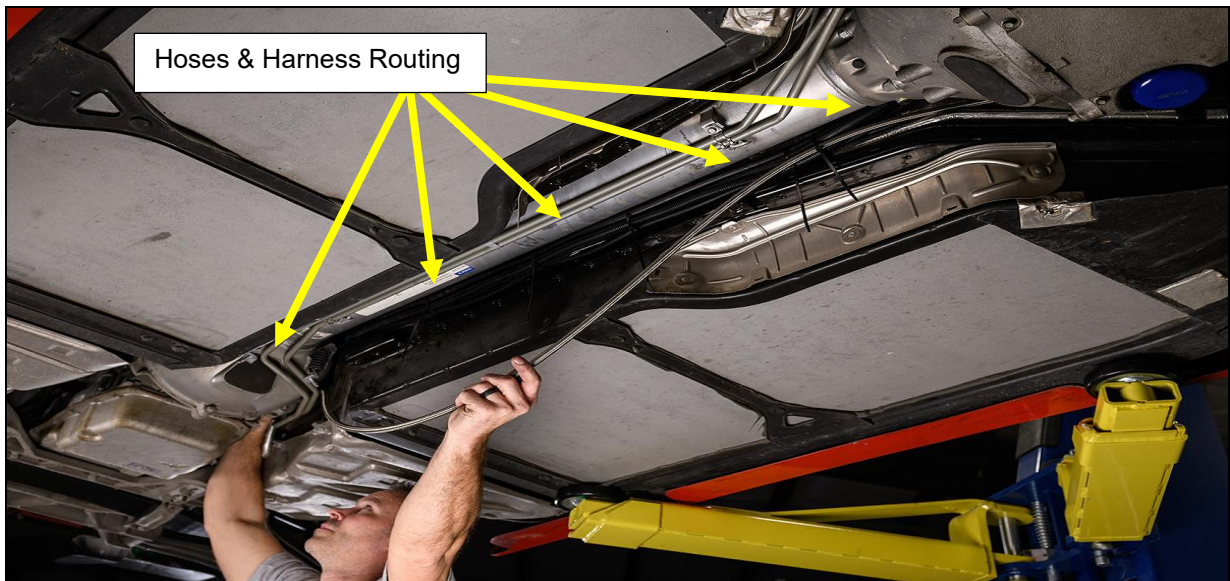


Figure 36

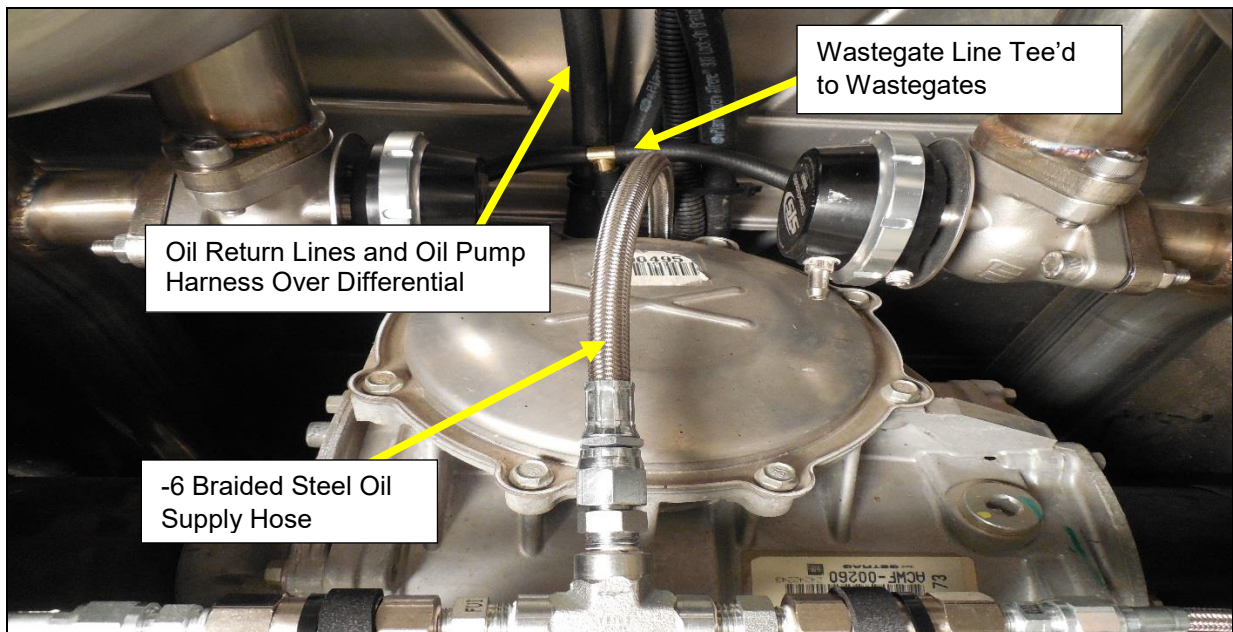


Figure 37

## Pre-Assembling Oil Return Pumps:

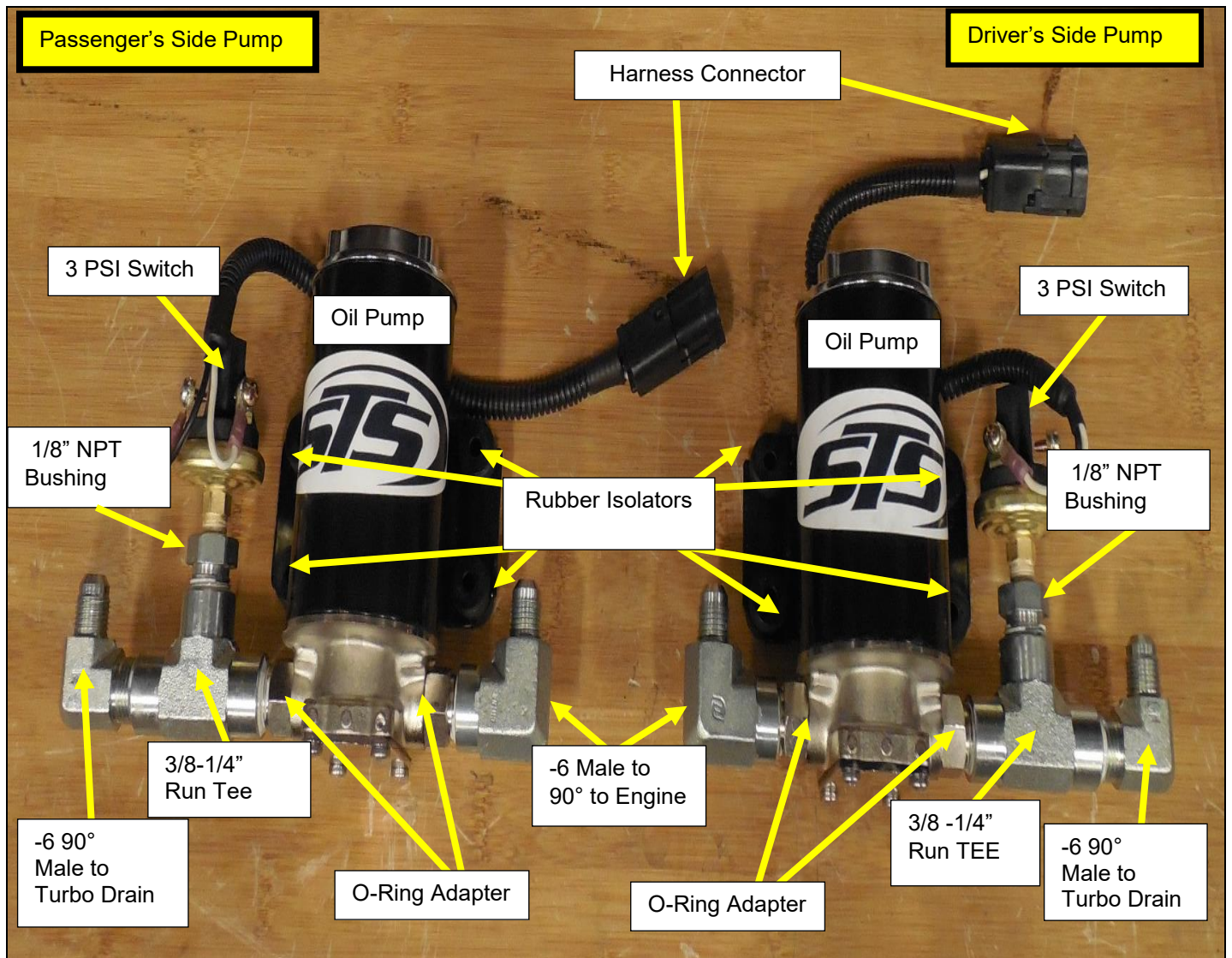
### Assembling Oil Pumps

Assemble the oil return pumps (**Figure 38**). The two pumps will be mirror images when assembled.

**IMPORTANT!** Mount the pump assemblies in this same configuration on the car. The oil return from the turbos comes into the pumps on opposite sides. The pumps are required to rotate in different directions to pull oil from the turbos. The wiring harness is pined to accommodate this and the pumps must be installed in the indicated direction to operate correctly.

1. Be sure the supplied sealing tape or pipe sealant is applied to all pipe threads.  
**NOTE:** Earls Instant Pipe Sealant P/N: D024L is an excellent alternative.
2. Pre-assemble the tee fitting, 90° -6, 3/8 to 1/8" NPT bushing, and 3 PSI pressure switch
3. Use a wrench to hold the adapter fitting in the oil pump body while installing the pipe fittings.  
**CAUTION:** This is an O-ring fitting at the pump body. Overtightening can damage the pump body.
4. Install the rubber mounting isolators into the (x4) mounting holes on each pump flange.
5. Install the flanged sleeves into the rubber isolators with the flange facing the pump.

**NOTE:** Oil pumps are displayed as they are mounted in the car looking up from below facing the rear of the vehicle.



**Figure 38**



# Installing the Oil Return Pumps

## Mounting the Pumps

1. Install the driver's side (left) pump assembly into the car (**Figure 39**) up against the rear bumper reinforcement between the muffler brackets. Align the inside upper mounting hole to the heat shield bolt. Maintain approximately 1" clearance between the 90° fitting and the side frame rail (**Figure 40**). Hold the pump in place level with the bumper reinforcement. Mark inside the oil pump mounting grommet for a reference to pre-drill the holes for the mounting screws.
2. Use a center punch to set the marks before the holes are drilled to prevent the drill from wandering.
3. Use a 9/64<sup>th</sup> drill bit to pre-drill the holes. **Do not use the supplied 5mm drill bit for this step.**
4. Use the supplied insulated self-tapping screws to mount the pump to the bumper reinforcement.
5. After the screws are installed, it is good practice to remove one at a time and apply thread locker and reinstall.
6. Repeat steps 1-6 for the passenger's side oil pump assembly.

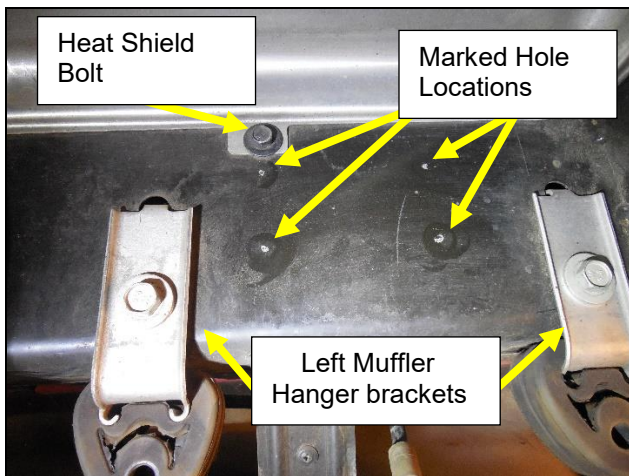


Figure 39

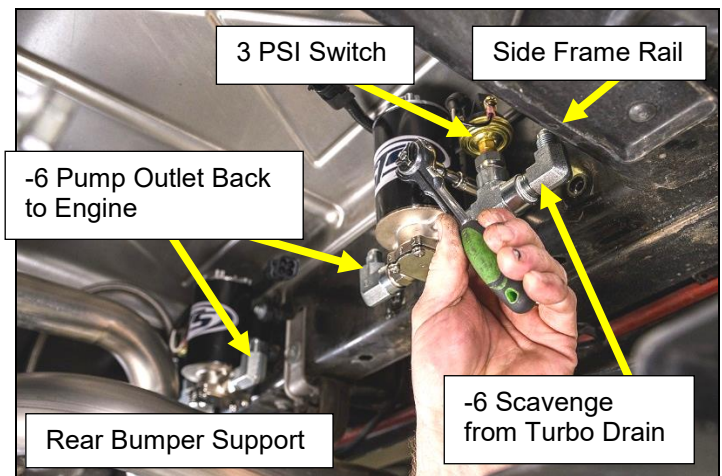


Figure 40

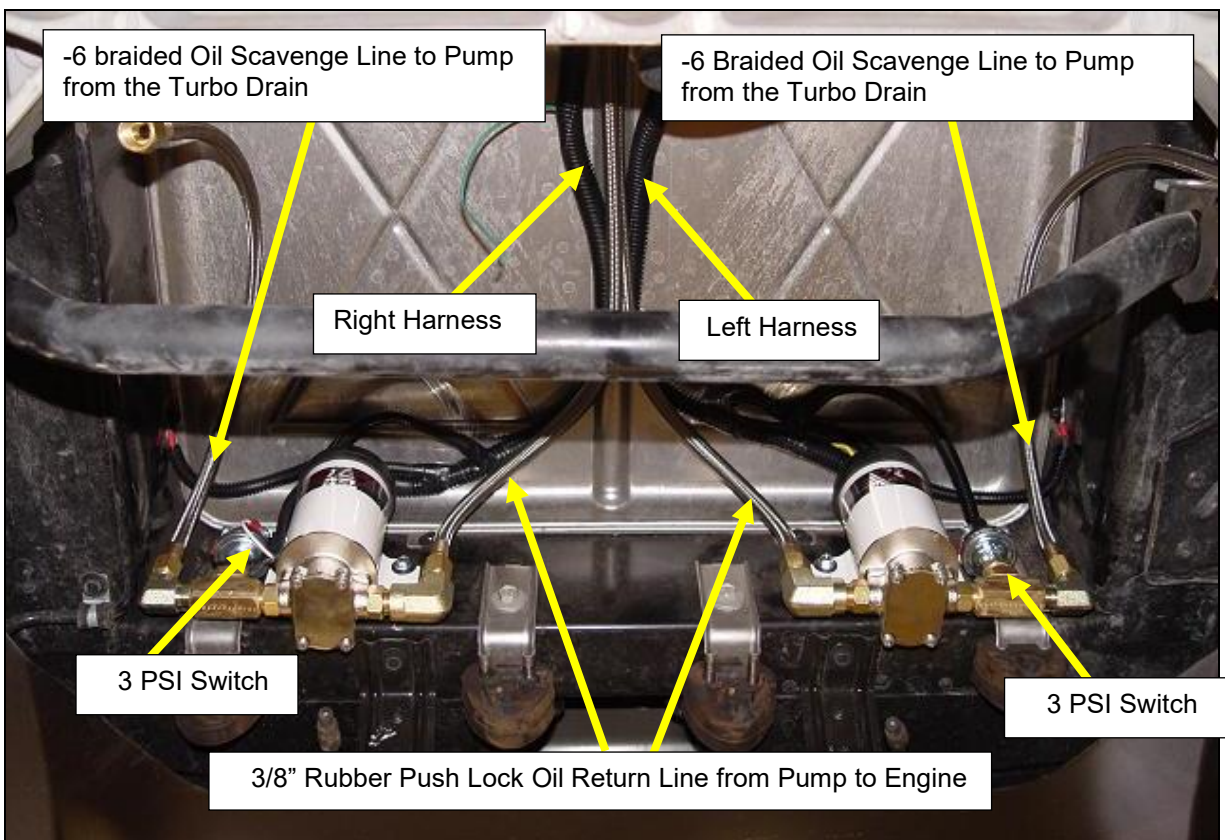
## Connecting Oil Lines and Pump Harness:

### Connecting the Oil Lines and Oil Pump Harness

1. Install the short -6 braided lines to the -6 90° fitting on each outboard side of the oil pump closest to the frame rail (**Figure 41**). **This will be the scavenge side of the pump “pulling” oil from the turbo.**
2. Install the straight -6 push lock fitting with the yellow collar on to each -6 90° fitting on the inboard side of each oil pump (**Figure 41**). **This is the discharge side of the pump “pushing” oil back to the engine.**
3. Locate the previously marked Left and Right 3/8” rubber push lock hoses running back to the valve covers and measure the hoses to install on to the push lock fittings at the -6 90° oil pump discharge fittings. Route the lines down the center of the muffler box from over the differential and down to the push lock fittings on each inboard oil pump fitting. Leave them long initially. They can be trimmed later, if necessary.
4. Plug the 4-pin harness connector into the oil pump it is labeled for – one is marked “DRIVER” side pump and the other is the “PASSENGER” side pump. **THE PUMPS SPIN IN OPOSITE DIRECTONS AND WILL NOT WORK CORRECTLY IF THEY ARE PLUGGED IN TO THE INCORRECT HARNESS PLUG.**

**NOTE:** Double check that the lines have been blown out with compressed air and are free of debris that could be washed into the engine with the return oil before the hose is installed on to the push lock barbs.

**NOTE:** Make sure the left pump feeds the left valve cover and right pump feeds the right valve cover.



**Figure 41**



# Pre-Assembling Exhaust Components:

## Assembling the Turbos

1. Remove the turbos from the packaging.
2. Loosen the flange bolts around the compressor housing and turbine housing to allow the center section to be rotated.
3. Rotate the center section on the passenger's side turbo (**Figure 42**) and driver's side turbo (**Figure 43**).
4. Apply sealing tape to the -4 x 1/8NPT 90° oil supply fitting and install (**Figures 42 & 43**).
5. Tighten one bolt on each flange to keep the housing from rotating while the other components are installed. Final adjustment of the housings is done later.
6. Install the oil return adapter to the opposite side of the center section with the supplied gasket and 8mm x 20mm bolts and washers (**Figures 44 & 45**).
7. Apply sealing tape to the -6 x 3/8NPT 90° fitting and install into the oil return adapter (**Figures 44 & 45**).

**Note:** Earls Instant Pipe Sealant P/N: D024L is an excellent alternative to PTFE tape.

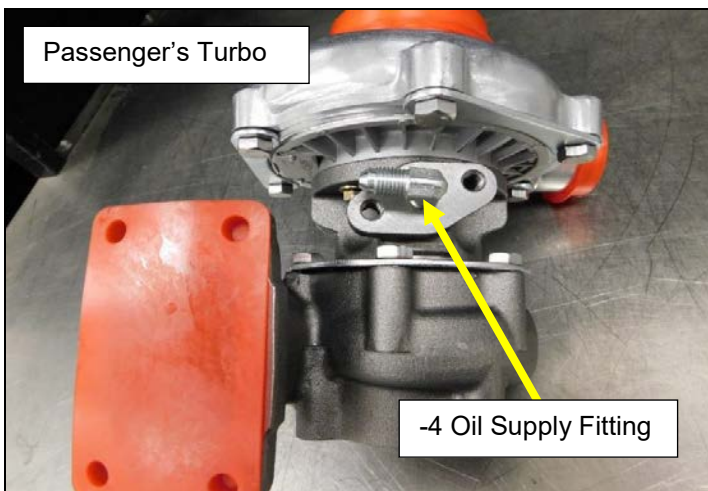


Figure 42

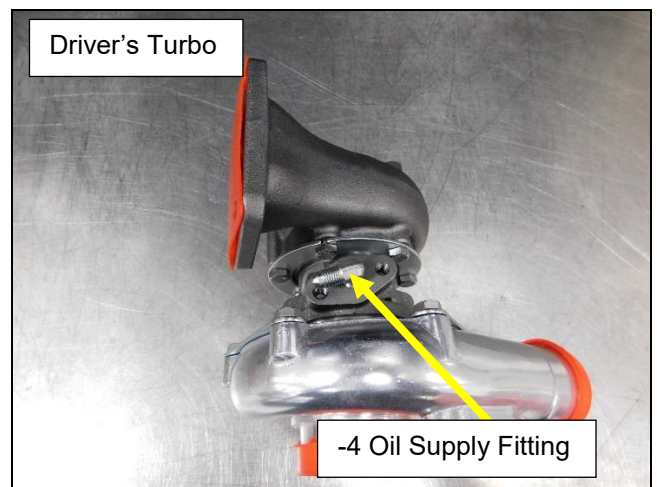


Figure 43

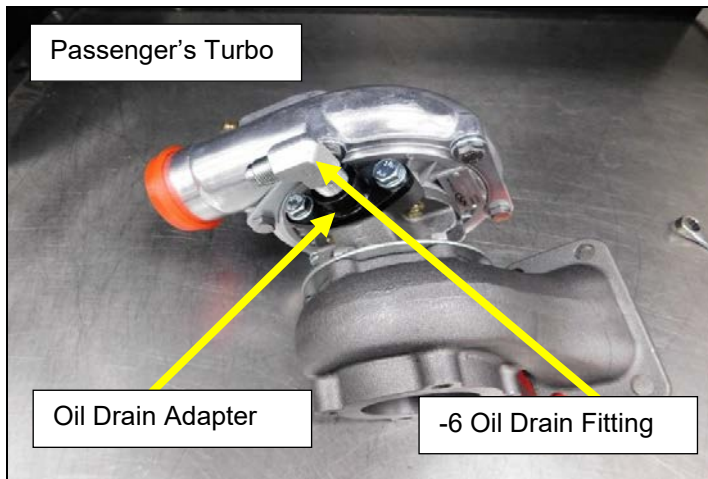


Figure 44

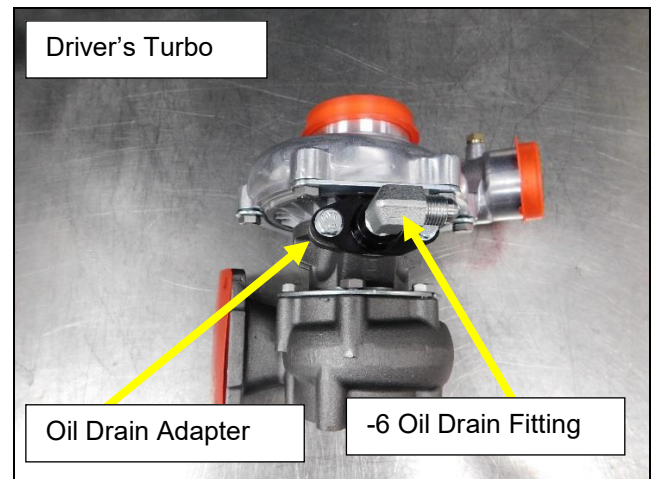


Figure 45

# Pre-Assembling Exhaust Components:

## Assembling the Wastegate

**IMPORTANT:** The **Boost Reference Line** from the 4-way tee at the brake booster **MUST ALWAYS** be connected to the lower side of the diaphragm (**Figure 47**). **NEVER** connect boost reference to the top side of the diaphragm. Connecting boost reference to the top diaphragm cover will result in serious over boost condition that will cause immediate and serious engine damage. The lower side of the diaphragm must have a boost reference to one port and the second port will be plugged.

The top diaphragm cover must be vented to atmosphere and may have one plug only. The second port must always be vented to atmosphere. Plugging both ports in the top cover will result in serious over boost condition that will cause immediate and serious engine damage.

1. Make sure the valve seat is installed correctly with the taper on the seat in toward the valve (**Figures 46 & 47**).
2. Install one hose barb and one plug in each side of the diaphragm housing (**Figure 47**).
3. **NEVER** plug both ports of the top diaphragm cover. **Both top cover ports may be left open.**
4. Always install the vent port(s) in a position to keep water and dirt from entering the valve.

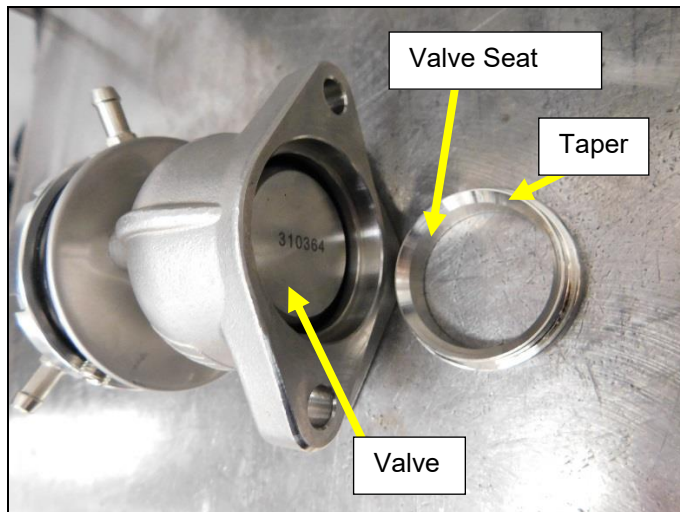


Figure 46

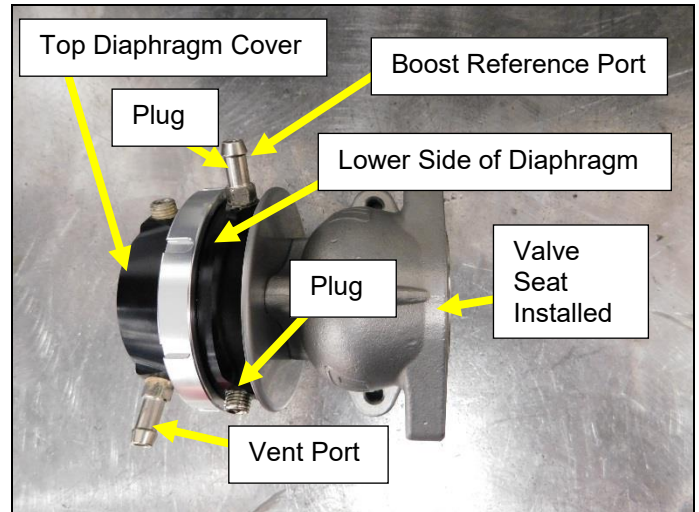


Figure 47

## Pre-Assembling Exhaust Components:

### Assembling Exhaust Pipes & Wastegate Dumps

1. Assemble the left and right exhaust #1 pipes to the turbos as shown below, using the supplied gasket, 3/8-16 x 1.5" bolts, washers, and nuts. Use anti-seize on the threads of the bolts (**Figure 48**).
2. Assemble the left and right exhaust #2 pipes to the exhaust turbine flange of each turbo, using the supplied M8 x 20mm bolts and washers. Use anti-seize on the threads of the bolts.
3. Remove the hardware packs and valve seat from the wastegate packaging.
  - a. Install the supplied valve seat into the body of the wastegate with the tapered side towards the valve and the flat side facing out (**Figures 46 & 47 on page 49**).
  - b. Assemble the wastegate to the 2-bolt flange on left and right exhaust #1. Use the supplied gasket, M8x 35mm Allen head bolts, and nuts. Use anti seize on the threads of the bolts (**Figure 48**).
4. Assemble the left and right wastegate dump pipes to the wastegate outlet. Use the supplied gasket and M8 x 25mm Allen head bolt. Use anti-seize on the threads of the bolts (**Figure 48**).
5. Install the -4 oil supply lines to the -4 fittings in the top of the turbo housing and tighten. **NOTE: Blow compressed air through the lines before installing them to the turbos.**

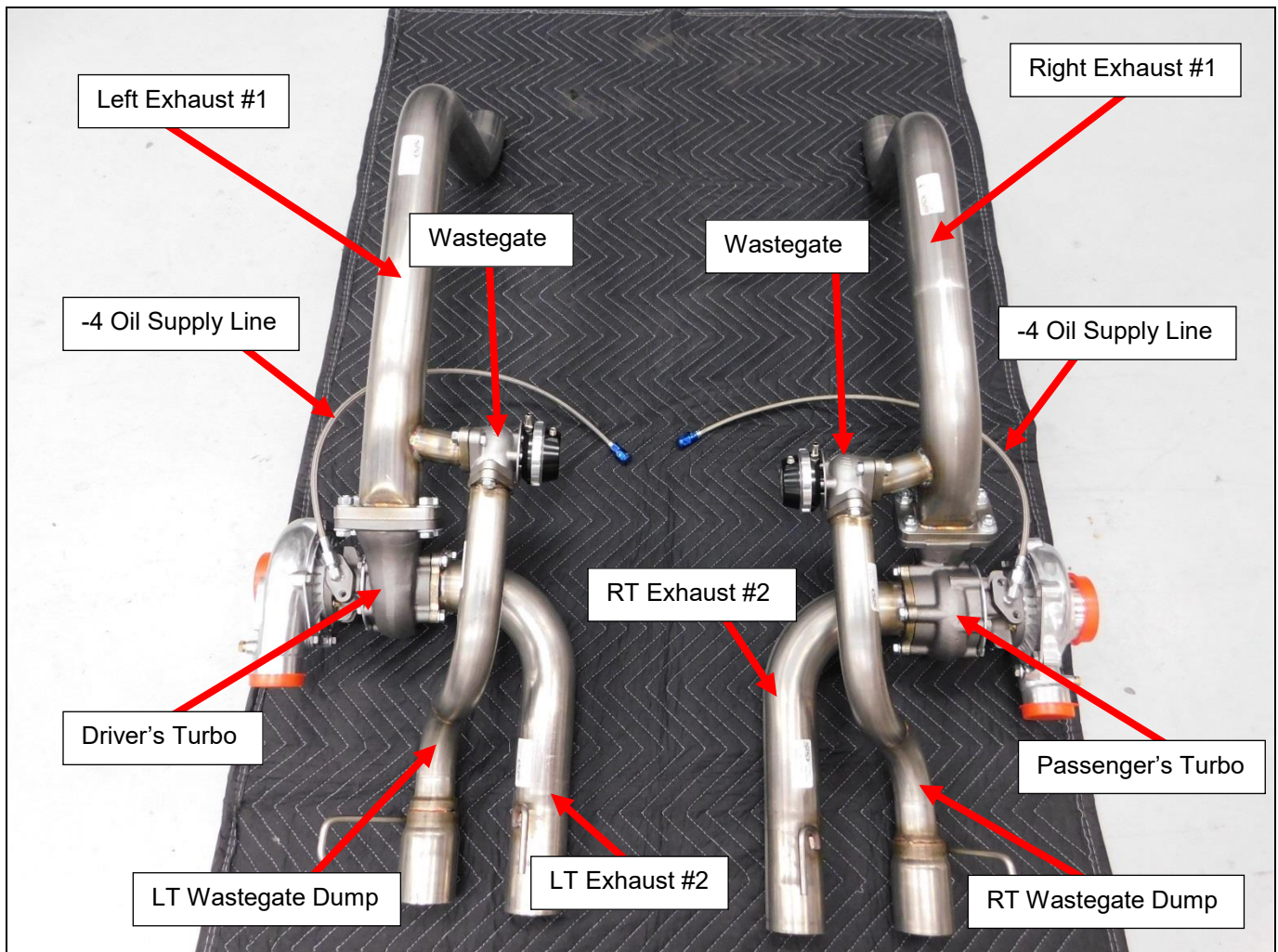


Figure 48



## Installing the Turbos and Exhaust Pipes:

### Installing the Turbo Assemblies in the Car – Figure 49

1. Install the passenger's turbo assembly into the vehicle. Route the exhaust inlet pipe #1 over the axle and into the factory H-pipe slip joint connection.
2. Install the tailpipe hanger rods into the rubber isolators at the rear bumper.
3. Repeat steps 1-2 for the driver's side turbo assembly.
4. Tighten the clamps at the H-pipe slip joint connection.

**NOTE: Automatic Transmissions – It may be necessary to place the shift selector in the neutral position when installing the left exhaust inlet #1.**

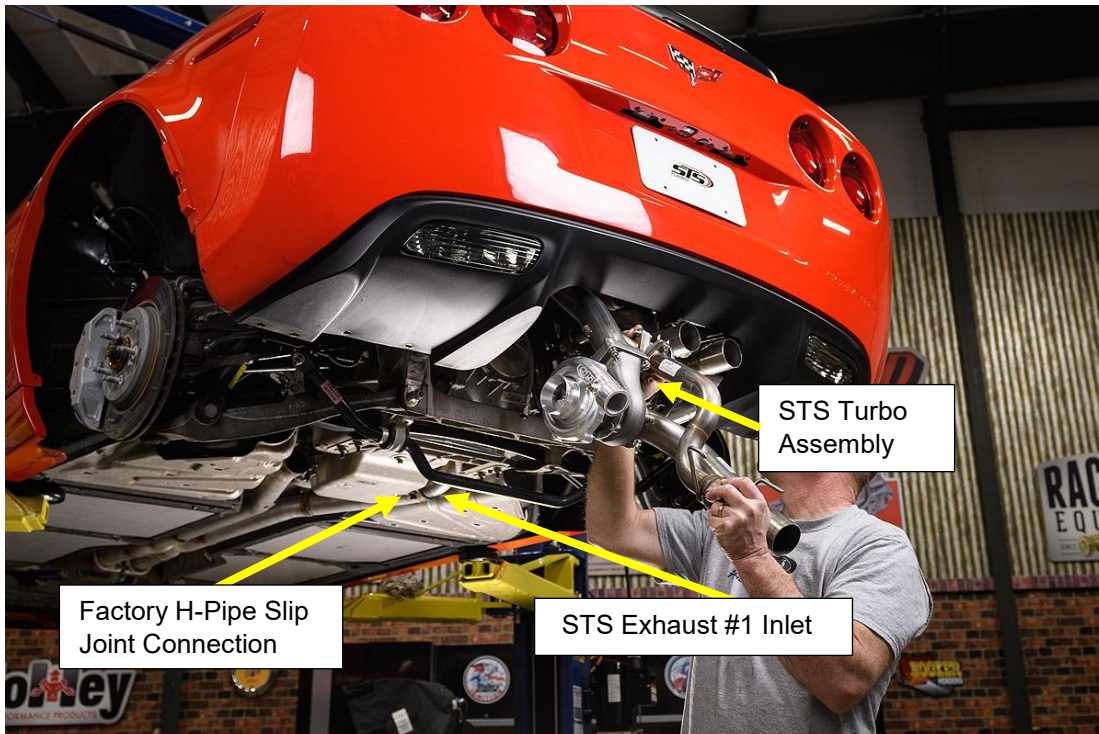


Figure 49



## Installing the Oil Feed Lines and Return Hose:

### Assembling the Oil Feed Tee and Flow Check Valves – Figure 50 (next page)

**ATTENTION:** Apply PTFE tape or pipe sealer to all NPT male pipe threads before assembly

Do not apply PTFE tape or pipe sealer to AN or JIC tapered fitting ends.

Do not allow pipe sealer or PTFE tape to enter the hose or fittings.

1. Install the 1/4"NPT to -6 AN adapter fitting into the center female port on the 1/4"NPT tee fitting.
2. Install a 1/4"NPT to 1/8"NPT adapter into each of the side 1/4" female threaded ports on the tee fitting.
3. Install a One Way Flow Check Valve at each 1/8" NPT male fitting previously installed on each side port of the tee fitting. **Fig.50 (See illustration next page)**

**ATTENTION:** The check valves are directional and the ARROW ➡ on the check valve body **MUST** point towards the direction of the turbo and away from the tee fitting. The oil will flow this direction to the turbo. If the arrow is pointing towards the tee fitting, the oil will not flow through the check valve to the turbo and failure of the turbocharger shaft bearing and oil pumps will result.

4. Install a 1/8"NPT to -4 AN fitting into each check valve outlet – \*The ARROW ➡ on the check valve should be pointing towards this fitting (**see Figure 51 next page**).
5. Install the assembled tee and check valves on to the -6 braided oil feed line from the engine that is routed over the differential.
6. Mount the tee assembly to the rear differential frame with the provided cable ties.
7. Connect the -4 oil supply lines from the turbos to each side of the tee assembly.

**NOTE:** Use the supplied cable ties to secure the lines away from hot or moving parts that can damage the lines.

### Oil Return (Scavenge) Lines:

1. Install the short braided -6 line from the oil pump inlet fitting (this is the fitting on the outboard side of the oil Pump that has the 3 psi switch installed) to the -6 fitting on the bottom of the Turbo. See **Figure 41 (previously) and Figure 50 (below)**.

## Oil Feed and Return (Scavenge) Lines:

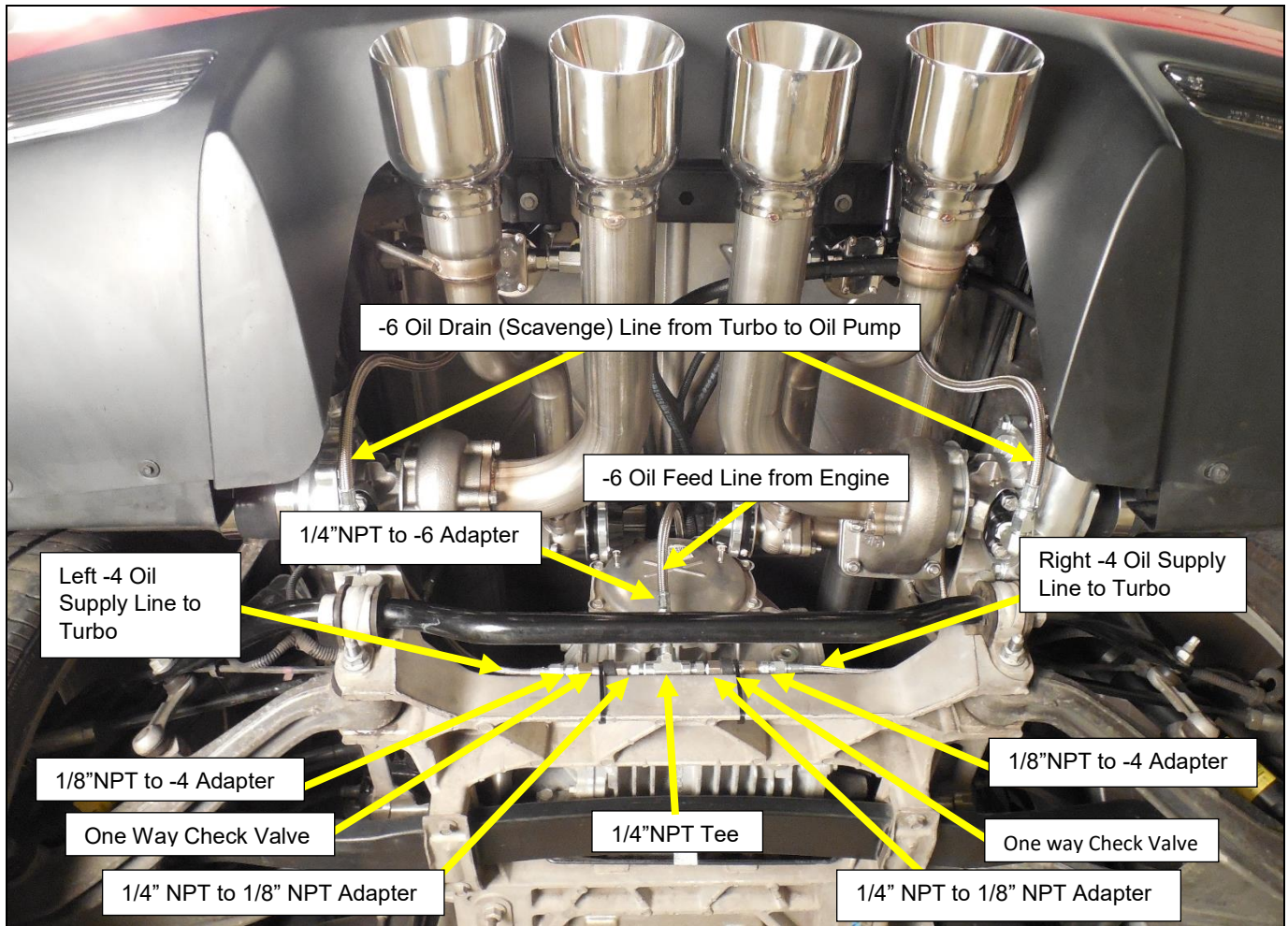


Figure 50

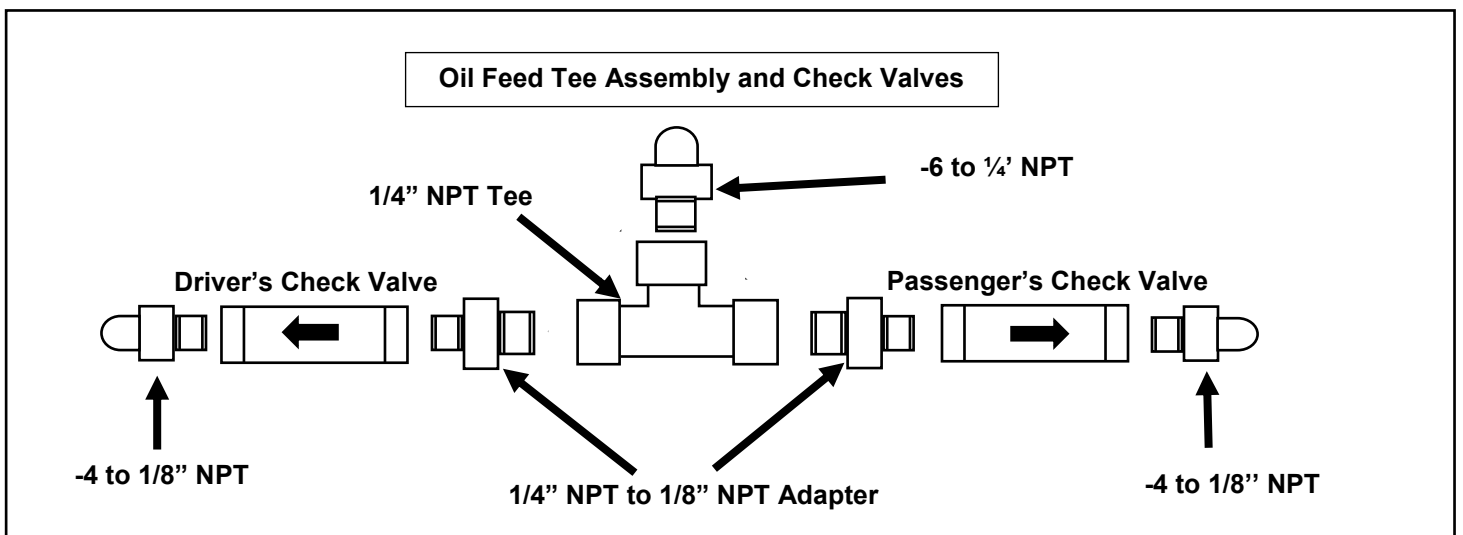


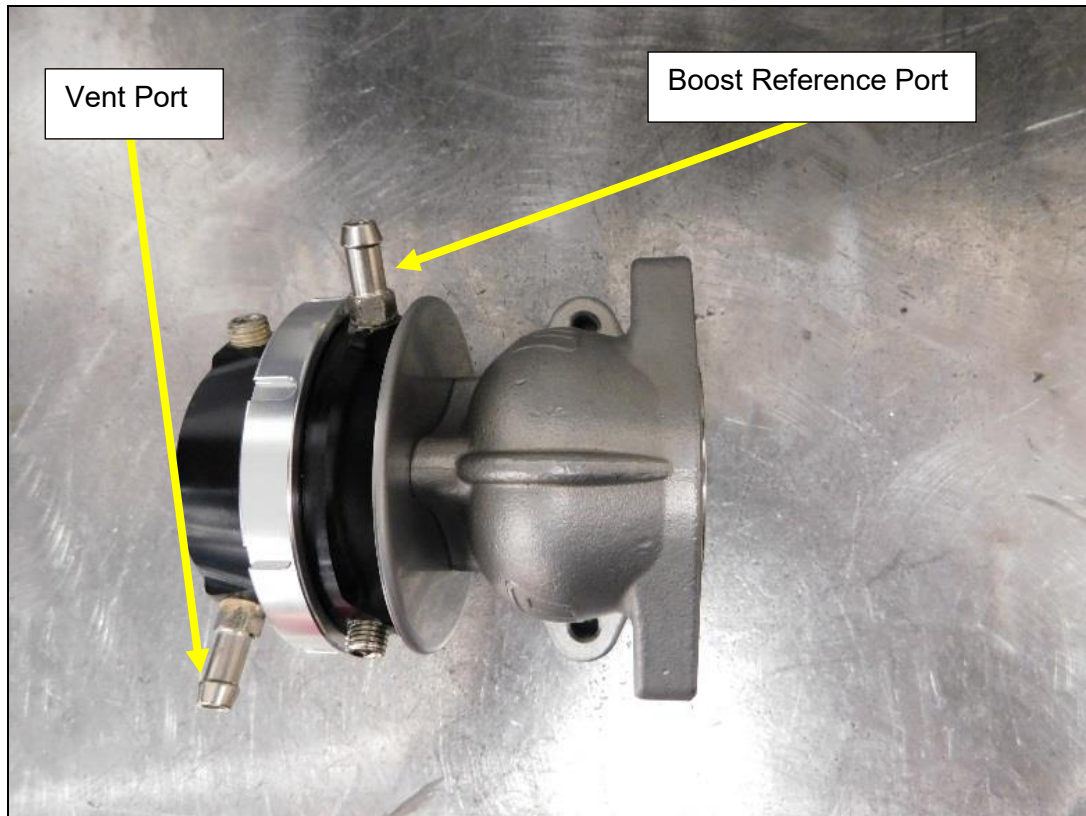
Figure 51

# Installing Boost Reference Lines to the Wastegates:

## Boost Reference Lines and Vent Ports

1. Locate the 1/4" boost reference line coming from the 4-way tee at the brake booster that was routed over the differential with the oil feed and return lines.
2. Cut the boost reference line just past the differential cover.
3. Install a supplied #4 hose clamp on to the boost reference line.
4. Install the center port of the supplied brass tee fitting into the boost reference line and clock the tee fitting so the side ports are facing the 3 and 9 o'clock positions and tighten the hose clamp.
5. Install the short sections of 1/4" hose onto each side port of the brass tee fitting. Install a #4 hose clamp and tighten.
6. Run the boost reference lines from the tee to the bottom port on the wastegate diaphragm and trim to length. **NOTE:** Leave extra length at first. It can be trimmed later, if necessary.
7. Install a hose clamp on each boost reference line and install on to the bottom barbed port of the wastegate diaphragm housing (**Figure 52**).

**IMPORTANT: DO NOT CONNECT BOOST REFERENCE TO THE VENT PORT OF THE WASTEGATE TOP COVER. DOING SO WILL RESULT IN AN OVER BOOST CONDITION, SERIOUS AND IMMEDIATE ENGINE DAMAGE WILL OCCUR.**



**Figure 52**



## Installing the Air Intake and Charge Pipes:

### Removing the Rear Inner Fenders and Taillights

1. Remove the driver's and passenger's REAR Inner wheel well covers (**Figure 53**).
2. Remove the rear taillights.
3. Remove the FRONT lower rocker panel caps. It is not necessary to remove the front inner wheel well covers (**Figure 54 – shown with charge pipe installed**).



**Figure 53**



**Figure 54**



# Installing the Air Intake and Charge Pipes:

## Modifications to Inner Fender Brackets

1. Remove the driver's and passenger's inner fender support brackets (**Figure 55 – driver's side shown**).
2. Modify the bracket as shown (**Figures 56 & 57**).

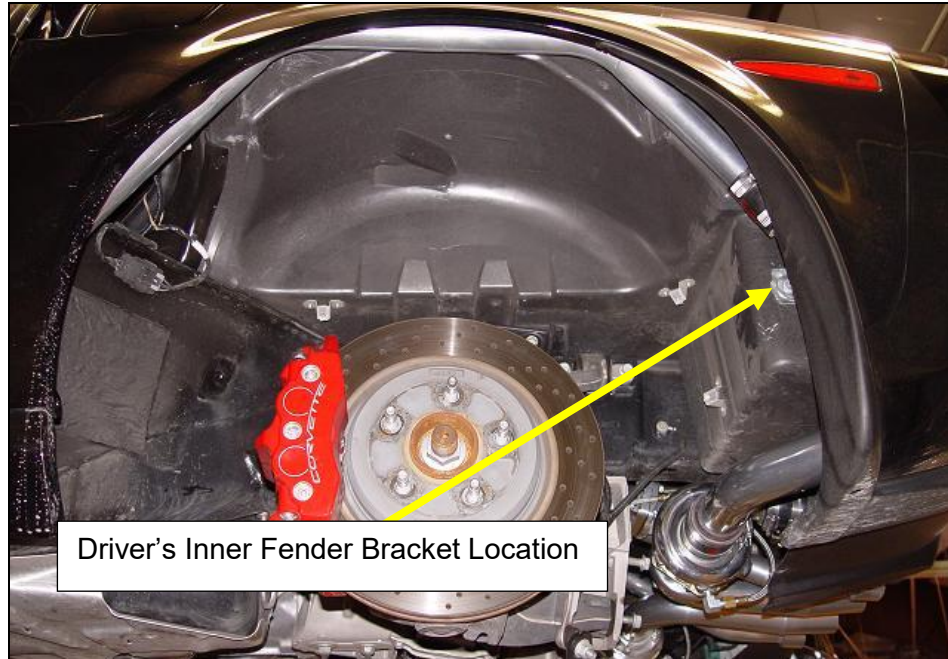


Figure 55



Figure 56



Figure 57

# Installing the Air Intake and Charge Pipes:

## Modifications to the Rocker Panels

1. Remove the lower portion of the pinch weld at the entry of the rocker box on the driver's and passenger's side to allow the charge pipe to pass through (**Figure 58** – passenger's side shown).
2. Remove the small fiberglass "knob" from inside the rocker panel on the driver's and passenger's side just behind the rocker cap at the front side of the rocker panel (**Figure 59**).

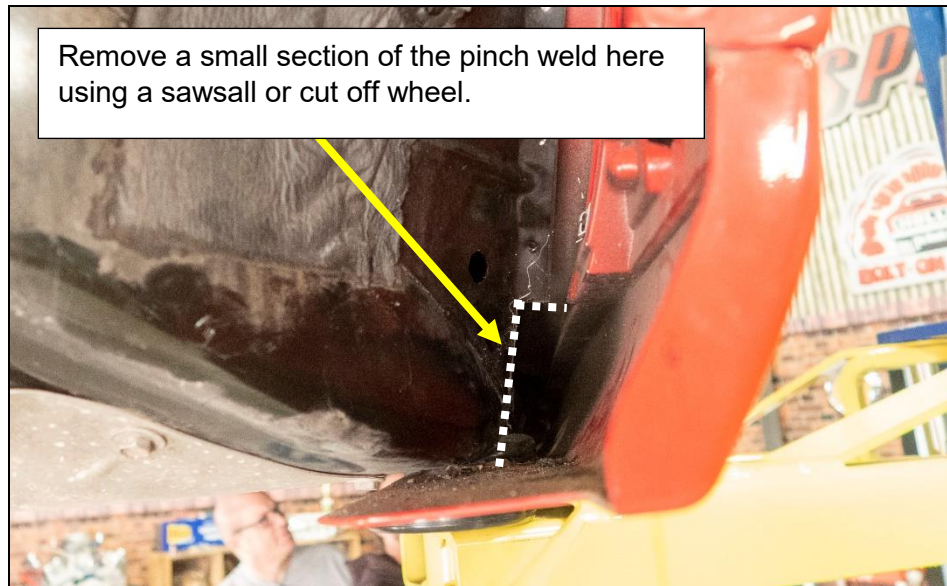


Figure 58



Figure 59

# Installing the Air Intake and Charge Pipes:

## Installing Turbo Air Intake Pipes

1. Install the left (driver's side) and right (passenger's side) turbo air intake pipe #1 (visual reference #4 and #14 page 6) through the taillight opening and "loosely" secure the bracket to the 6mm stud on the trunk wall using the fender washer supplied and the existing flange nut on the stud. The bracket should be on the inside of the tube against the trunk wall. The short end of the tube will be located behind the mounting bracket for the inner fender support bracket when installed (**Figure 60**).
2. Install a 2.5" silicone coupler on to the long end of the left (driver's) and right (passenger's) turbo air intake pipe #2 (visual reference #5 and #15 page 6) secure with a supplied clamp.
3. Install a second clamp on to the coupler of turbo air intake #2 and position so it can be tightened from inside the wheel well just over top of the fender bracket (**Figure 60**).
4. Install the left (driver's side) and the right (passenger's) turbo air intake pipe #2 on to the turbo air intake pipe #1 previously installed. Snug the clamp just enough to hold the clamp in place at the top edge of the coupler, but still be able to adjust the tube if necessary (**Figure 60**).

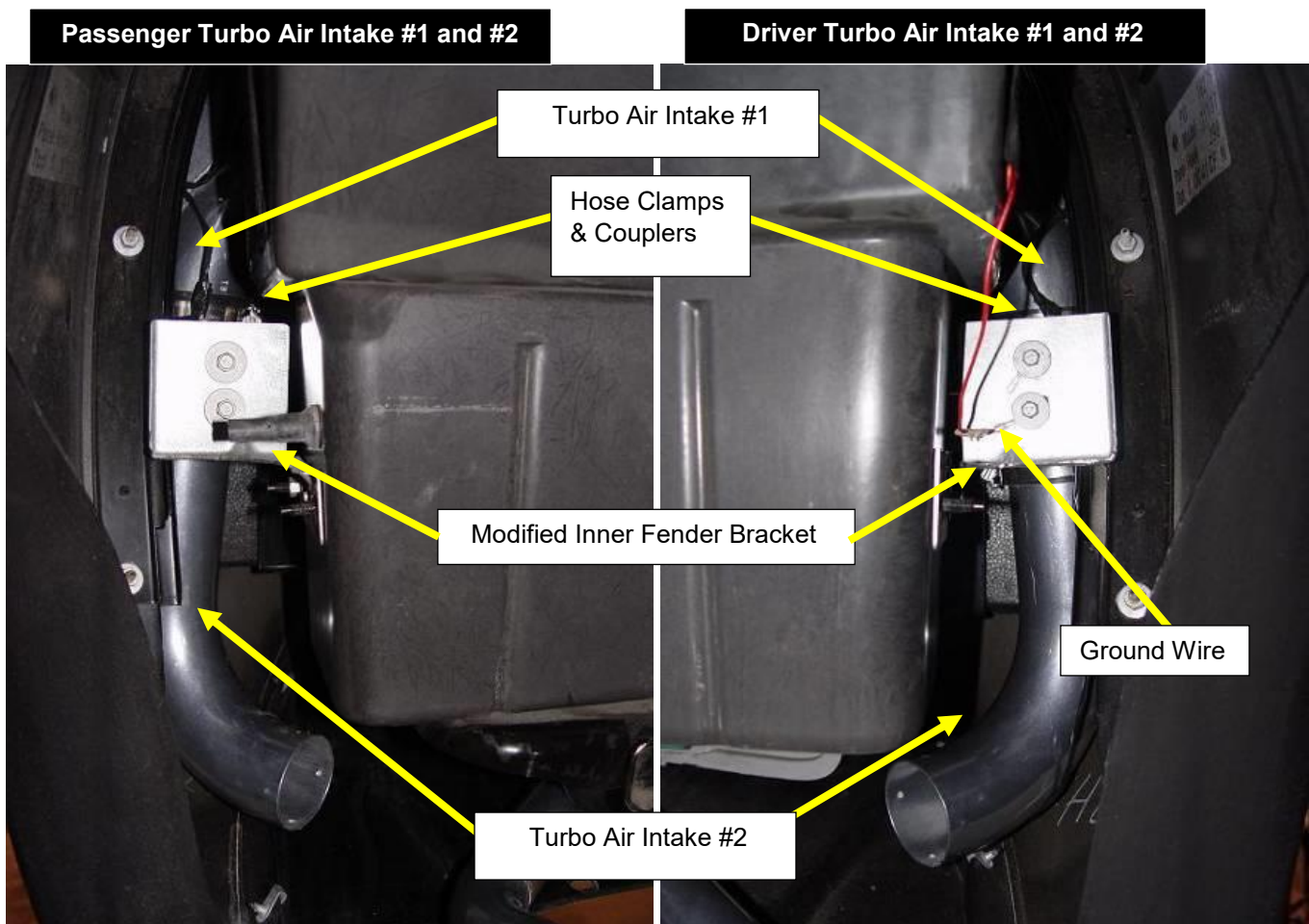


Figure 60



# Installing the Turbo Air Intake and Charge Pipes:

## Installing Turbo Air Intake Pipes (Continued)

5. Install the 2.750" silicone coupler on to the compressor inlet of the driver's and passenger's turbo (Figure 61).
6. Install a 2.5" silicone coupler on to the 2.5" end of the left (driver's side) and right (passenger's side) turbo air intake pipe #3 (visual reference #6 and #16 page 6).
7. Install the left (driver's side) and right (passenger's side) turbo air intake pipe #3 between the turbo compressor inlet and turbo air intake pipe #2 (Figure 61).
8. Adjust turbo air intake pipes #2 and #3 for proper alignment.
9. Tighten the clamps at the coupler between pipes #1 and #2 only
10. Remove both the driver's and passenger's turbo air intake pipes #3 (temporarily).
11. Install the modified inner fender brackets, if not already installed. Do not install the outermost nut at this time. It will be used to mount intake charge pipes L1 and R1 (Figure 61).

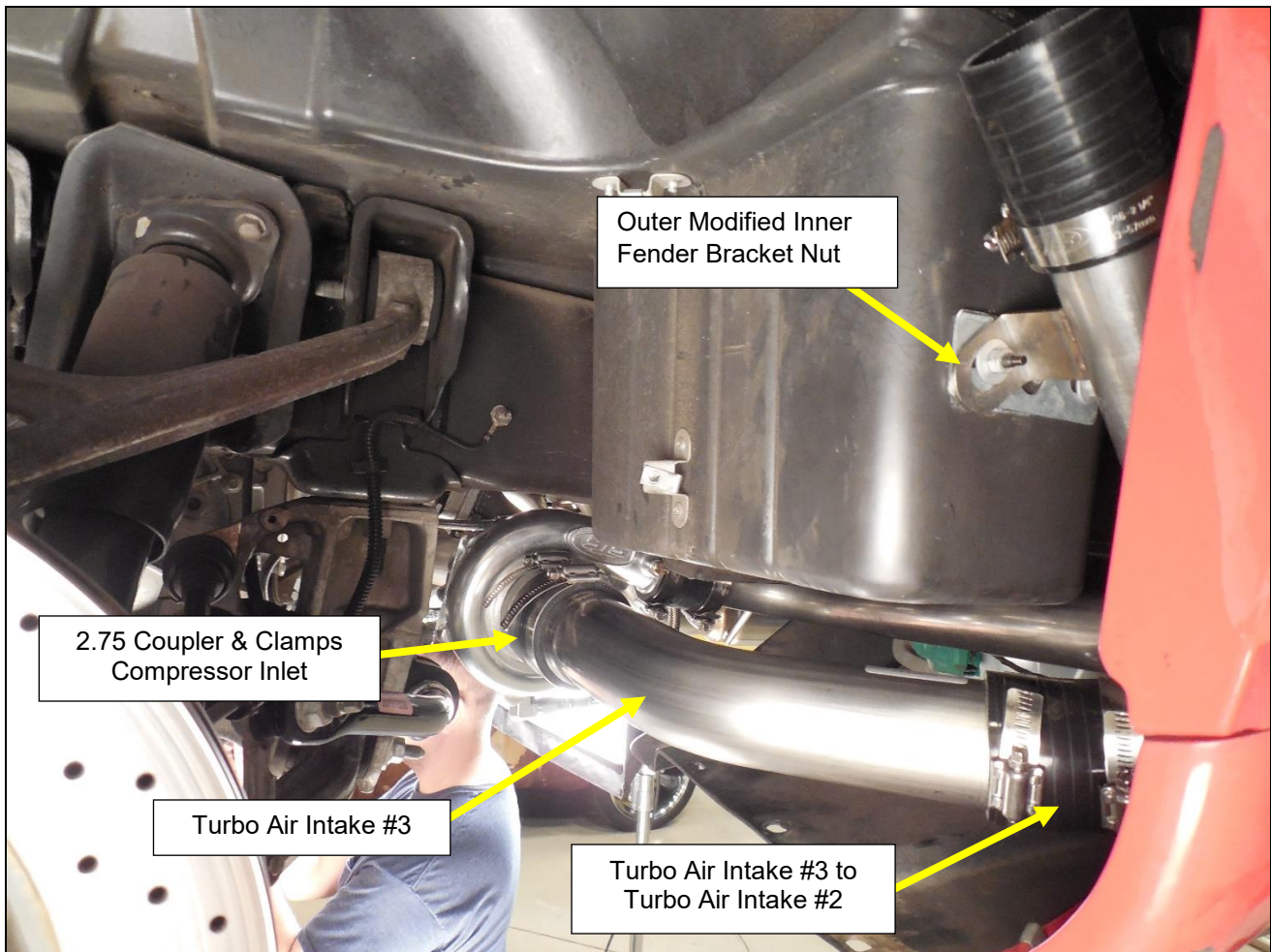


Figure 61

# Installing the Turbo Air Intake and Charge Pipes:

## Installing the Intake Charge Pipes

1. Install the left (driver's side) and right (passenger's side) intake charge pipe #1 (visual reference #7 and #17) from the turbo compressor outlet to the mounting stud for the inner fender bracket. Install the remaining 6mm flange nut hand tight for adjustment later (**Figure 62**).

**IMPORTANT:** It may be necessary to rotate the compressor housing to align with Charge pipe #1. Loosen the (x6) bolts at the center section of the turbo and rotate the compressor housing only. Align the compressor outlet to the charge pipe #1. Make sure the center section of the turbo is still aligned with the oil fittings at 12 and 6 o'clock. Tighten the bolts around the compressor housing evenly and DO NOT overtighten.

**NOTE:** Intake charge pipe #1 will route between turbo intake #2 and the trunk well floor.

2. Reinstall turbo air intake pipe #3 between the turbo compressor inlet and turbo air intake pipe #2.
3. Install the 1/4" NPT x 3/8" hose barb fitting into the right air intake pipe #3 at the threaded bung.
4. Route the 3/8 rubber hose from the 3-way vent valve installed in the PCV vent to this location. Connect the PCV vent hose from the 3-way vent valve to the 3/8" hose barb installed into air intake #3.  
**IMPORTANT: make sure this hose is free of kinks, pinches, or obstructions.**
5. Tighten all hose clamps and bracket mounting hardware.

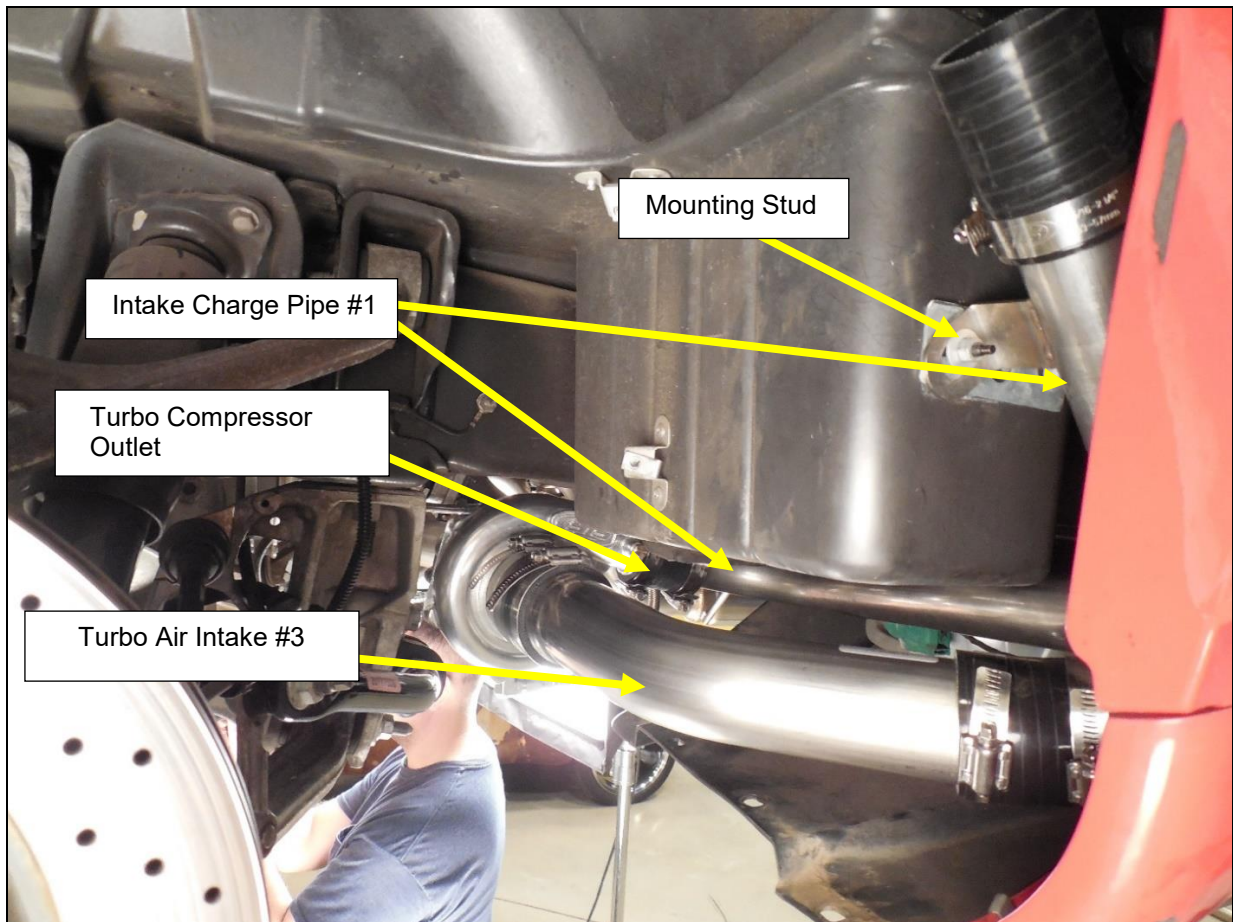


Figure 62



## Installing the Intake Charge Pipes (Continued):

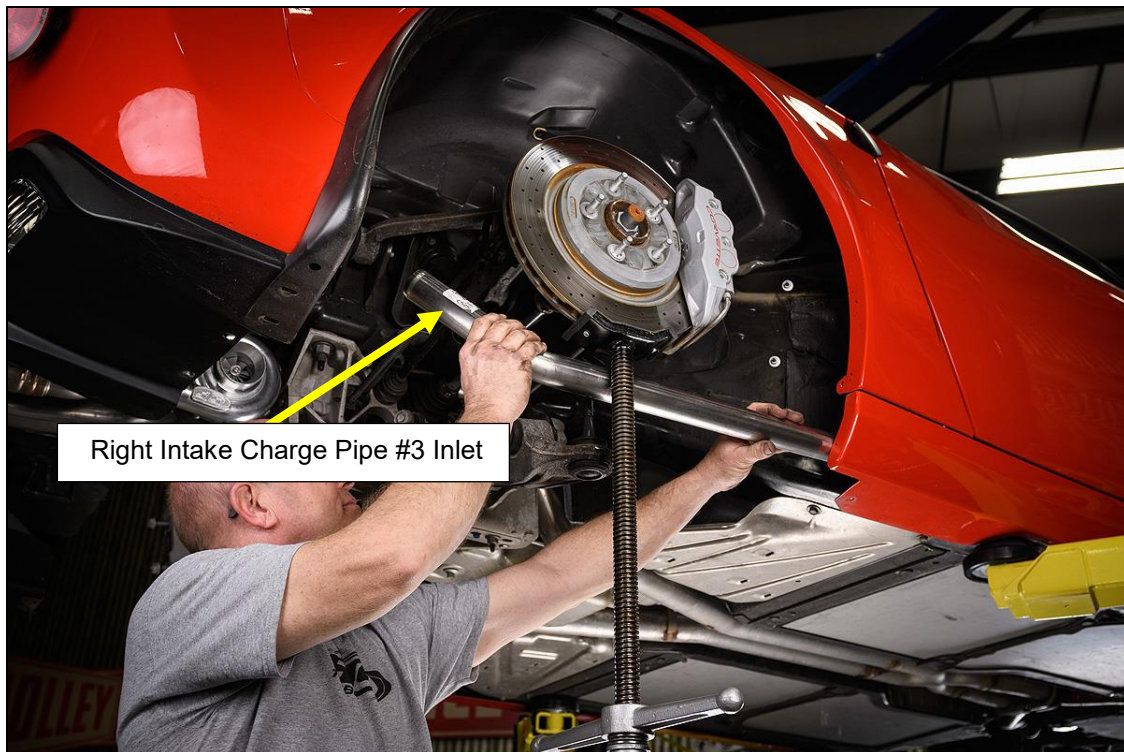
**NOTE:** It is necessary to separate the lower ball joint on the rear suspension to install intake charge pipes L3 and R3 (visual reference #9 and #19 page 6). See **Figure 63**.

**IMPORTANT:** Follow the manufacturer's recommended service procedure for separating the lower control arm from the spindle at the ball joint. Damage to the control arm or ball joint can occur if the correct procedure is not used.

6. Install the 1.75 x 3.75in long silicone coupler onto the outlet end (long end) of the left (driver's) and right (passenger's) intake charge pipes #3 (visual reference #9 and #19 page 6). Install the clamps with the bolt on the clamp at approximately the 1 o'clock position from front of vehicle and facing the outside of the car when the charge pipe is installed and the inlet end of the pipe is at approximately the 12 o'clock position in the rear wheel well. This will allow access to the clamp bolt if it should need to be tightened later.
7. Separate the rear suspension as described above and support the upper control arm and spindle assembly as high as possible. The lower control arm will be pulled to its lowest possible position.

**NOTE:** Cover the opening of the left and right #3 intake charge pipes with a rag to prevent dirt from entering the pipe during installation.

8. Slide the left (driver's) and right (passenger's) intake charge pipes #3 (visual reference #9 and #19 page 6) between the suspension and into the rocker boxes. Check the orientation of the hose clamps on the outlet end of the pipe to be sure it clocked properly. Adjust if necessary (**Figure 63**).
9. **Reassemble the rear suspension and torque the ball joint nut to specification.**



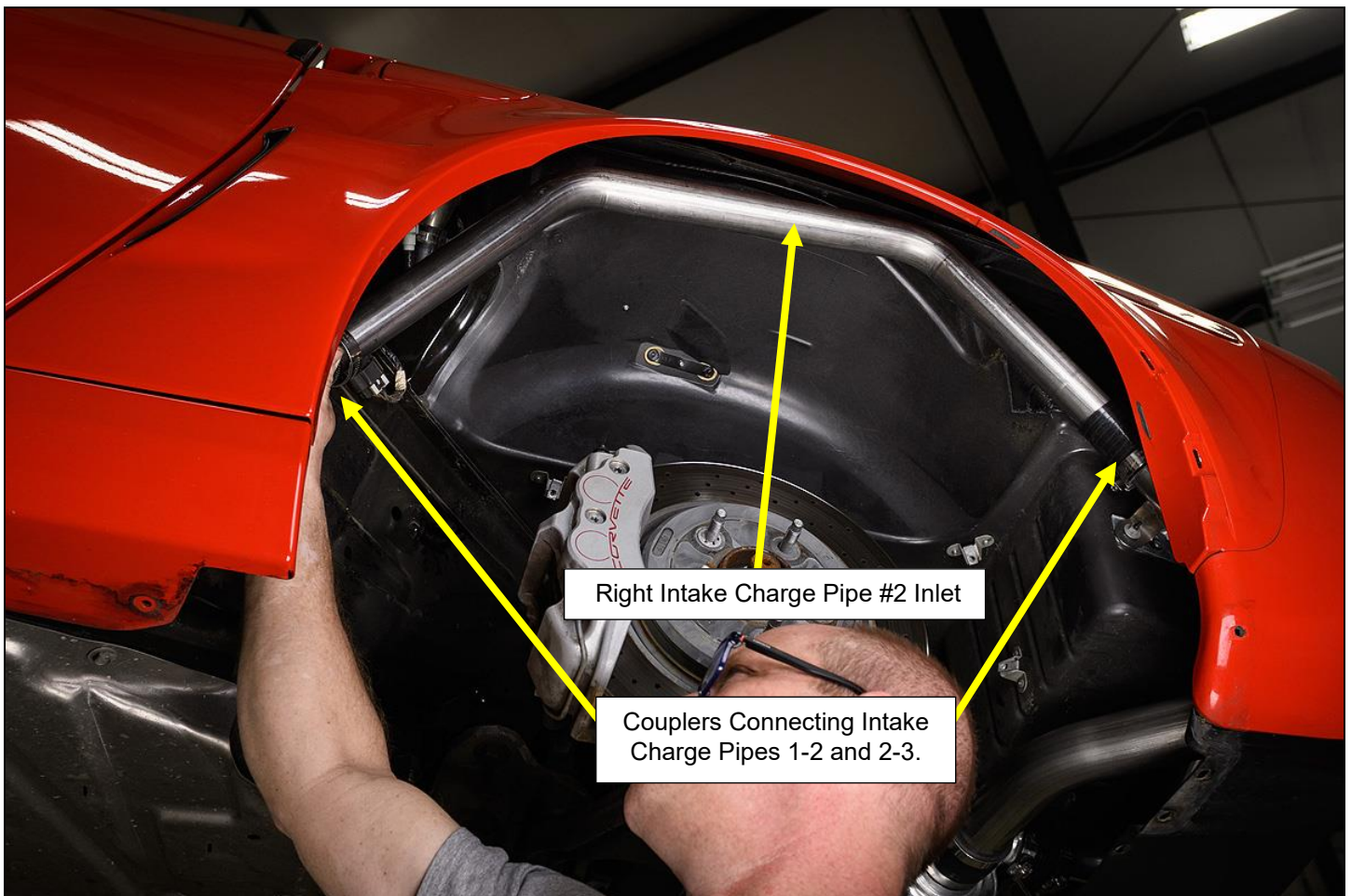
**Figure 63**



## Installing the Intake Charge Pipes (Continued):

10. Install a 1.750 x 3 silicone coupler on to the Inlet end of the left and right #3 intake charge pipes (**Figure 63**). Slide the coupler all the way on until even with the tube.
11. Install the 1.75 X 3.0 in long silicone coupler onto the inlet end (long end) of the left (driver's) and right (passenger's) Intake charge pipes #2 (visual reference #8 and #18 page. 7). Slide the coupler on until even with the tube.
12. Install the left and right #2 intake charge pipes into the rear wheel well opening, align the couplers with the #1 and #3 previously installed intake charge pipes (**Figure 64**).
13. Install (x2) clamps on to each coupler, align the tubes to be connected, and slide the couplers on to the intake charge pipe connecting to it. Make sure the coupler is installed with a 50 /50 split between the two pipes being connected. Make any necessary adjustment to the intake charge pipes and tighten the clamps (**Figure 64**).

**NOTE:** Make sure to install the #2 Intake charge pipes up into the wheel arch as far as possible. This will make installing the wheel well covers less difficult and prevent the charge pipes from Rattling against the inner wheel well. Pre checking the brake ducts at this time is a good idea to see if any adjustment of intake pipes needs to be made to accommodate there installation later.



**Figure 64**

## Installing the Intake Charge Pipes (Continued):

14. Remove the rag covering the couplers at the outlet of intake charge pipes #3 inside the rocker panel. Check for any dirt or debris that may have made its way into the pipes during installation. Install a clamp onto each of the silicone couplers at the outlet of the pipes.
15. Install a clamp on to the 10" and 9" long silicone couplers at the intercooler inlet pipes.
16. Remove the 21mm nut at the subframe rear mounting bolt and driver's side sway bar mounting bolt (**Figure 65**).
17. Install the left (driver's side) intake charge pipe (visual reference #10 page 6) into the coupler inside the rocker to intake charge pipe #3.
18. Work the outlet of intake charge pipe #4 into the 10" long coupler at the driver's side intercooler inlet pipe. Use the supplied washers to space the mounting bracket down until the pipe clears the stud on the subframe bolt and clears the suspension components. Install the bracket over the stud and install the 21mm nut.
19. Align the front bracket to the sway bar mounting bracket and install the bolt. Use the supplied washers to space the bracket down if needed.
20. Align the clamps and tighten at the intercooler and the coupler between intake charge pipes #3 and #4.
21. Tighten the sway bar bolt and the 21mm nut at the subframe mount.
22. Repeat this process for the right (passenger's side) intake charge pipe #4 (visual reference #20 page 6).

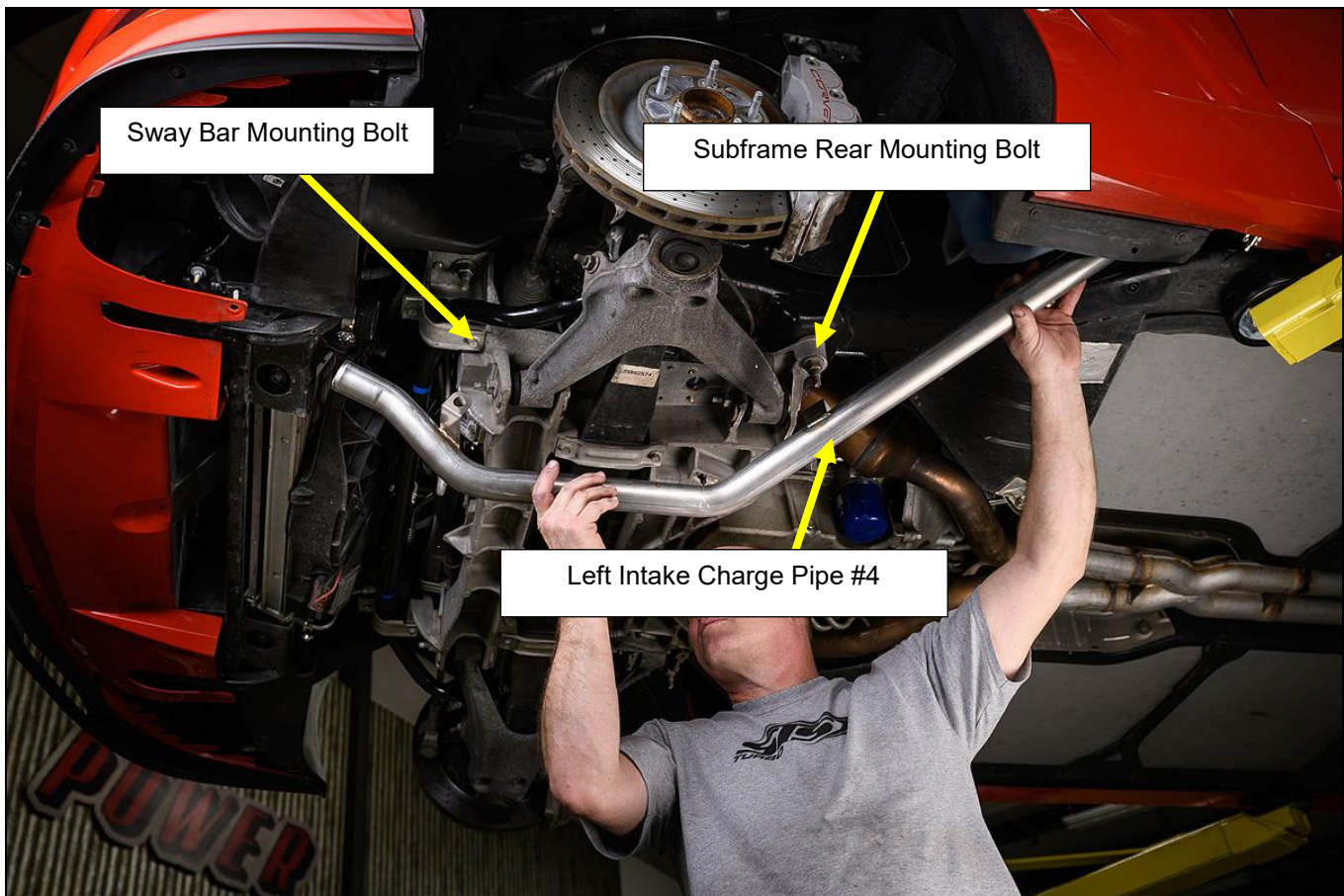


Figure 65



## Final Adjustments of the Pipes and Hoses:

### Install the Air Filters

1. Install the outer wears pre filters on to the supplied air filters. Install the filters on to the turbo air intake pipes through the taillight openings. Tighten the clamps on the filters and the mounting bracket bolt on the left and right air intake pipe #1.

### Double Check and Adjust

1. Start at the turbos and work towards the front of the car. Make adjustment to the charge pipes and couplers as necessary to achieve best fit and clearance.
2. Tighten all the hose clamps several times, letting the clamps relax for a few minutes between tightening cycles.
3. Check all the hoses, lines, and wire harnesses for correct routing, use the supplied cable ties to secure the lines and hoses away from any moving or hot parts that will damage them.

### Installing the Inner Wheel Arch Covers and Rocker End Caps

1. Install the rocker end caps end make reference marks to start the trimming process. Start conservative and make small adjustments until the rocker cap fits neatly around the charge pipes (**Figure 66**).



Figure 66



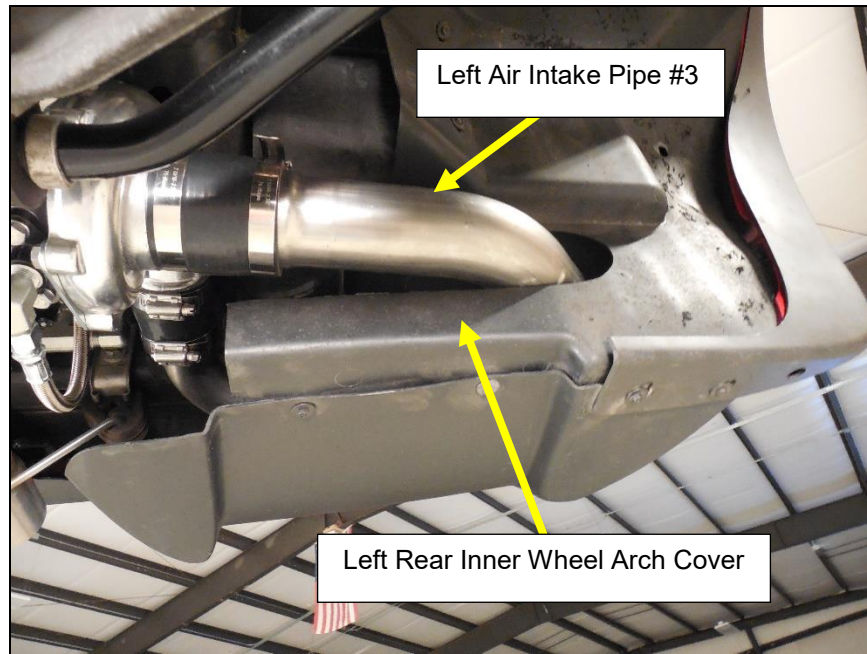
# Installing the Inner Wheel Arch Covers and Rocker End Caps:

## Rear Wheel Arch Covers

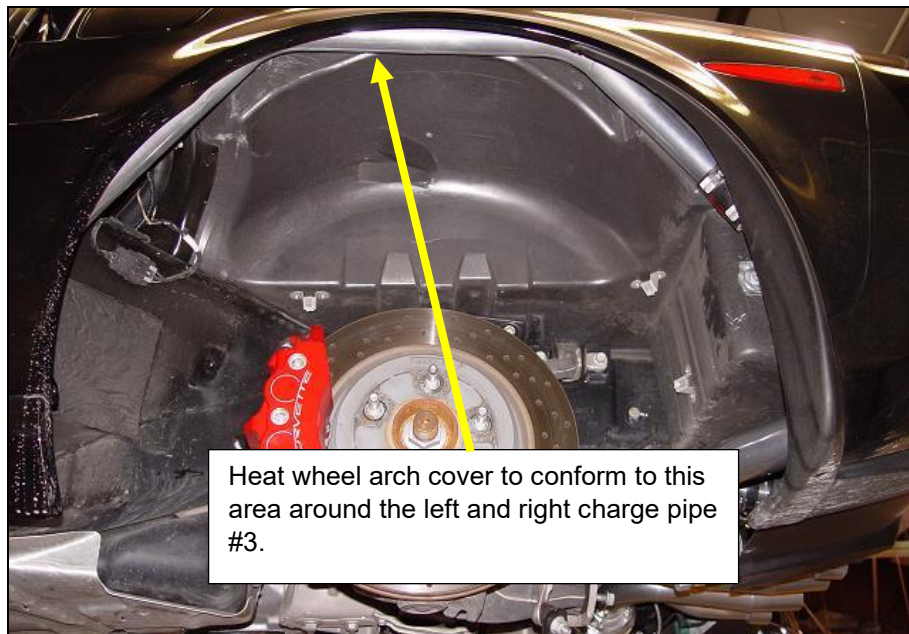
1. Install the rear wheel arch covers into the vehicle. The cover will require trimming at the rear bottom portion of the cover to allow the left and right air intake pipes #3 to come through (**Figure 67**).

**NOTE:** Trim the cover a little at a time and avoid over sizing the cut out.

2. It will be necessary to heat the top of the wheel arch cover with a heat gun to mold the plastic slightly to clear the charge pipe and allow the cover to install correctly (**Figure 68**).



**Figure 67**



**Figure 68**

## Installing the Front Air Dam and Brake Ducts:

### Reinstall the Lower Valance and Air Dam – Figure 69

1. Notch the lower valance to clear the intercooler.
2. Install the lower valance.

**NOTE:** The center section rectangular plastic filler will NOT be reinstalled to allow air flow to the intercooler.

3. Install the brake ducting.
4. Install the center air dam section.

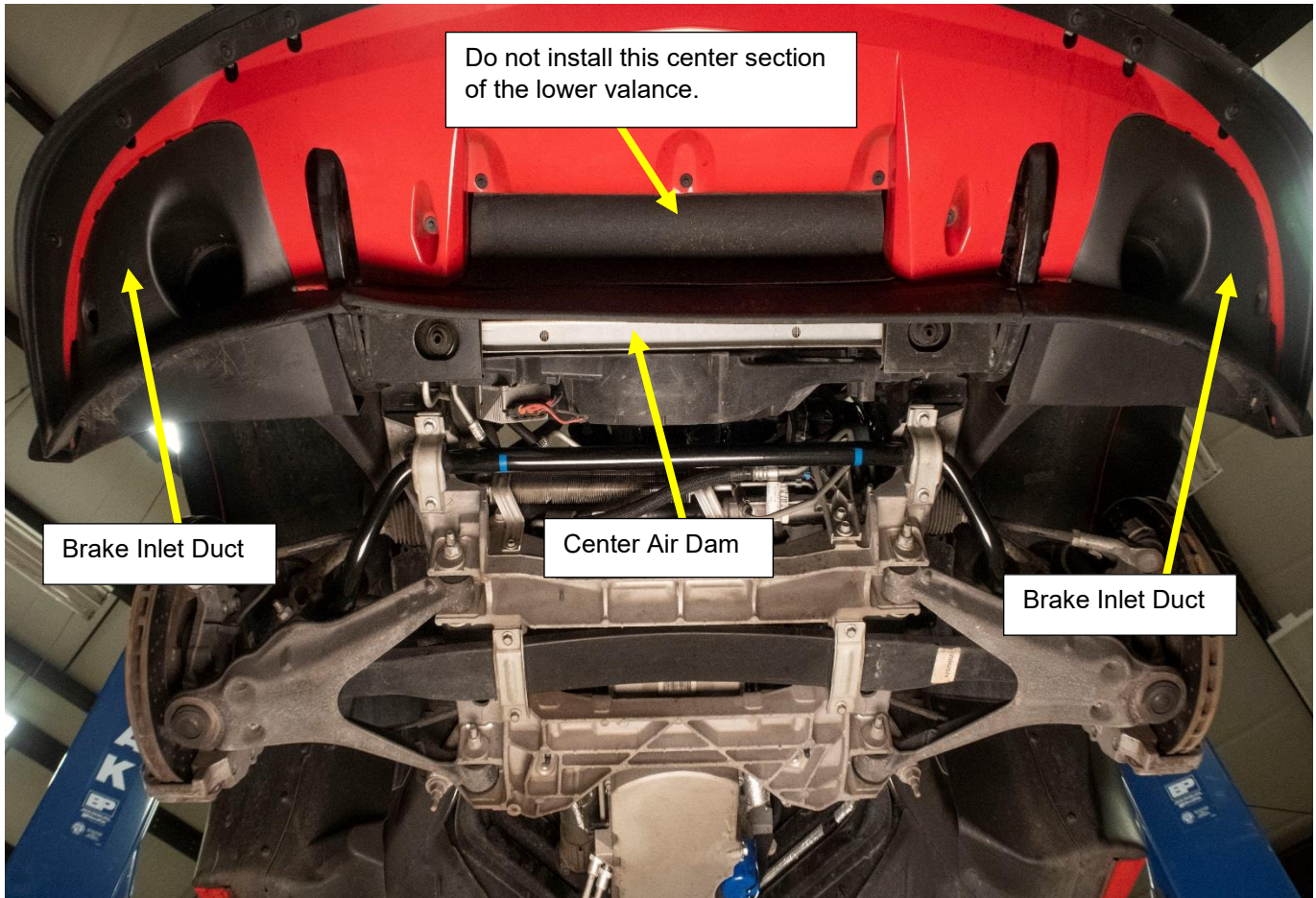


Figure 69

## Finishing the Installation:

**Congratulations! You have just completed a very high level installation that required several critical Vehicle Chassis and Engine system components to be removed, modified, and reinstalled. Please take your time and inspect all aspects of the vehicle to be sure the job was done completely and that all components are ready for initial startup.**

### Last Few Steps

1. Install the battery and leave the negative terminal disconnected at this point.
2. Install the wheels and lug nuts.
3. Make one last inspection of all systems. Make one last detailed inspection around the engine compartment for loose hoses, electrical connectors, retainers, clamps, and fittings. Pay particular attention to the fuel rails and around the fuel lines for any issues that could cause a fuel leak.
4. Remove the fuses from the STS power harness fuse holders and make sure the BLUE wire is disconnected from the STS engine harness at the fuel injector.
5. **Connect the negative terminal of the battery.**

### Fuel System Leak Test

**WARNING: Any fire or smoking is absolutely prohibited during this process. Use extreme caution as fuel hoses and lines are pressurized and can spray fuel. Take all necessary precautions when servicing pressurized fuel lines and working with open fuel containers!**

**NOTE:** You should have installed the STS fuel injectors and STS Turbo Tune from the i3 Tuner at this point if you purchased the "With Tune" option kit.

## DO NOT START THE VEHICLE!

1. Have spotters stand on each side of the vehicle to look for leaks.
2. Place the ignition switch into the RUN position and allow the vehicle to "power up", but not start.

**NOTE: "DO NOT" press the brake pedal when powering up the vehicle.**

**CAUTION: If any leaks are detected shut down the vehicle power immediately. Clean up any spilled fuel, disconnect the negative cable of the battery and fix any leaks before proceeding.**

**IMPORTANT:** The oil pumps should not run during this test. If the oil pumps are running, check to be sure the BLUE STS switched power wire at the fuel injector is "disconnected".

3. If no leaks are detected or after any leaks have been repaired, repeat steps 1 and 2 several times until you are confident the fuel system is free of leaks.



# Electrical and Safety Systems Checks:

## Oil Pump Polarity Test

**NOTE:** This test will ensure the pumps are connected properly and will scavenge the drain oil from the turbos and return it to the engine.

1. Install the fuses into the STS wire harness fuse holders.
2. Disconnect the -6 braided oil scavenge hose from the bottom of the turbos.
3. Disconnect the BLUE STS 12V power harness from the short pigtail splice at the injector harness.
4. Install a jumper wire between the BLUE wire of the STS harness connector and the battery power terminal at the power distribution box (**not the pigtail spliced into the injector power wire**). See **Figure 70**.
5. The oil pumps should run when power is applied to the BLUE harness wire.

**NOTE:** Do not allow the pumps to run dry for any longer than necessary to perform the test procedure.

If the STS oil pumps do not run with power to the blue STS harness wire, check the following:

- 12v to the BLUE STS Harness wire
  - STS fuses are installed and not blown
  - Relays are installed and clicking when power is applied to the blue wire
  - STS harness ground is connected to a solid chassis or engine ground
  - Oil pumps are plugged in to the STS harness
6. **With the pumps running:** Check that the scavenge hose has vacuum (pulling air in) on the hose end. If there is air blowing (pushing air out) from the hose end, the pump is running backward. If both driver's and passenger's scavenge hoses have air blowing (pushing air out) from the hose ends, simply swap the driver's and passenger's oil pump harness connectors and recheck. If only one pumps is running backwards you will have to swap one of the black wires and the yellow wire with a black stripe in the STS harness connector of the oil pump that is running backwards.

**NOTE:** Use a small thin plastic bag (sandwich bag) SEALED over the hose end to determine if the pump is pulling vacuum or pushing air from the hose. If the plastic bag inflates, the pumps are running backwards. If the bag deflates the pumps are running correctly.

7. Disconnect the jumper wire from the battery terminal and reconnect the -6 Scavenge hose to the bottom of the turbo when testing is completed.

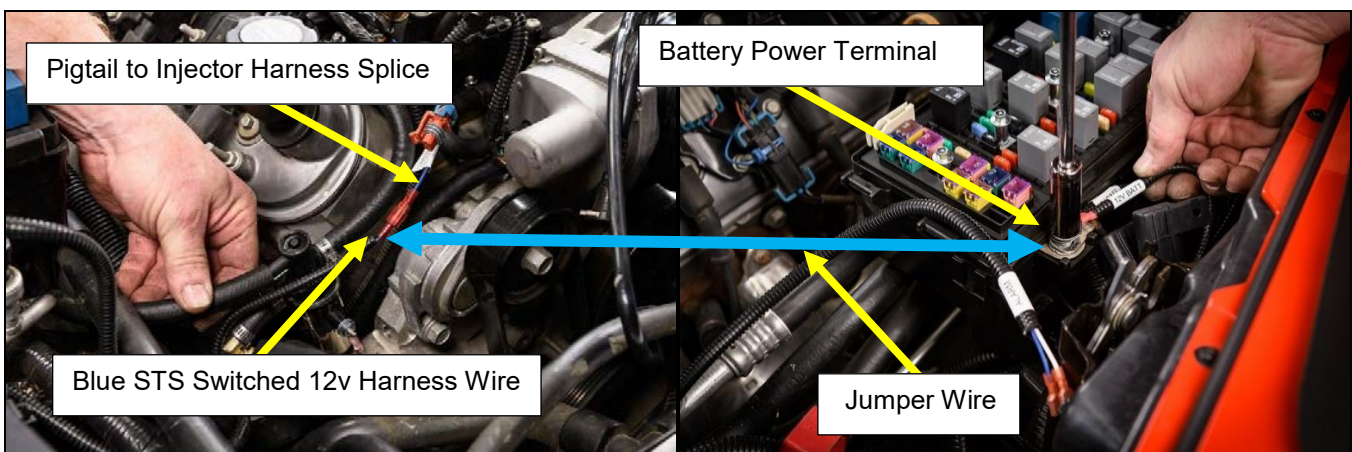


Figure 70

# Electrical and Safety Systems Checks (Continued):

## Testing the PCV Switch Valve

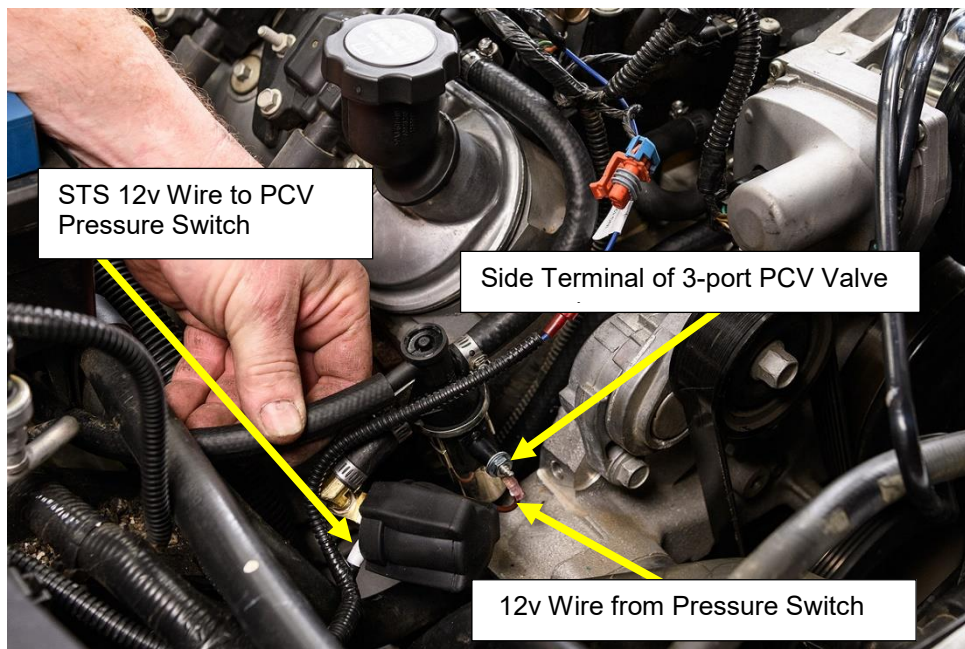
1. Disconnect the oil pumps from the STS harness for this test to prevent them from running dry.
2. Remove the rubber cover from the 3-port PCV pressure switch.
3. Connect the jumper wire from the BAT 12V terminal to the BLUE STS switched 12v harness wire.
4. Use a second jumper wire and connect the (x2) terminals of the 1 PSI pressure switch at the 3-port switching valve. The switching valve should have an audible click when the jumper is applied, indicating that the valve is activated. If the valve does not “Click”, perform the following diagnostic tests.
5. Disconnect the jumper wire and replace the rubber cover on the 1 PSI switch when the test is successfully completed.

### Diagnostic Tests

- Is the wire from the STS Harness connected to one terminal of the 1 PSI pressure switch?
- Does the wire from the STS harness have 12v at one terminal of the 1 PSI switch?
- Is the short wire from the second terminal of the 1 PSI pressure switch connected to the side terminal of the 3-port switching valve? Does it have 12v with the jumper across terminals of the 1 PSI switch?

**If the side terminal of the 3-port switching valve has 12v and the valve is not switching, check the following:**

- Is the 3-port switching valve properly grounded to the cylinder head? Is the engine properly grounded?
- Has the side terminal of the switching valve been overtightened and damaged?
- Loosen the retaining nut and perform a wiggle test. If the valve activates when the terminal is moved, it is likely the valve has been damaged.



**Figure 71**

## Electrical and Safety Systems Checks (Continued):

### Oil Pump Alarm Buzzer – Figure 72

1. Connect the STS oil pump harness connectors to the oil pumps.
2. Remove the rubber covers from the 3 PSI pressure switches at the oil pump scavenge ports.
3. Place a jumper wire between the terminals of the passenger's (right) 3 PSI pressure switch.
4. Install the jumper wire between the Batt 12v power terminal and the BLUE STS switched 12v harness wire.
5. **The oil pumps should be running and the oil alarm buzzer should sound.**
6. Disconnect the jumper wire from the passenger's pressure switch and connect to the driver's 3 PSI pressure switch. The oil alarm buzzer should sound again.
7. Disconnect the jumper wire and replace the rubber cover on the 3 PSI switches if the tests are successfully completed.

**If the oil pumps are running and the oil alarm buzzer is NOT sounding, check the following:**

- Is the jumper wire connected between the terminals of the pressure switch?
- Is the oil alarm buzzer connected?
- Is the BLUE wire to the oil alarm buzzer connected to the spade terminal indicated with a RED marking or (+ side) and the white wire connected to the opposite terminal or (- negative)? The alarm buzzers are polarity sensitive.
- Does the BLUE wire at the buzzer have 12v with the oil pumps running?
- Is the BLACK wire on the pressure switch connected to chassis ground?

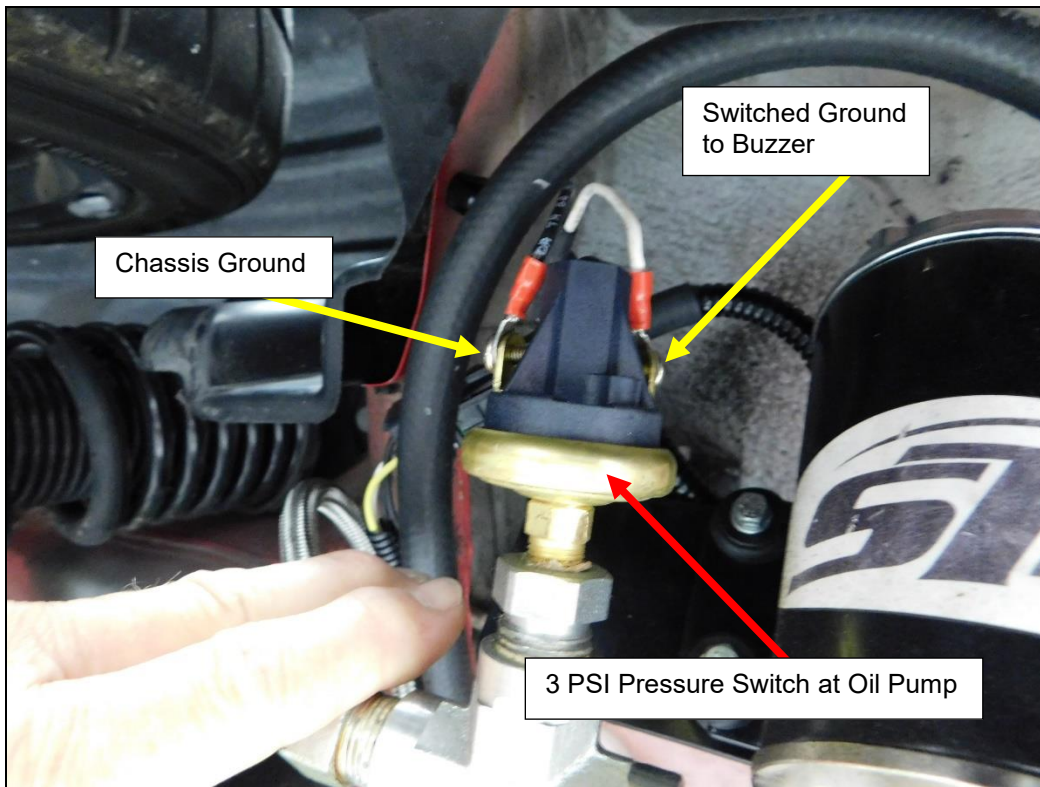


Figure 72



# Flushing the Oil Feed Lines:

## -6 and -4 Oil Feed Line Flush

1. Remove the -6 oil feed line from the tee fitting at the differential.
2. Disconnect the -4 oil feed lines from the top of the turbo.
3. Place a pan or bucket under the -6 oil feed line large enough to hold approximate 1/2 quart of motor oil.
4. Plug the BLUE STS switched 12v harness into the short blue pigtail spliced into the injector wire.
5. Verify the oil pumps are plugged in.
6. Check that the engine oil is full for a cold engine.
7. Verify all critical engine components are secured and there are no loose hoses or wires that will be damaged when the engine is started for the first time.

**Make sure the -6 line is directed to the pan. The oil will flow from the line at a considerable rate and the hose may move around when the oil begins to flow.**

**If you have replaced the injectors, the turbo tune must be installed before the engine is started.**

- Start the engine and let it idle. **DO NOT REV THE ENGINE!** You will damage the turbos!!
- Check under the car for oil and fuel leaks, shut the car off, and repair leaks immediately if needed. The engine should be running relatively smooth. **If the engine is struggling to stay running or very rough, diagnose and fix the problem before continuing.**
- Run the car at idle until approximately 1/2 quart of oil has run through the line. Shut the engine off.
- Clean the fitting on the hose and reconnect to the -6 tee fitting at the differential.
- Direct the -4 hoses into the pan or separate pans if needed.
- Start the engine and allow approximately 1/2 quart of oil to run through the lines. Shut the engine off.
- Clean the fittings and reinstall the -4 oil feed lines to the top of the turbo.
- Check the oil level and top off to the recommended cold full level.
- The STS oiling system adds approximately 1/2 quart of oil to the system.
- Start the engine and allow to idle.
- **Check the oil return line fittings at the valve covers for leaks. The oil pumps are now scavenging oil from the turbos and returning that oil to the valve covers.**
- Check all oil lines and fittings for leaks while the engine is warming up. Repair oil leaks as soon as they are identified.
- The Oil Warning Buzzer should not be sounding.
- **MAKE SURE NO OIL IS PRESENT INSIDE THE TAILPIPES. THIS IS A SIGN THAT THE OIL RETURN SYSTEM IS NOT WORKING CORRECTLY.** See the following steps if oil is present in the exhaust pipe from the turbo:
  1. Verify the oil pumps are running and in the correct direction.
  2. Oil alarm buzzer is not sounding.
  3. Oil return lines are clear back to the engine and not pinched or blocked.
- Install the STS exhaust tips. **THIS PROCESS REQUIRES WELDING.**

## The vehicle is now ready for final inspection and data logging.

### Final Inspection:

1. Visually inspect every system and component on the vehicle that was removed and installed.
2. Nut and bolt the entire car from front to back.
3. Check all hose clamps and silicone coupler connections.
4. Check all suspension connections and hardware.
5. Check all fuel lines ,oil lines, vacuum lines, and boost reference lines.
6. Install the wheels and tires. Torque the lug nuts to factory specifications.
7. Are all the body panels and brake ducting in place and secure?
8. **DOES THE CAR HAVE FRESH 93 OCT (91min) FUEL IN THE TANK?**
9. **HAS THE OIL BEEN TOPPED OFF?**
10. **IS THE COOLANT LEVEL FULL?**
11. **HAS THE STS “TURBO BASE TUNE” BEEN INSTALLED?**

### First Drive:

If you are **NOT** installing an STS (T) kit with the fuel injectors ,i3 tuner, and spark plugs and are providing your own tune support, “**DO NOT**” attempt to drive the vehicle until you have had YOUR tuner make the necessary changes to the engine management system to avoid serious and immediate engine damage.

1. Are the wide band O2 meter and boost gauge connected and working? (RECOMMENDED)
2. If no wide band meter or boost gauge are being used, you must use the data logging feature of the i3 to monitor engine tune and look for signs of excessively rich or lean fuel mixtures and spark knock (knock retard) during the first **very easy test drive**.
3. Start the car and let the engine come up to normal operating temperature. The engine should be running fairly smooth and is able to take small throttle blips in park to 2500 RPM. If the engine is running poorly, smoking, making any noise, or the check engine light comes on, shut it off and fix the problem(s).
  - **Is the STS turbo tune installed?**
  - **Are the fuel injectors installed?**
  - **Are all OEM sensors plugged in and working correctly?**
4. If the engine is running normally, you may drive the vehicle at low speeds and light load being very careful not to allow the turbos to spool and produce more than 2 PSI of boost. If the engine is running normally, you should start performing data logs and continue to drive the vehicle normally while the **passenger** monitors critical engine parameters on the live data screen. Gradually work your way into boost. Review data logs frequently as you increase engine load and speed. Take your time with this process and resist the urge to drive the vehicle under full boost until you have verified the **Air Fuel Ratio** and Timing are in a safe range.

**DO NOT ATTEMPT TO MONITOR THE DATA SCREEN WHILE YOU DRIVE! SERIOUS INJURY OR DEATH COULD RESULT FROM A CRASH!**

# Data Logging and What to Look for:

## Data Logging on the i3

1. Plug in the i3 to the supplied OBDII adapter cable.
2. Plug the OBD cable into the vehicle OBDII diagnostic port.
3. Allow the unit to initialize then press YES if you agree to the terms.
4. Turn on the ignition.
5. Press the SCAN option /CONTINUE if ignition is on.
6. Press the DATA LOG option – wait for communication.
7. You will be given several options:
  - **RECORD** – at the top of the screen – starts data log recording.
  - **Add PIDs** – This will enable specific inputs to the data stream not on the default list.
  - **REMOVE PIDs** – This will remove specific inputs from the data stream not wanted.
  - **Restore Default PID LIST** – Restores the factory preset data inputs to view.
8. Press ADD PIDs:
  - Scroll down and select **MISFIRE** from the menu.
  - Scroll down and select **KNK.RET** to enable the “**Knock Retard**” data stream to the live data screen.
  - **SAVE THE PID SELECTION**
    - Press the back arrow ← at the top of the screen
    - Press **YES** to save PIDs to list.
9. Press the back arrow to return to the DATA LOG main menu.
10. Press **RECORD** to start a data log.
  - The data screen will appear with all the preset and added PID’s that were selected  
**NOTE:** The PIDs are active and the log is recording even if the engine is not running. To avoid excessively long logs only press Record when you are ready for a log to begin recording data. If long periods of data stream are watched and not necessary to record, do not save the log when exiting the data log.
  - Start the engine. The information for each PID will become more active as the sensors are sending live data to the ECU.
  - Drive the vehicle and have the passenger watch the data on the screen. Scroll up and down to find the PIDs that you want to monitor.
  - When the drive is complete, exit the log by pressing the back arrow at the top of the screen. You will be prompted to save the log – YES or NO.
  - Press **YES** to save the log and exit or **NO** to exit with no saved data.
  - If no passenger is available to watch the data, save your recording and view the log on the Diablosport “DATA VIEWER” software available as a download on the Diablosport website.
  - **Never attempt to monitor data while you are driving a vehicle. Serious injury or death can result from a crash.**

## Reviewing a Data Log:

### Download a Data Log from the i3

1. Plug in the supplied USB interface cable into the top of the i3.
2. Plug the USB into your PC or laptop.
  - You will see the i3 appear on the drives list.
  - Click on the **Logs** folder and the recorded logs will be listed.
  - You can rename these logs or save them to a new folder from here.



## View a Data Log

### Viewing data logs requires the Data Viewer utility be downloaded from the Diablosport website

1. Connect the i3 to your PC or laptop.
2. Open Data Viewer.
3. Open the folder tab in the upper left hand corner.
4. Select logs from the i3 drive menu.
5. Select desired log to view.
6. Select the desired PIDs from the “tree” on the left side of the screen.
  - The data will appear on the viewer.
  - Slide the tool bar on the bottom of the screen to advance the data manually or select play to have the data “stream” in motion.
  - Use the cursor to select a specific data point on the screen and the value for that data point will be displayed in the upper right of the data screen.
  - Each data selection will be displayed in a specific color for easy identification.

**NOTE:** Like any tool, data logging is only as useful as the data that was recorded on the drive. Be deliberate when making data logs and turn off all accessories.

**CAUTION:** Never watch a laptop or other device that will distract you from safely driving the vehicle. Respect all traffic laws and speed limits while data logging.

## What to Look for in a Data Log:

**WARNING:** Do NOT attempt to drive the vehicle while being distracted by monitoring the data on the i3!

**WARNING:** All testing should be done using the data logging feature and on a closed course. Do NOT drive in traffic on public roads while distracted by tuning parameters. Operate the vehicle safely and obey all traffic laws.

**IMPORTANT:** It is highly recommended that you have a wideband air fuel ratio gauge installed along with a boost gauge to monitor AFR and boost levels. Lean conditions and/or over-boost conditions can cause severe engine damage very quickly.

Monitor the Long Term Fuel trim percentage while normally driving (NO Boost). These values should be within -10% and +10%. If these values are out of this specified range, you will need to do diagnostics to find out why the vehicle is running too rich or too lean. If these values are more negative than -10%, the tuning is too rich and will most likely be too rich when you test wide open throttle (WOT). If these values are more positive than +10%, the tuning is too lean and will most likely be dangerously lean when you test WOT. Drive the vehicle in the idle to 3000 RPM range with varied throttle, not to exceed 40% throttle. During these conditions, the fuel trims should stay within the specified range.

Test WOT in 1st gear and watch the following PIDs:

- Spark Advance (should be in the 10-14 degree range at WOT)
- Knock Retard and Total Knock Spark (should be in the 0-2 degree range at WOT)
- Oxygen Sensor B1S1 and B2S1 (should be in the .90 to .92 volt range at WOT)
- Boost Gauge (should be in the 4-7 psi range at WOT)
- Air Fuel Ratio (AFR) Gauge (should be approximately 14.7:1 during normal driving and in the 10.5:1 to 11.5:1 range at WOT)

**WARNING:** O2 sensor values lower than .88 volts and AFR higher than 12:1 at WOT with boost are considered too lean and can cause engine damage! Knock retard values higher than 3 degrees are indicating that the engine is detonating and can cause severe engine damage!

If values are within specification, you can test in 2nd gear and then in 3rd gear, etc. to ensure that all parameters are within safe ranges. If you do not see the above parameters, you can use the "ADD PIDs TO LIST" function on the i3 and add the required parameters to data log.

**WARNING:** All testing should be done using the data logging feature and on a closed course. Do NOT drive in traffic on public roads while distracted by tuning parameters. Operate the vehicle safely and obey all traffic laws.

# Troubleshooting:

## Oil Pump Alarm Sounds

- IMMEDIATELY turn the engine OFF as quickly as can be done safely.
- Check to see if oil pump is working while the vehicle is running.
- If pump is working, check to see that the oil pump is spinning in the correct direction.
- If pump is not working, check inline fuse(s) in main harness and electrical harness connections.
- Check relays to make sure they are plugged in properly.
- If everything is working properly, check wire harness for a short in the WHITE wire or a faulty Oil Alarm pressure switch.
- Check to make sure the oil is flowing from the pump back to the engine unrestricted.

## Oil Pump is Noisy

- Oil pump will be slightly noisy upon startup and when cold, but should get quieter as system warms and as pump breaks in.
- Check to make sure that the pump mounting hardware is not too tight, causing the pump to transmit noise through its mounting surface.
- Check to see if oil pump or housing are rubbing on frame and that rubber insulators are in good shape.

## Turbo won't Boost, Produces Low Boost, or has Excessive Spool Time

- Check intake tubing for any leaks at tubes or hose connections.
- Check exhaust system for any leaks.
- Check wastegate to see that valve isn't stuck open.
- Spool up time will decrease as the turbocharger breaks in and should improve over first few days of driving.
- Check condition of air filter or pre-charger filter cover.
- Detonation
- Check for lean condition. AFR should be 11.5:1 or richer and O2 readings should be above .900 volts at WOT Check Octane rating of fuel and **use PREMIUM fuel only.**
- Check boost level to see that it isn't running too much boost.
- Check wastegate and hose connections.

## Squeaking or Rattling Noise

- Check to see that all mounts and tubing are secure.
- Check to see that tubing and hose clamps are not rubbing on any moving parts.

## Check Engine Light

- Check all sensor electrical connections.
- Pull codes with diagnostic scanner and follow diagnostic flow charts.
- If MAF code appears, check and clean MAF sensor of any oil residue or contaminants.
- Trouble code may reset on its own with time as computer relearns and recognizes higher sensor readings as normal values.
- Clear out code and let computer relearn new values and see if code reoccurs.
- Have a competent repair shop diagnose and repair the trouble code.



### **Gas Smell and Fuel Tank Pressurization**

- Check to see that injectors were installed correctly and that O-ring seals are not damaged.
- Check fuel lines and connections for leaking.
- Check to see that fuel tank evap solenoid is working properly.

### **Excessive Engine Blow-By or Smoking**

- Check condition of gaskets and seals and look for oil leaks.
- Check condition of PCV valve. A bad valve will let boost into crank case (also refer to the electrical system tests).
- Check to see that the PCV Switch Valve hoses are routed correctly and that the valve is switching properly.
- Check the 1 PSI pressure switch to see that it is powering the BROWN wire at 1 PSI switch.
- Check cylinder compression to verify engine is in good condition.
- Check oil pump operation and for any flow restrictions.
- Check for oil at the tailpipes – indicates problem with oil return system.

### **Burning Smell**

- Check to see that all wiring harnesses and hoses are routed properly and away from hot exhaust.
- Check to see that there are no shorts in electrical wiring harness.
- Check oil pump operation and for any flow restrictions.

# STS Turbo Systems – SAFETY WARNING – Please Read!

## IMPORTANT

### **Oil System Warning Buzzer**

Your STS™ Turbo System is equipped with a safety system that will alert you in the event that your oil pump fails. This system is a buzzer that will be heard inside your vehicle. If you hear the Oil Alarm sound, immediately shut the engine off and safely pull over to the side of the road and contact STS Tech Support. Serious engine damage can occur if the pump stops while your engine is running. With the pump stopped, oil will flow out of the turbo and will not return to the engine.

### **Premium Fuel**

STS Turbo recommends that you only use Premium Fuel, 91 Octane or higher, on vehicles equipped with the STS™ Turbo System. Premium fuel reduces pinging and detonation which can cause significant damage to your vehicle.

### **Engine Pinging or Detonation**

If you hear pinging in your engine, back off the throttle immediately. Pinging is the sound of detonation and can cause significant damage to the engine. If you hear pinging, do NOT drive the vehicle during this condition and call your local STS dealer immediately.

### **Heavy Towing**

The STS Turbo System, like other turbo and supercharger systems, under certain heavy towing situations can create more power than a stock engine can handle. STS Turbo does not recommend using this system for heavy towing purposes.

### **Vehicle Modifications**

STS Turbo Systems were designed to fit stock vehicles. If you have modified your vehicle, modifications to the turbo system or your vehicle may be necessary to ensure the proper fit and safe use of the STS Turbo System. Inform your dealer of any aftermarket changes to your vehicle.

The STS Turbo system is designed to provide enhanced power and engine performance. It could cause severe damage to your vehicle if it is not properly installed or if your vehicle is not properly tuned and maintained for the system. Under some circumstances, improper installation or use of the STS™ Turbo system could result in serious personal injury or even death.

STS Turbo Systems cannot accept responsibility for the proper maintenance or the proper operation of your vehicle. Please take all necessary precautions to use the STS™ Turbo system strictly in accordance with all instructions and warnings.