



# **BANTAM II B/T**

**INSTALLATION INSTRUCTIONS**

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If your vehicle has been or is being modified, some procedures will need to be adjusted to fit your particular application. Read below before cutting/drilling. Since this is a custom installation that will vary based on your particular vehicle, many of our procedures can be viewed as suggestions. Your personal preferences will play a major role in the actual installation.

### **CHECK LIST, PRE-INSTALLATION:**

- ☑ Before beginning the installation check the shipping box for the correct components. YOUR BOXED UNIT INCLUDES A LIST OF MAJOR COMPONENTS AND A LIST OF BAGGED PARTS. We have a 5 stage check process to make sure you have everything you'll need.
- ☑ If your vehicle has been or is being modified, some procedures will need to be adjusted to fit your particular application.
- ☑ A basic cleaning of the engine compartment and interior before beginning will make things go more smoothly.
- ☑ Check condition of engine mounts. Excessive engine movement can damage hoses to A/C and/or heater.
- ☑ Drain the radiator. Retain the coolant and reuse, or dispose of properly.

**SAFETY FIRST:** Wear eye protection while drilling/cutting, deburr sharp edges, and never get in a hurry or force a part.

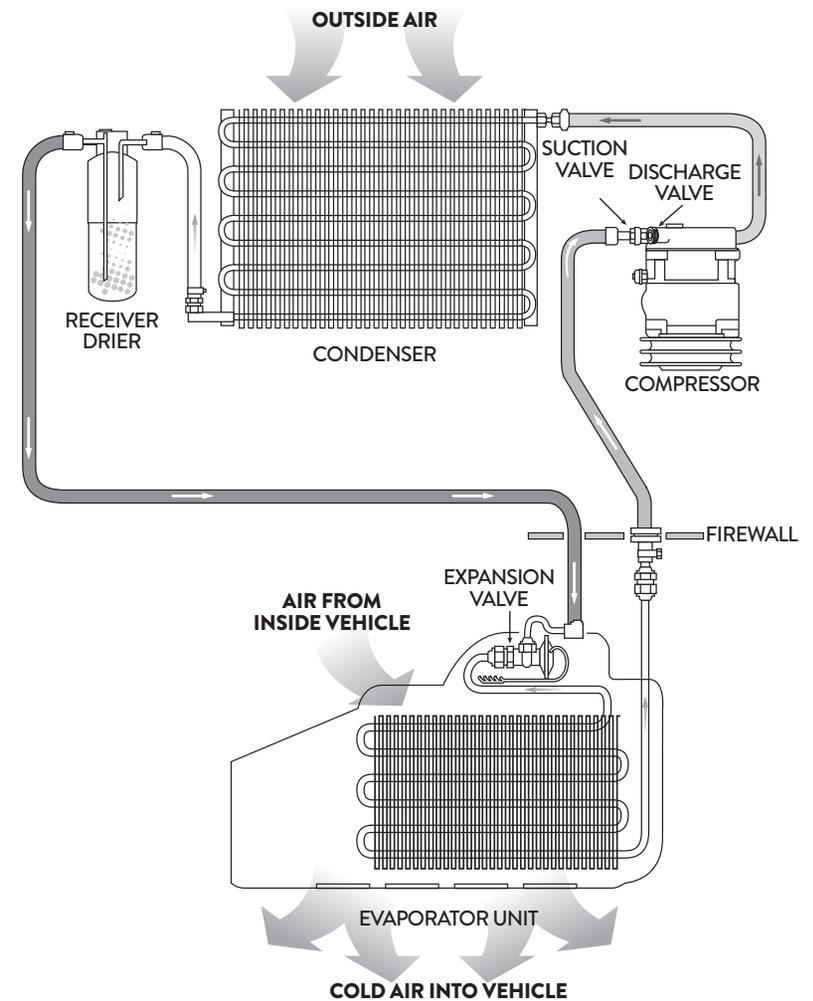
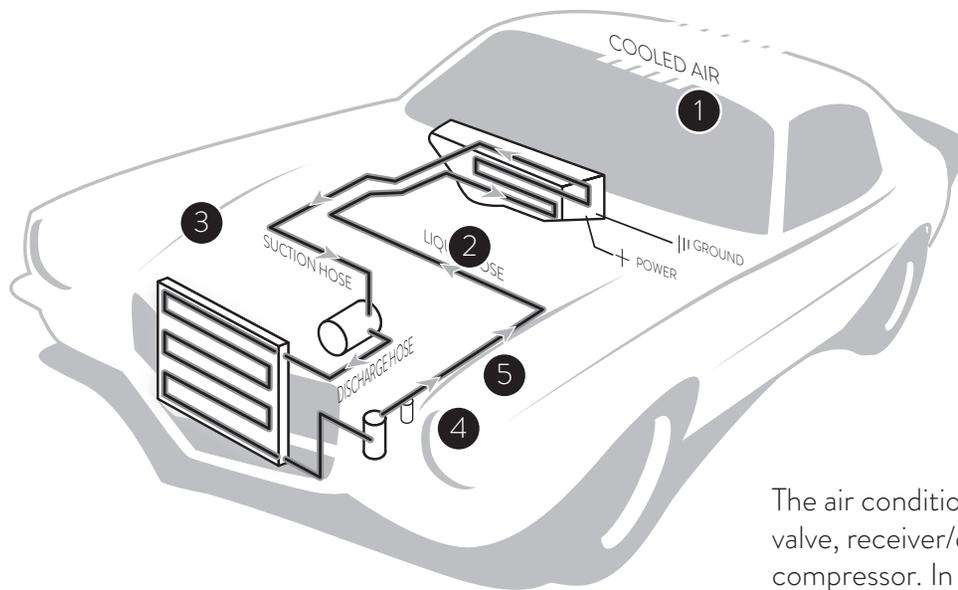
### **PROCEDURES, DURING INSTALLATION:**

- ☑ Fittings: Use one or two drops of mineral oil (supplied with your kit) on ALL rubber o-rings, threads and rear of bump for o-ring where female nut rides. Do not use thread tape or sealants.
- ☑ Measure twice (or more), cut once
- ☑ Should you have any technical questions, or feel you have defective components (or missing items), call us immediately, we will be glad to assist you. Our toll-free number is listed on every page, we're here to help!

**YOU CAN NOW BEGIN THE INSTALLATION.**

## A BASIC OVERVIEW OF AUTOMOTIVE A/C

- 1. Evaporator with Blower Fan** In order to remove the heat from the air in the vehicle, the A/C evaporator allows the refrigerant to absorb the heat from the air passing over it. The blower fan moves cool air out into the car interior.
- 2. Compressor** The compressor pumps and circulates the refrigerant through the system.
- 3. Condenser** The condenser is a heat exchanger mounted at the front of the vehicle. Heat drawn out of the interior of the car is expelled here.
- 4. Receiver/Drier** The drier not only dries refrigerant, it also filters the refrigerant and stores it under certain operating conditions.
- 5. High Pressure Switch** A pressure switch is used to shut down the system if high or low pressure is detected, basically it acts as a safety switch.



The air conditioning system in your car is comprised of a compressor, condenser, expansion valve, receiver/drier, and evaporator. Refrigerant (also known as Freon) is compressed in the compressor. In the condenser, gas is cooled to a liquid state and travels to the expansion valve. As the liquid refrigerant goes through the expansion valve it rapidly cools in the evaporator. A fan blows over the evaporator and cools the air that blows out your vents.

# ATMOSPHERE

Before you get started you need to download the Restomod air App Atmosphere.



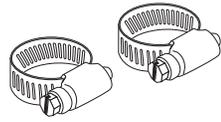
For all Apple devices go the App Store and search Restomod Air. The title of the app will be Restomod Atmosphere. Press get to install App.



For all Android devices go the Google Play Store and search Restomod Air. The title of the app will be Restomod Atmosphere. Press install App.



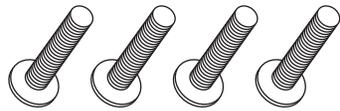
**INCLUDED IN THE KIT**



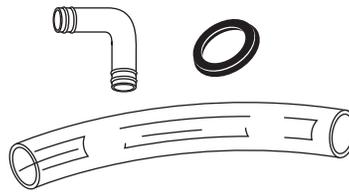
TWO WORM GEAR CLAMPS



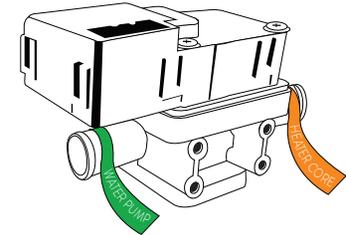
FOUR #1/4 - 20 X 1" BOLTS  
+ WASHER + LOCK NUTS



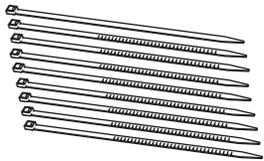
FOUR WELDABLE  
STUDS



DRAIN TUBE  
+ 90 DEGREE ELBOW + GROMMET



ELECTRONIC WATER  
CONTROL VALVE



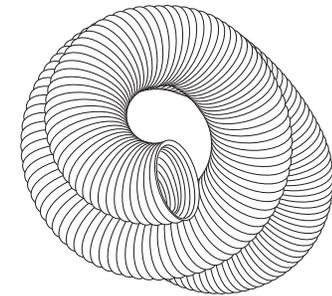
EIGHT ZIP TIES



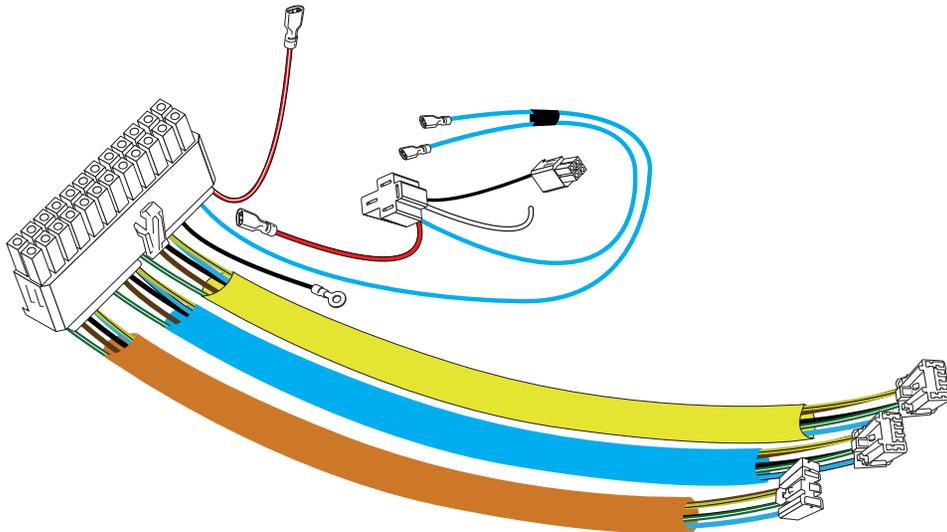
NUT + BOLT



REFRIGERANT TAPE



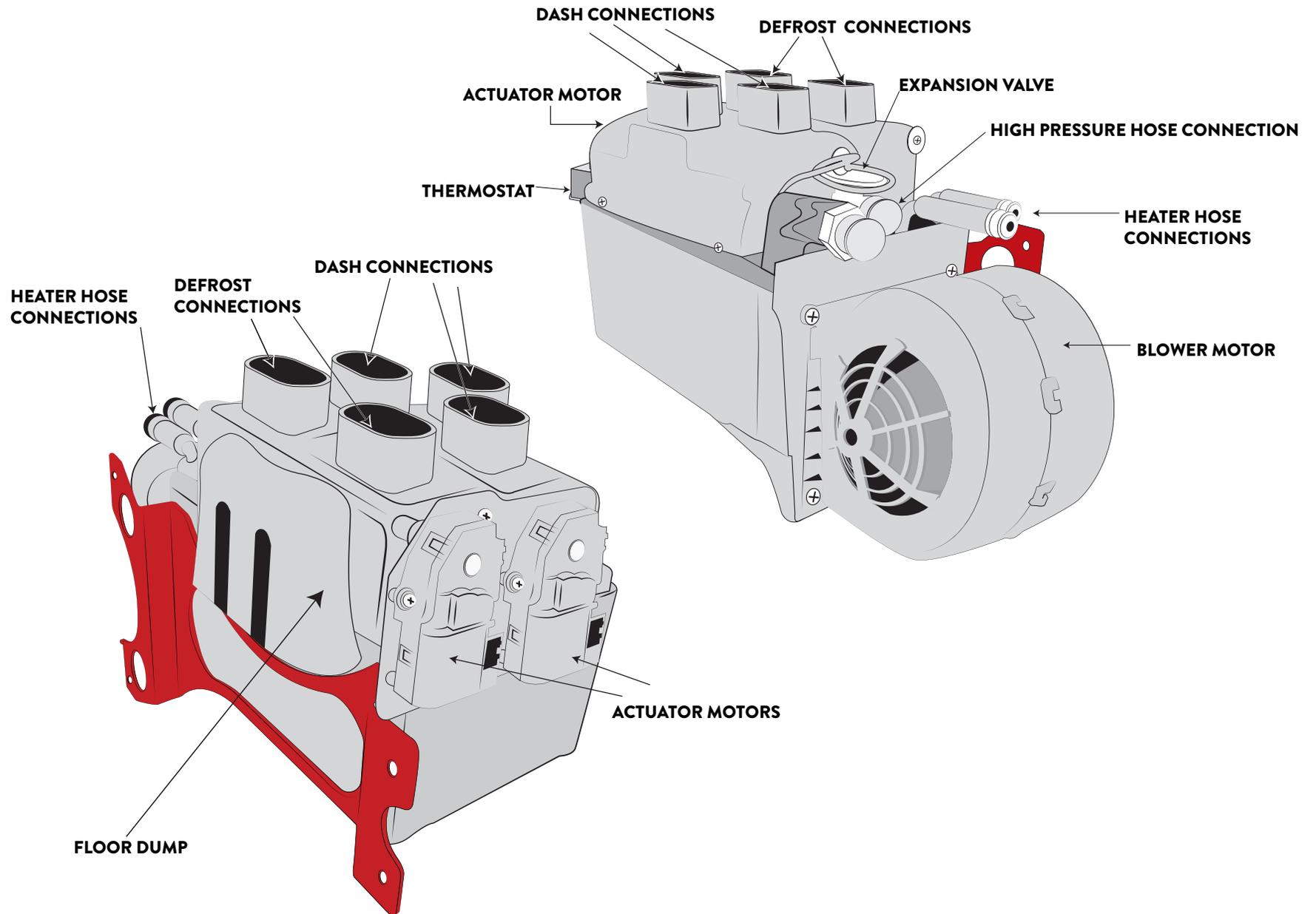
ONE DUCT HOSE, 2" I.D., 15' LONG  
(DUCT HOSE AND LINES WILL  
BE IN BOX, NOT BAGGED)



MAIN POWER HARNESS



RESTOMOD ECU  
BLUETOOTH



## GENERAL PROCEDURES AND VEHICLE PREPARATION

Our Bantam II B/T is designed to be flexible in its final mounting location, but generally the dash area behind the glove box area is the most common and practical. We've included several options for how you can mount the evaporator.

- It's a good idea to visualize the final outcome of all components before cutting into your vehicle. If you're really unsure about a component fitting, you can always make a paper or cardboard mock up first. Measure twice, cut once.
- The mounting location of the evaporator is usually determined by two factors, space and your desired way to route the heater and A/C hoses.
- Duct hose routing and vent locations should be given careful consideration before final mounting is selected. Position the vents to give you optimal air flow. Route hoses so they will not interfere with the operation of controls or other mechanisms.
- Wrap all exposed metal on suction tube or fittings to ensure no condensation will form inside of vehicle and drip on floorboard or blower motor.
- Retain all parts you remove until after the installation is completely finished.

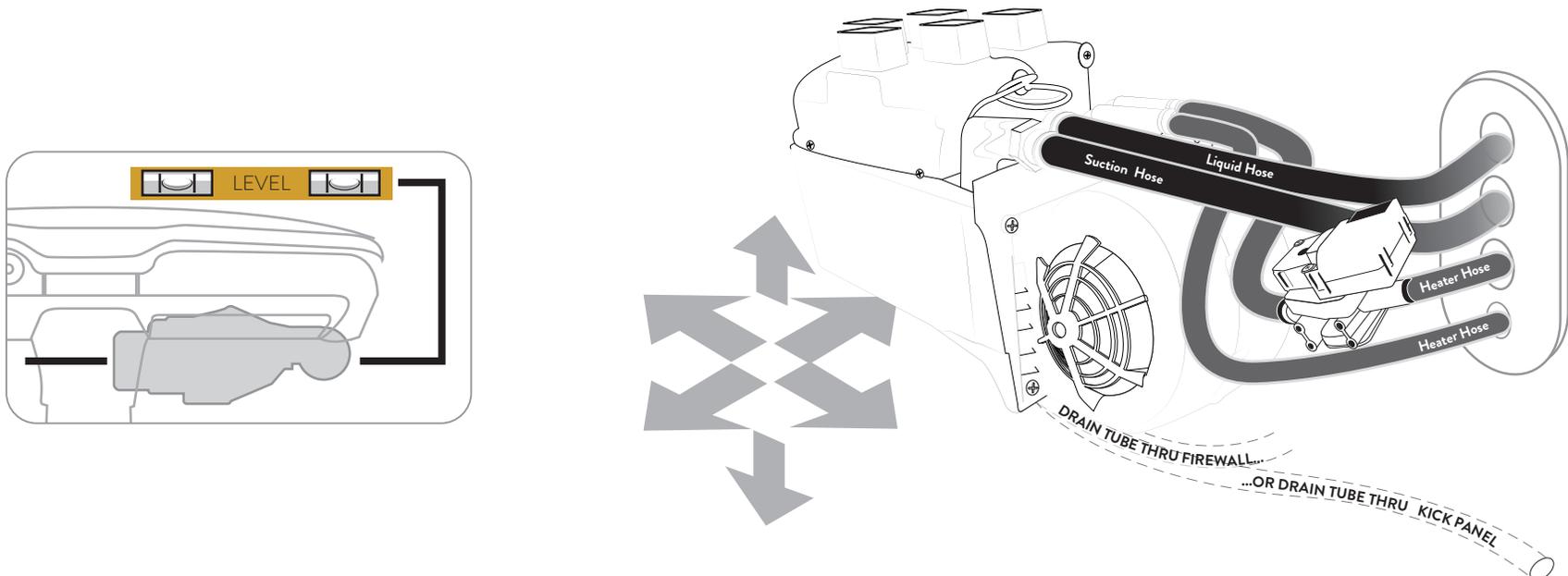
## VEHICLE PREPARATION:

- Before beginning your installation, **DISCONNECT THE BATTERY**. Next, remove glove box (and console, if equipped) for more space to work within.
- Remove all OEM heater unit and A/C components. You may be able to reuse the factory style defrost vents.
- Before installation, double check the firewall and transmission tunnel area for any holes or cracks that may allow hot engine air into the interior of the car. Be sure to seal all of these before completing installation.

Mock up the installation, including with the lines test fitted to make sure you'll have the room needed before you drill holes or weld the studs to your firewall.

Use whatever method you like to securely mount the evaporator (we show you two options on the next pages).

Be sure to align the evaporator unit level with the bottom of instrument panel (assuming the vehicle is sitting level). This will allow for proper drainage of condensation.



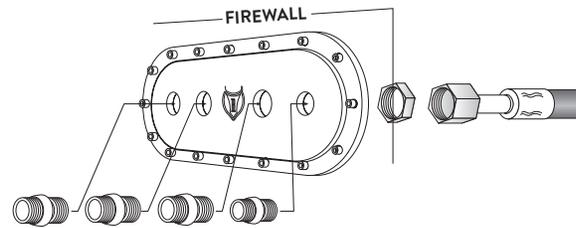
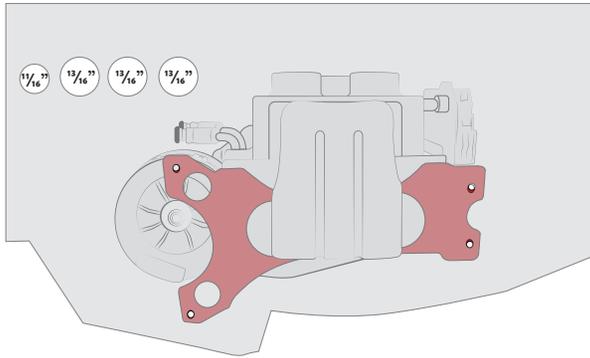
## BULKHEAD INSTALL

Find a nice flat surface to install your bulk head and make sure that the area you selected is clear of any obstructions or components that can be damage.

**Use the bulkhead to mock your holes for the hoses.**

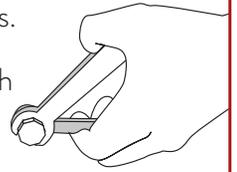
**TIP** When installing the bulkhead make sure to follow the instructions for your particular bulkhead.

Standard sizes for the fitting are 13/16" for the heater and suction hoses. The liquid hose needs a 11/16" hole. After drilling any holes, carefully deburr them to eliminate any potential snags. When final installation of hoses is done be sure to use the proper o-rings and a few drops of mineral oil in each connection.



### IMPORTANT

- Use 2 wrenches to tighten fittings.
- Do not over tighten.
- Use a few drops of mineral oil with every o-ring.
- Crushing or ripping an o-ring will create a small leak very difficult to locate.

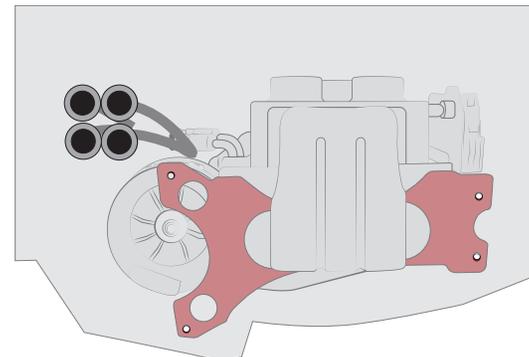
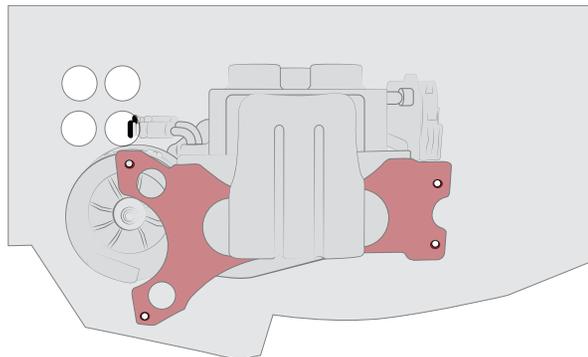


## NO BULKHEAD INSTALL

When drilling make sure to check for obstructions on either side of the firewall. We recommend using grommets if a bulkhead plate is not utilized.

Standard sizes for the fitting are 13/16" for the heater and suction hoses. The liquid hose needs a 11/16" hole. After drilling any holes, carefully deburr them to eliminate any potential snags.

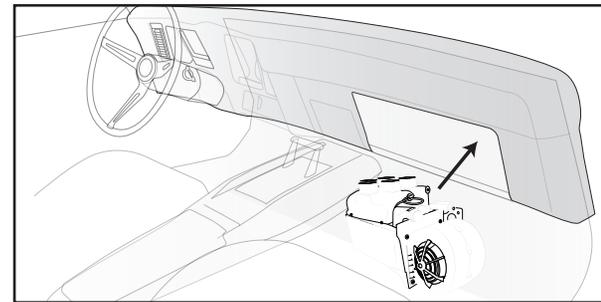
Route the hoses thru the fire wall into the engine bay.



## STEP 1

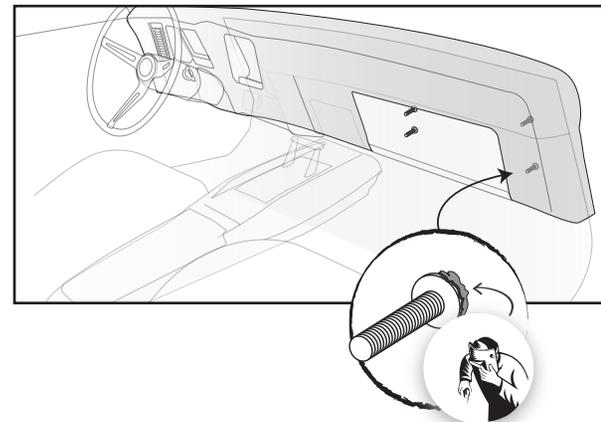
Use mounting bracket 4 holes to mark the evaporator unit on firewall.

MAKE SURE THAT THE UNIT IS LEVEL



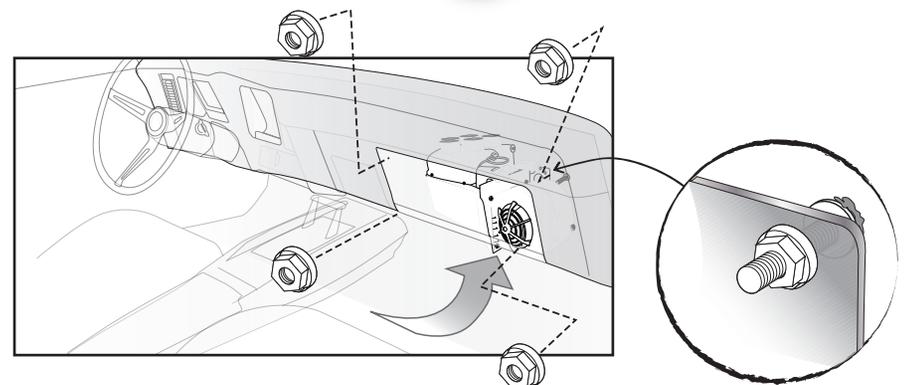
## STEP 2

Weld 4 mounting studs in locations you marked.



## STEP 3

Roll evaporator under dash. Place onto mounting studs and secure with flange nuts.





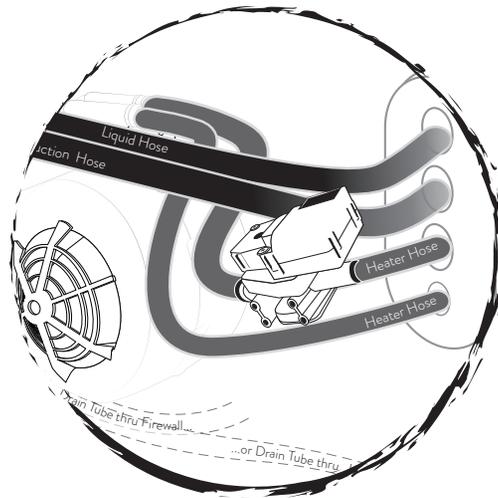
## IMPORTANT

Next, route all A/C and heater hoses from evaporator unit to your firewall. Make sure you have the correct orientation on the electronic water valve...

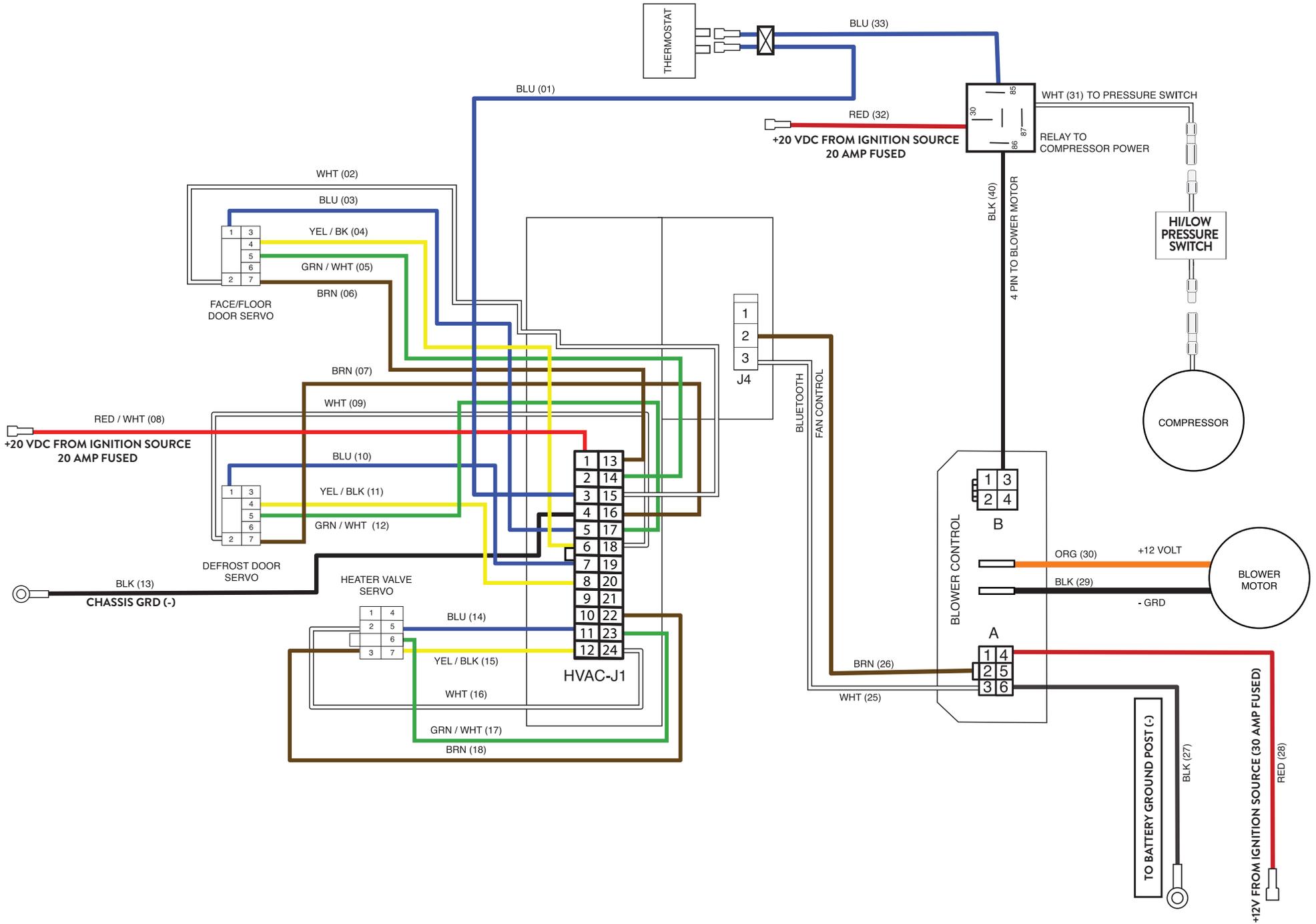
**IMPORTANT NOTICE... WATER VALVE MUST BE INSTALLED PER THESE INSTRUCTIONS:** The lower connection on the tubes coming thru the block off assembly is going to be routed to the water outlet on the intake manifold. Attach your hose with cable clamps on both ends and route where it will not interfere with linkage or come in contact with exhaust manifolds or headers.

The water valve can be connected to either heater connection on the evaporator unit. Make certain the water valve is connected to the hose that connects to the WATER PUMP, If you only remember one thing during this installation make certain that the water valve goes to the water pump. We are stopping the flow of coolant leaving the heater core!

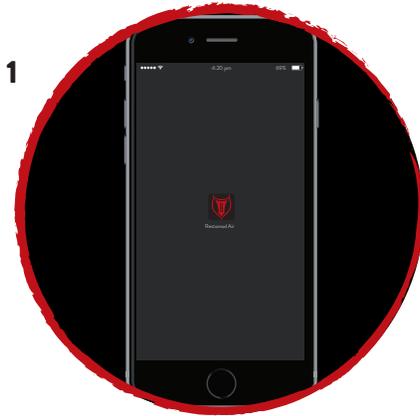
Locate a mounting place for the ECU in a location near the evaporator unit. Don't permanently mount it just yet, you can do that after you calibrate it.



For a cleaner installation, we recommend mounting the electronic water valve in the interior area next to the evaporator.

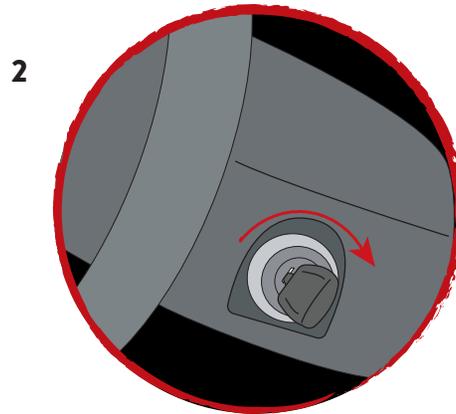


# ATMOSPHERE CALIBRATION

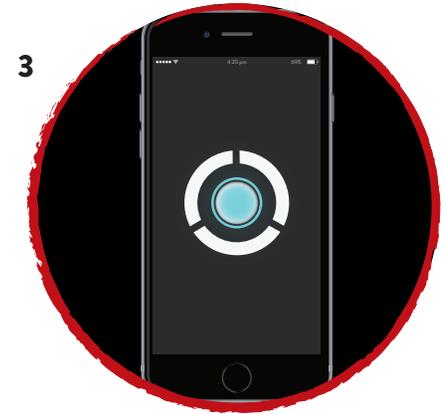


Launch the Atmosphere App by pressing the Restomod Air logo. (Make certain that you have BLUETOOTH ON.)

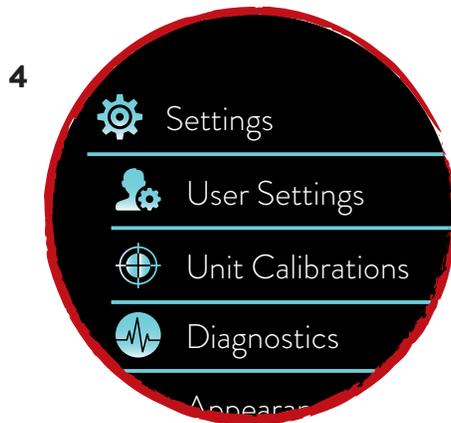
\*Reference Atmosphere Flowchart for additional troubleshooting.



Power Unit. Turn on IGNITION

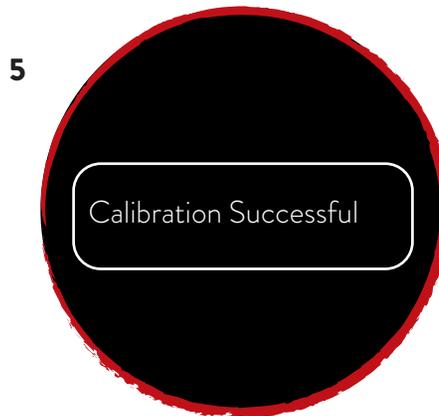


This is your Atmosphere home screen. From here press the center button and hold for 2 seconds. This will take you to the Setting Screen.

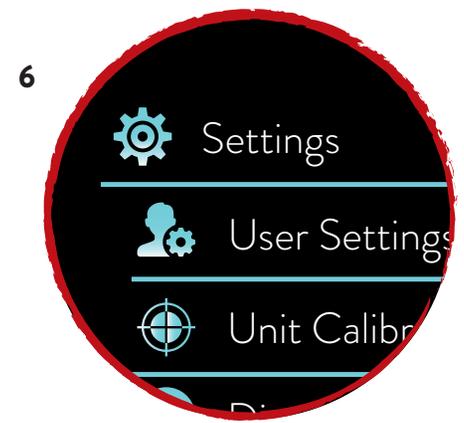


From this settings screen press Unit Calibrations.

Note: you will hear the Bantam doors move, your system is calibrating.

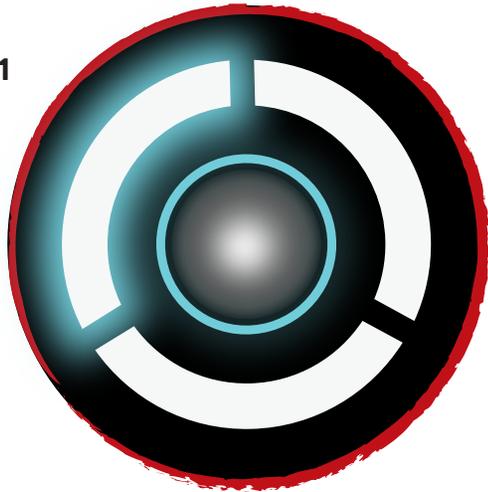


Next you will see a pop up window



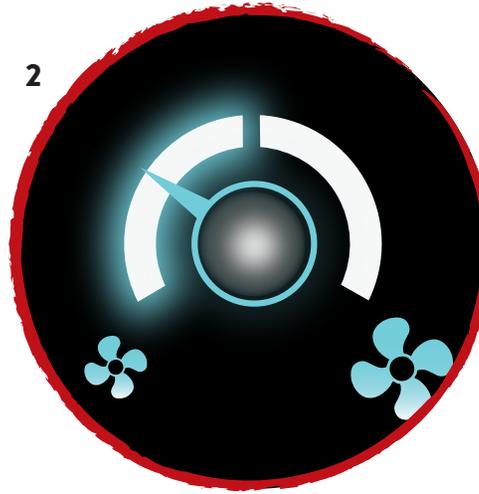
Press the gear on the Settings Screen to go back to the Home Screen.

1



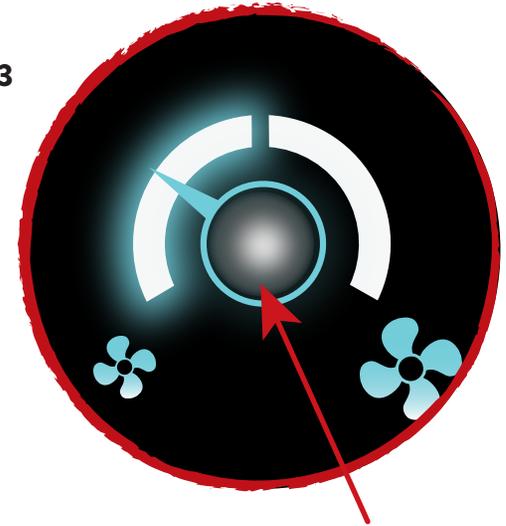
From the Home Screen you can press the LEFT "FAN" button and verify function of your blower motor.

2

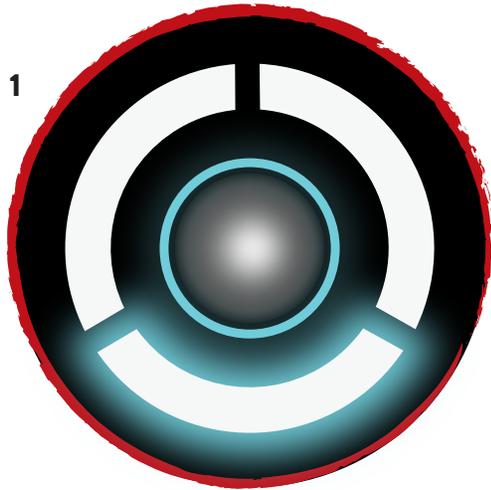


From here you can rotate needle to verify that the blower motor is increasing and decrease speed.

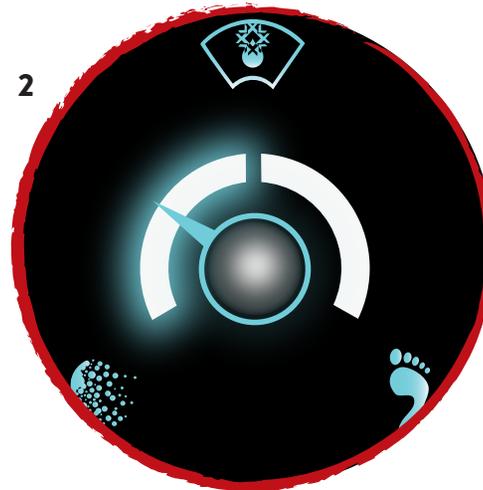
3



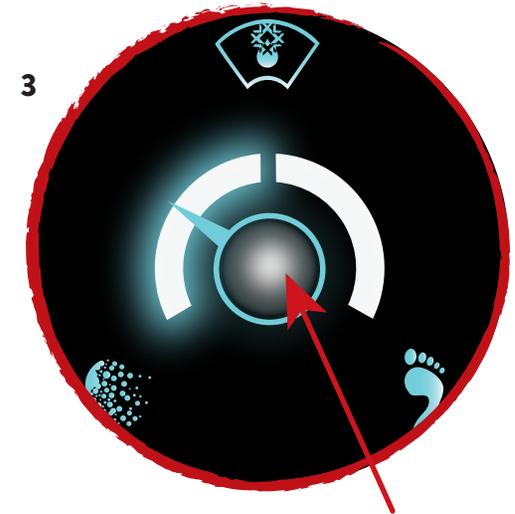
At anytime press the center button to be taken home.



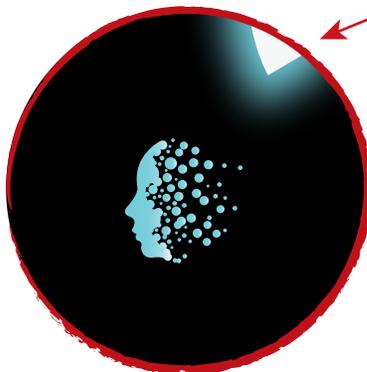
From the Home Screen you can press the LOWER "MODE" button and verify function of your door positions.



From here you can rotate needle to verify that air is coming out of your Dash, Defrost, Floor.



At anytime press the center button to be taken home.



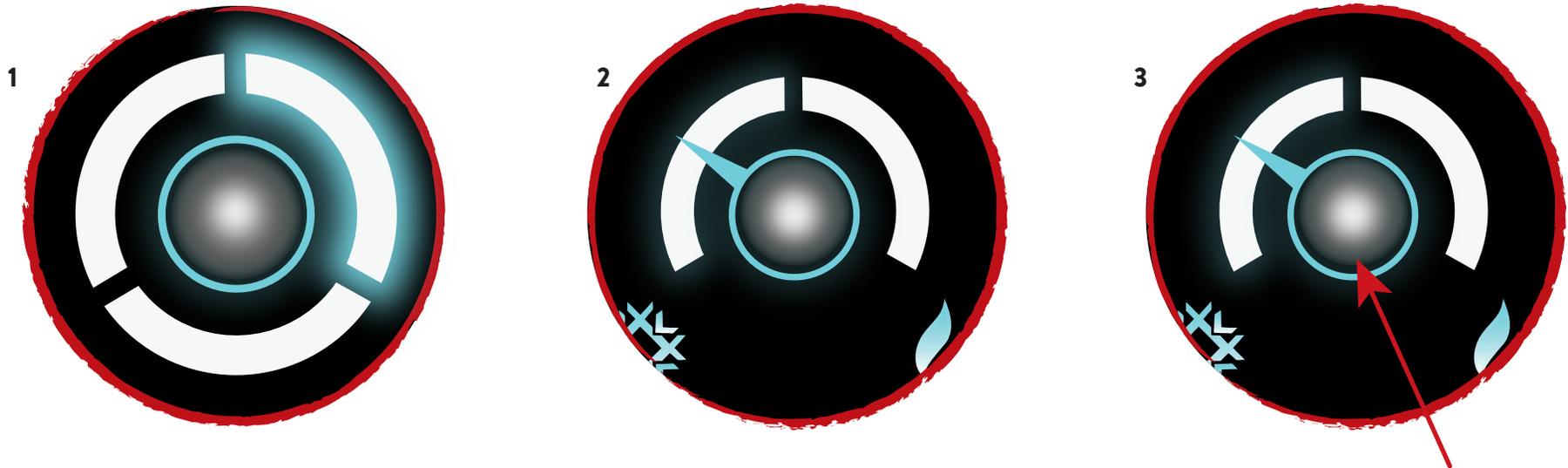
DASH



DEFROST



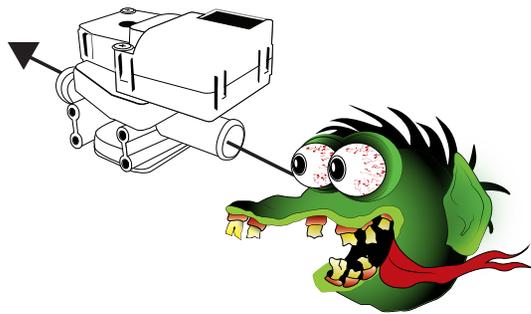
FLOOR



From the Home Screen you can press the RIGHT “TEMP” button and verify function of your water valve positions.

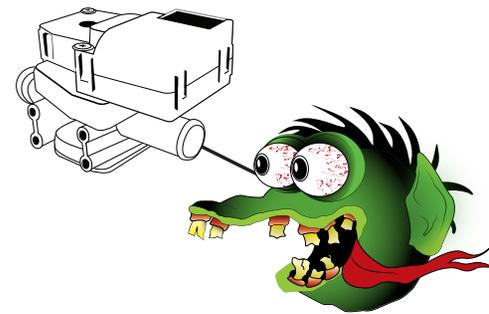
From here you can rotate needle to verify that water valve is opening and closing.

At anytime press the center button to be taken home.



## OPEN

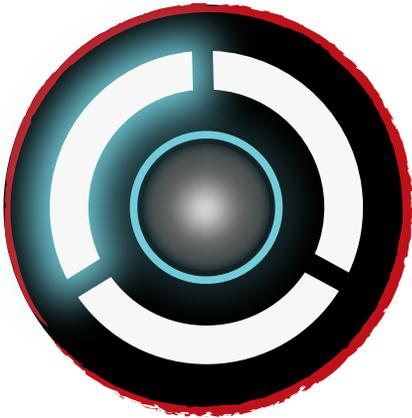
You will be able to see through water valve passage



## CLOSED

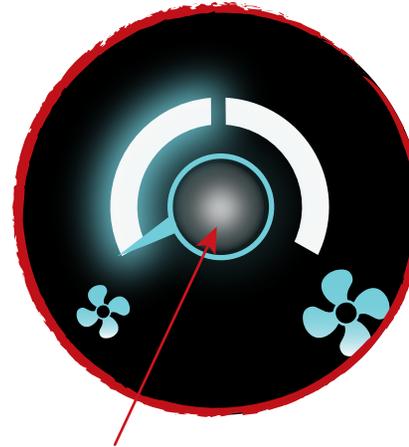
You will NOT be able to see through water valve passage

1



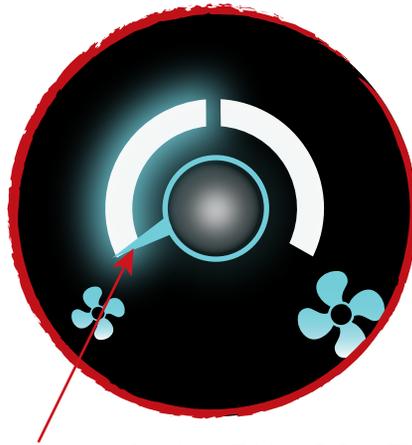
From the Home Screen you press the LEFT "FAN" button.

3



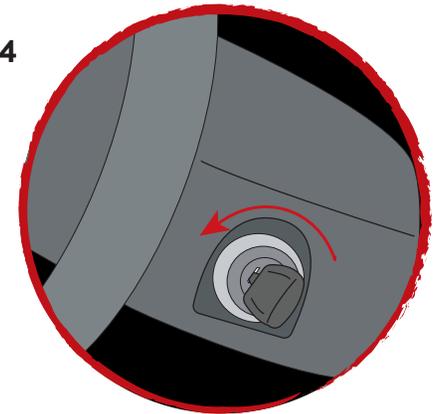
Press the center button to be taken home.

2



Rotate needle to SMALL FAN ICON This will shut down the blower motor.

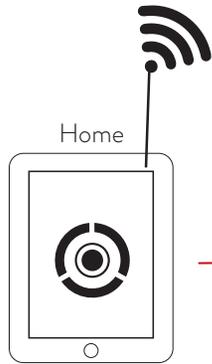
4



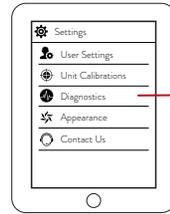
Turn off IGNITION

NOTE: To power OFF the UNIT you must SHUTDOWN the APP. Refer to your iOS/ ANDROID device on proper App shutdown.

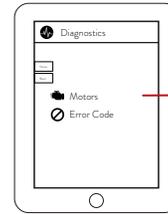
**NOTE: AFTER EACH SESSION THE APP MUST BE RESTARTED**



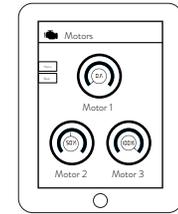
If you are having no response with the blower motor, or changing the mode of your unit. Hold down center dot 2 seconds to be taken to the SETTINGS screen.



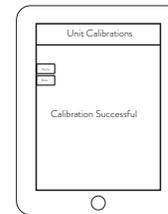
From here click Diagnostics.



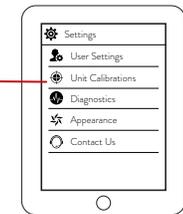
Here you can find out what problem you are having. Clicking on the Motors icon will let you know if you have a motor issue.



Here you can see the positions of your servo motors. This is useful for troubleshooting a problem. If you are having a motor issue the motor on screen will turn red. Make sure the corresponding cable for the motor is plugged in correctly. From here we will need to do a unit calibration to correct any issue. Afterwards press the BACK tab twice to go to Settings screen.



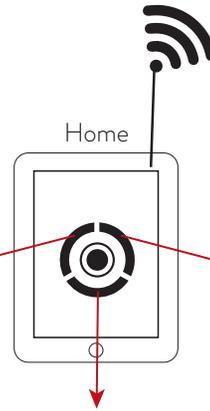
Here is where you need to calibrate your unit after trouble shooting your servo motor. NOTE if calibration is unsuccessful you may have to calibrate to 3 times to have everything reset. Press HOME tab to return home screen.



From here click Unit Calibration.

# ATMOSPHERE FLOWCHART

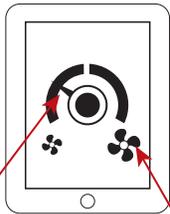
## FAN, MODE, TEMP OPERATIONS



Pressing the LEFT TAB will bring you to the FAN screen. This is where you can control the speed of your unit.

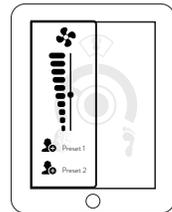
Pressing the LOWER TAB will bring you to the MODE screen. This is where you can control the direction would like your A/C or HEAT to go.

Pressing the RIGHT TAB will bring you to the TEMP screen. This is where you can control how HOT or COLD you want your system to be.



Fan

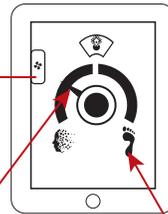
Tap FAN icons to increase or decrease intensity. You can also grab the needle and rotate to whatever speed you like. At anytime press the center button to be taken HOME.



Mode

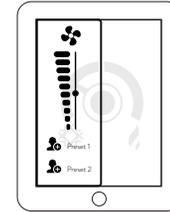
Notice a shortcut to FAN speed has been built in. At anytime you want to increase/decrease the speed press the side button with the small FAN icon to make and adjustment.

Notice this is where you can switch to a Preset User Setting that you create.



Mode

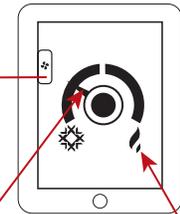
Tap MODE icons to switch from Dash, Defrost, Floor. You can also grab the needle and blend between. At anytime press the center button to be taken HOME.



Temp

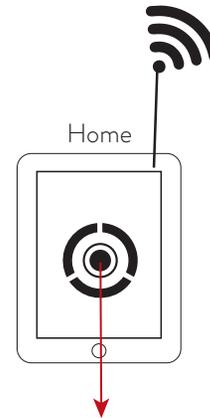
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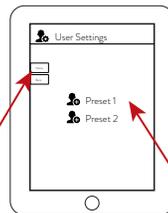


Temp

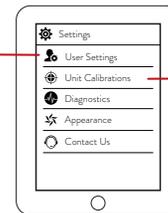
Tap TEMP icons to switch from Cold, Hot. You can also grab the needle and blend between the two. At anytime press the center button to be taken HOME.



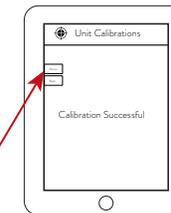
Hold down center dot 2 seconds to be taken to the SETTINGS screen. From there you can setup different users, calibrate your unit, diagnose a problem, change the appearance of the app, and contact Restomod Air.



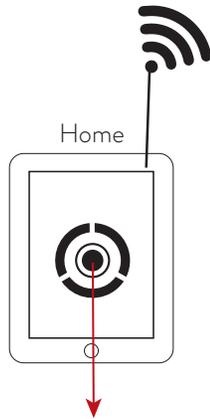
Here you can create two presets for you system. You do this by setting your system up the way you want it and then hold down Preset 1. Do the same for Preset 2.  
Press HOME tab to return home or the BACK tab to go to previous screen.



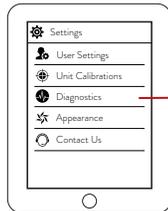
From here you can create a User setting, Calibrate your unit, Diagnose a problem, Change the appearance on the app or contact us. To get back HOME from this screen press the Gear icon next to Settings.



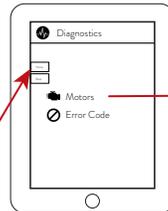
Here is where you setup your unit to communicate with the app. It is an automated setup once pressed. This should only be a one time process. Press HOME tab to return home or the BACK tab to go to previous screen.



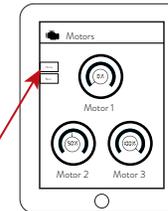
Hold down center dot 2 seconds to be taken to the SETTINGS screen. From there you can setup different users, calibrate your unit, diagnose a problem, change the appearance of the app, and contact Restomod Air.



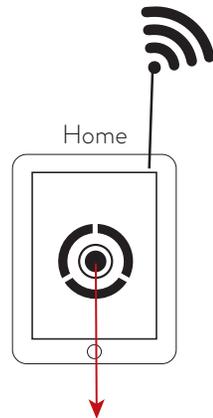
From here you can create a User setting, Calibrate your unit, Diagnose a problem, Change the appearance on the app or contact us. To get back HOME from this screen press the Gear icon next to Settings.



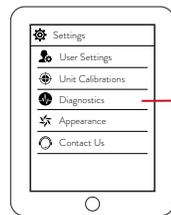
Here you can find out what problem you are having. Press HOME tab to return home or the BACK tab to go to previous screen.



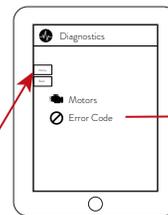
Here you can see the positions of your servo motors. This is useful for troubleshooting a problem. Press HOME tab to return home or the BACK tab to go to previous screen.



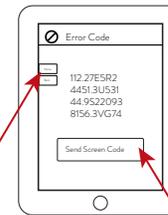
Hold down center dot 2 seconds to be taken to the SETTINGS screen. From there you can setup different users, calibrate your unit, diagnose a problem, change the appearance of the app, and contact Restomod Air.



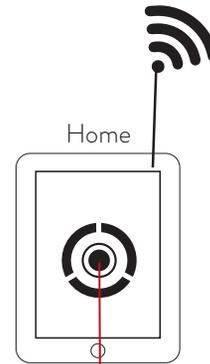
From here you can create a User setting, Calibrate your unit, Diagnose a problem, Change the appearance on the app or contact us. To get back HOME from this screen press the Gear icon next to Settings.



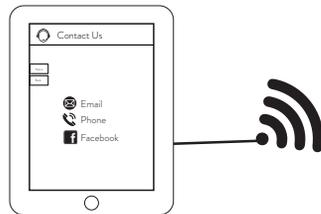
Here you can find out what problem you are having. Press HOME tab to return home or the BACK tab to go to previous screen.



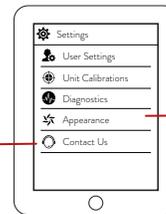
Here you can see an error code and send it directly to a Restomod Air Tech. That code will inform the Tech what problem you are having so you and the Tech can get your system up and running quickly. Press HOME tab to return home or the BACK tab to go to previous screen.



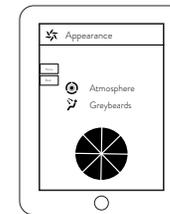
Hold down center dot 2 seconds to be taken to the SETTINGS screen. From there you can setup different users, calibrate your unit, diagnose a problem, change the appearance of the app, and contact Restomod Air.



The contact us page is exactly how it sounds. From here you can email a Restomod Air Tech, call us directly, or visit our Facebook page. Press HOME tab to return home or the BACK tab to go to previous screen.



Holding center button for 2 Seconds will take you to the SETTINGS screen. From here you can create a User setting, Calibrate your unit, Diagnose a problem, Change the appearance on the app or contact us. To get back HOME from this screen press the Gear icon next to Settings.



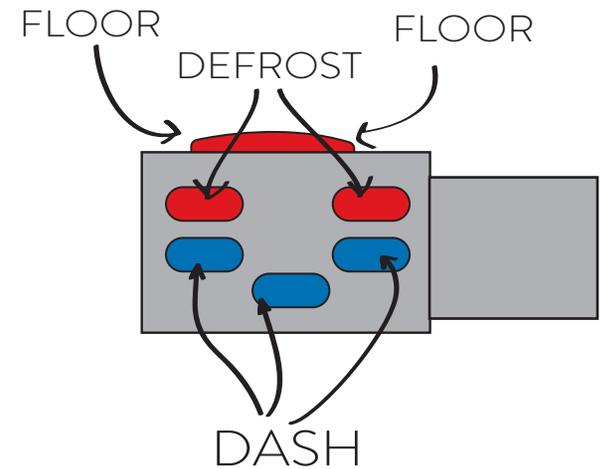
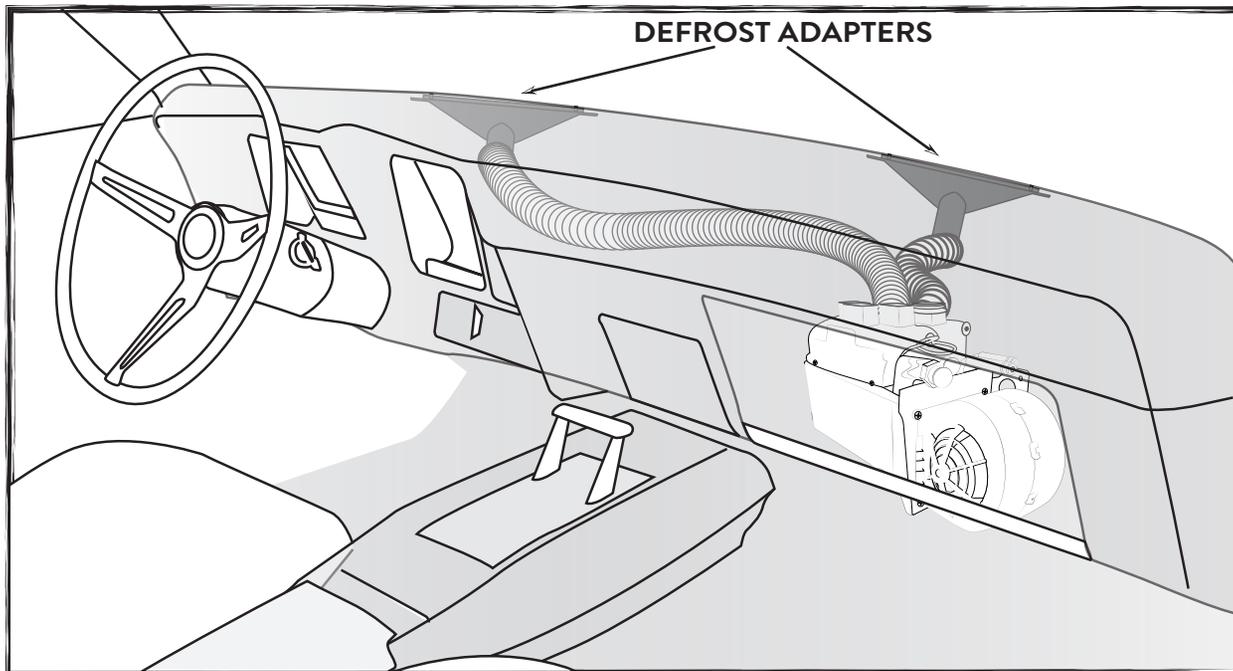
Here you are able to change the look of the app. You can change the color to match your interior and even change the interface of the icons. Greybeards, is a traditional icon look. Atmosphere, is a modern icon look, which is currently set to. You can switch form either one as desired by coming to this screen. Press HOME tab to return home or the BACK tab to go to previous screen.

# ATMOSPHERE

Congratulations you have completed setting up the worlds first vehicle climate control app Atmosphere.

You can now wirelessly control your Restomod Air A/C system from any mobile device. Mount your mobile device in dash or not, totally up to you. No cables, no mess, no problem. Totally customizable.

We've included 15' of flex hose for you to route to your choice(s) of main vents and defrost vents. The goal is measure, cut, and install hose sections that will be taunt, but not so tight that the individual lengths will be not have a bit of flexibility. Be sure to keep bends in the flex hoses to a minimum for optimal airflow, and route the hoses so that they will not interfere with any mechanisms.



Installing Vents, a Quick Primer:

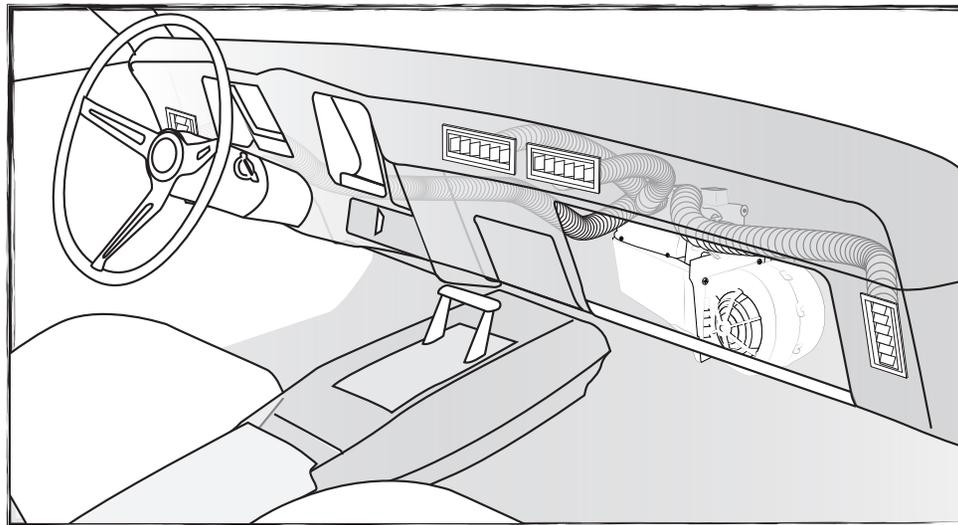
Installing them will go very easily if you plan ahead and take your time. In some cases you may be able to use factory installed vents, if not, follow the following steps:

A: While sitting in the vehicle, make a plan of where the vents will be located, situating them for maximum airflow and convenience. Make sure the location of the vents will not interfere with actions like shifting gears, or that the vents will not be subjected to excessive impact.

B: Many of the vents will require some drilling thru the lower dash to attach. Mark the drill hole(s) location first, and drill pilot holes (i.e. with a small bit like 9/32") before attaching the vents with the included Tek Screws. Also make sure that you don't drill thru wires or other mechanisms when drilling the pilot holes.

C: Some vents can be inserted into OEM vent holes, or you may need to cut-out holes within the dash... measure twice - cut once.

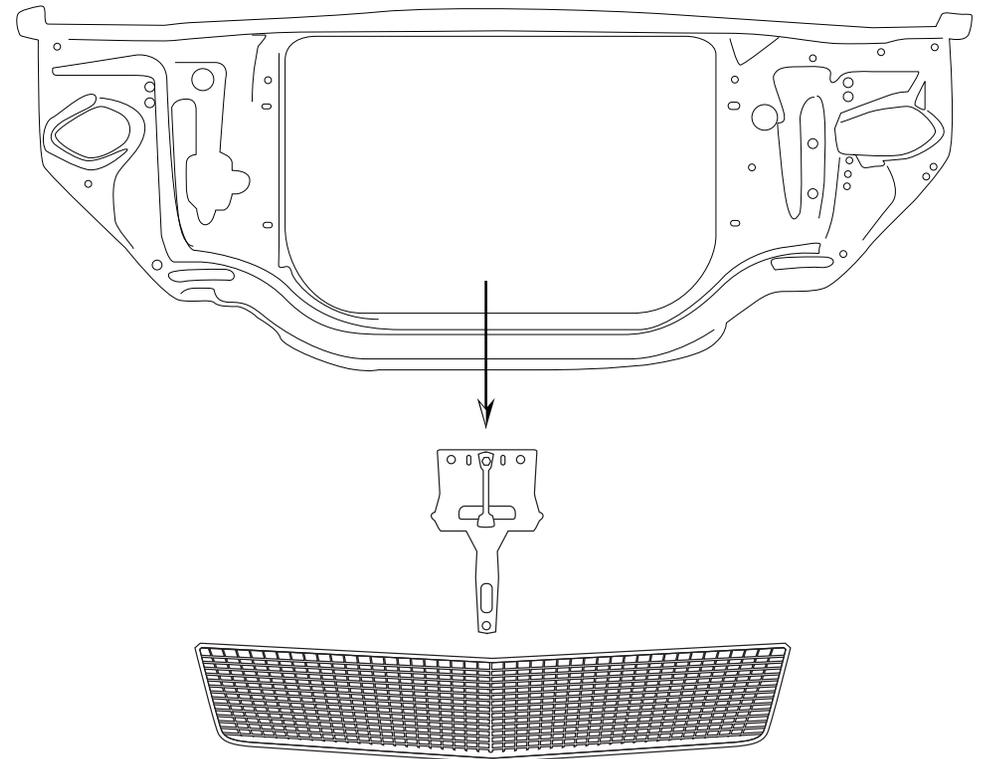
D: Use zip-ties to connect the flex hoses to the back of the vents.



## IF YOU HAVE NOT DONE SO ALREADY, DISCONNECT THE BATTERY.

During the next steps you'll be installing the condenser, drier \*, and routing the pressure switch\* wire and the A/C lines. Since much of this is installed in the OEM location for the condenser, you'll probably need to remove the center grill section, horn(s), and latch support assembly (see figure 37). Be sure to retain all the mounting screws – you'll reinstall these pieces in the exact reverse order with the OEM screws.

\*If Applicable.

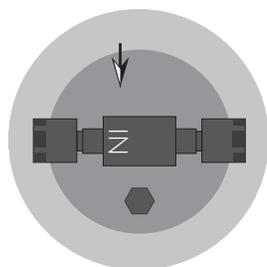


**CONDENSER PREPARATION.** Attach brackets using supplied #10-20 x 1/4" HEX HEAD screws to condenser mounting holes found on each side of condenser. The condenser must be mounted to vehicle so that the larger fitting is on top  
**(FAILURE TO DO SO WILL CAUSE AIR CONDITIONING SYSTEM TO FUNCTION INCORRECTLY).**

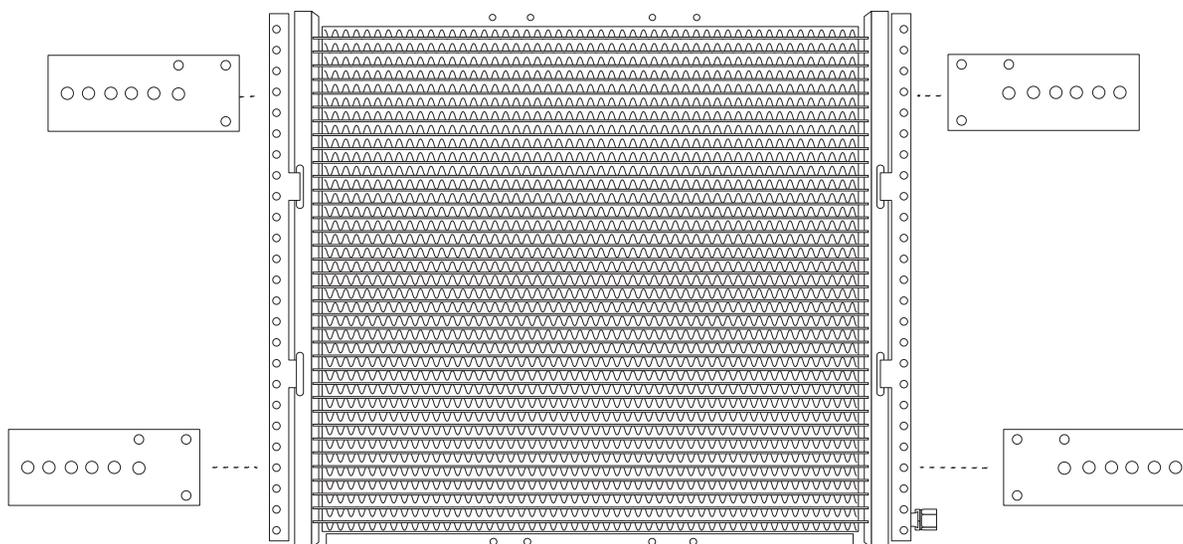
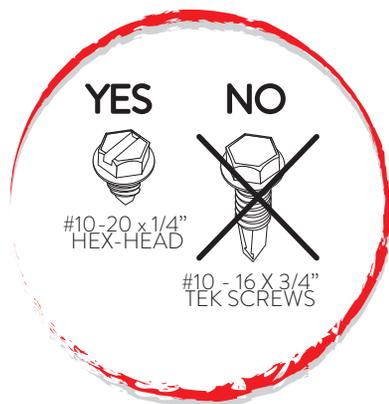
**DRIER PREPARATION.** First insert the drier into the drier mounting bracket (it's basically a sleeve for the drier). Screw the high-pressure switch into the port at the drier. Go ahead and plug the pressure switch harness into the switch at this time (black electrical boot with two long white wires). Mount Drier in preferred location with connections upward. Keep in mind the threaded connection labeled "IN" will connect to the lower connection of condenser.

**PRESSURE SWITCH:** Install the supplied pressure switch to the port on the top of the drier (Looks like a bolt head). Remove dust cover and attach wiring harness to electrical connections

## TOP VIEW OF DRIER

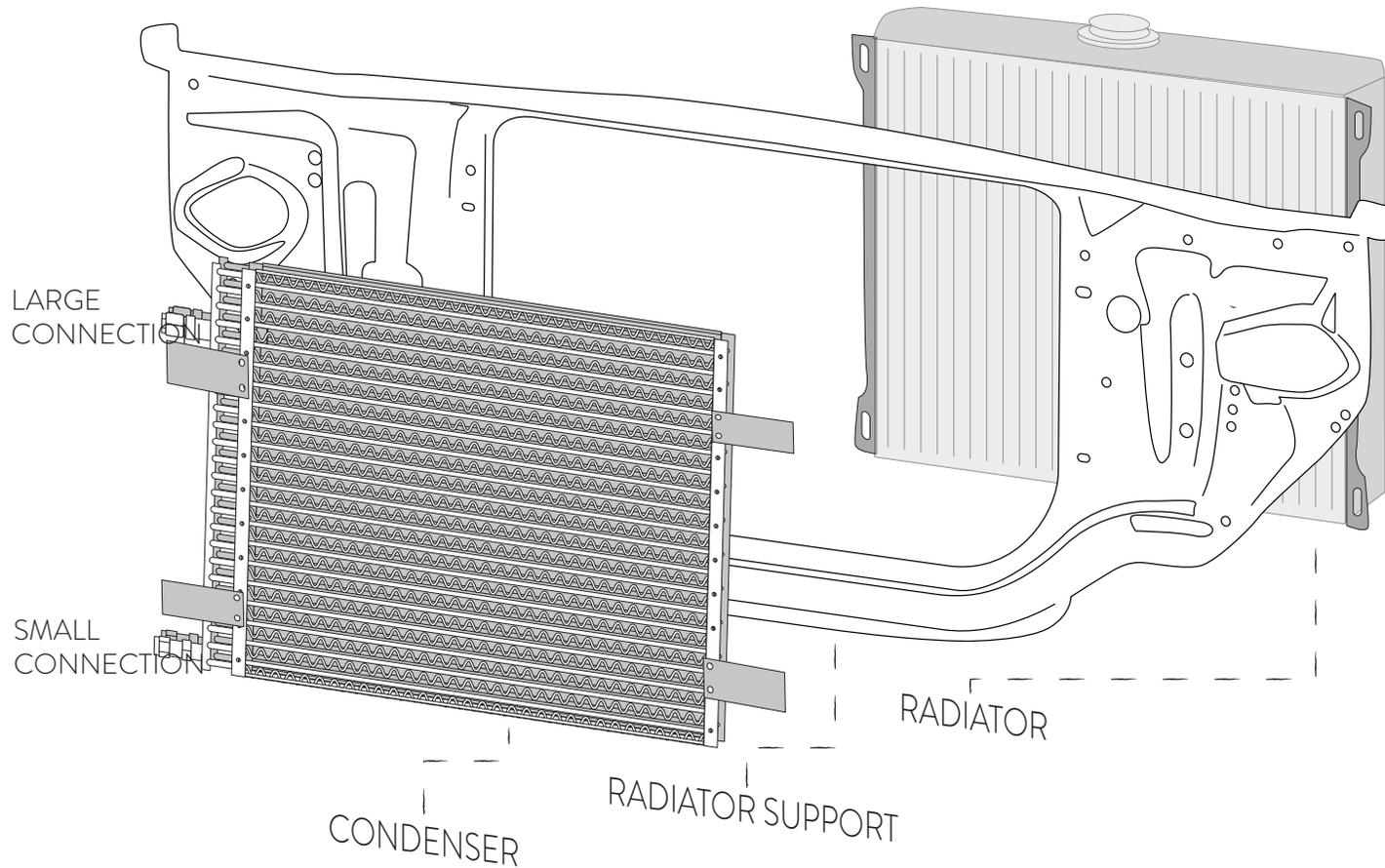
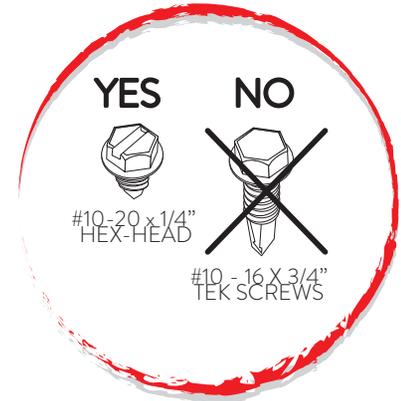


Be sure to mount drier vertically with fittings to top.



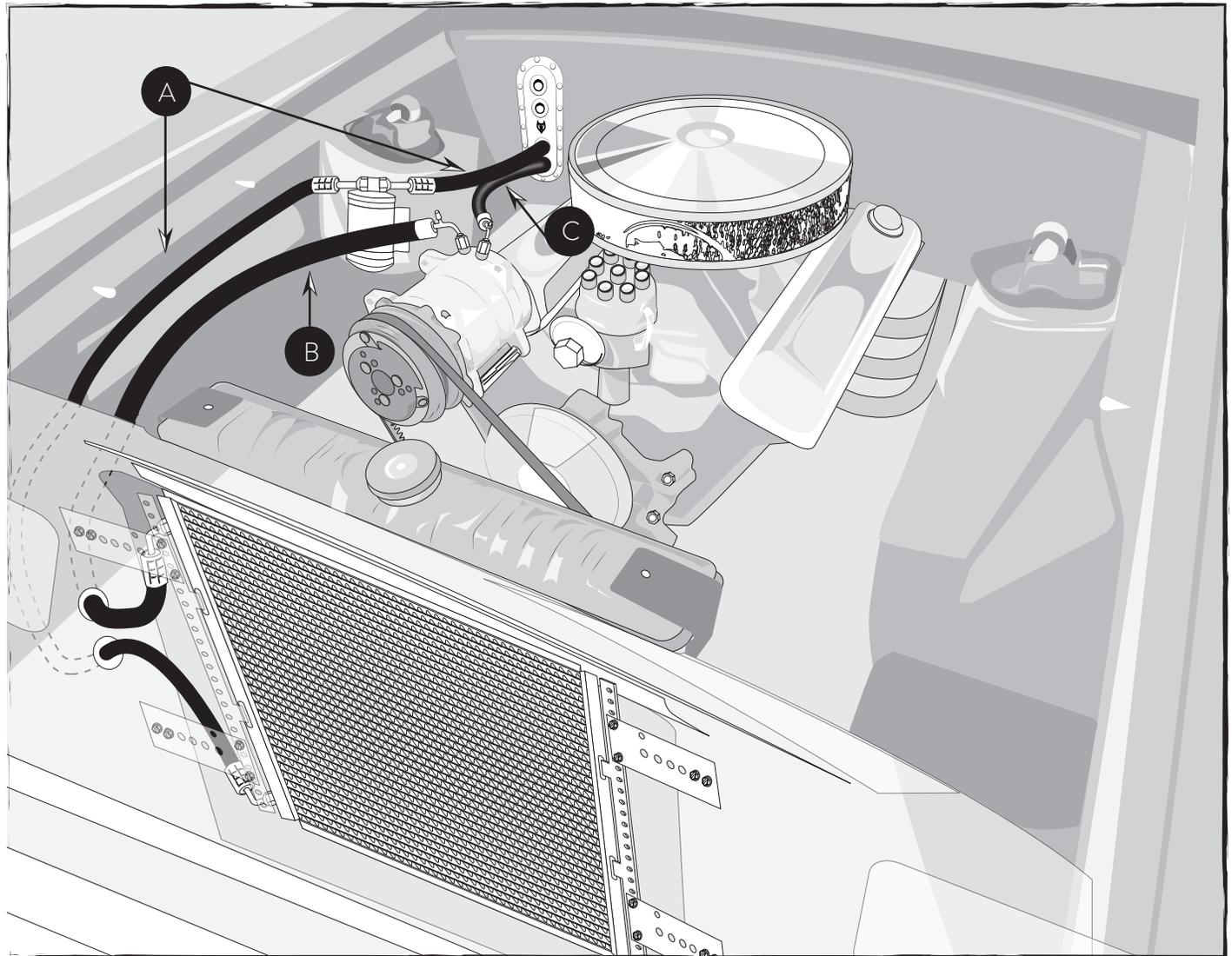
Place condenser in front of radiator and mount to radiator support with supplied #10-16 x 3/4" TEK screws or desired hardware. Condenser can be mounted with fitting connections to either driver or passenger side.

(MAKE CERTAIN LARGE FITTING CONNECTION IS TO THE TOP. FAILURE TO DO SO WILL CAUSE SYSTEM TO FUNCTION INCORRECTLY)



## PASSENGER SIDE COMPRESSOR HOSE ROUTING

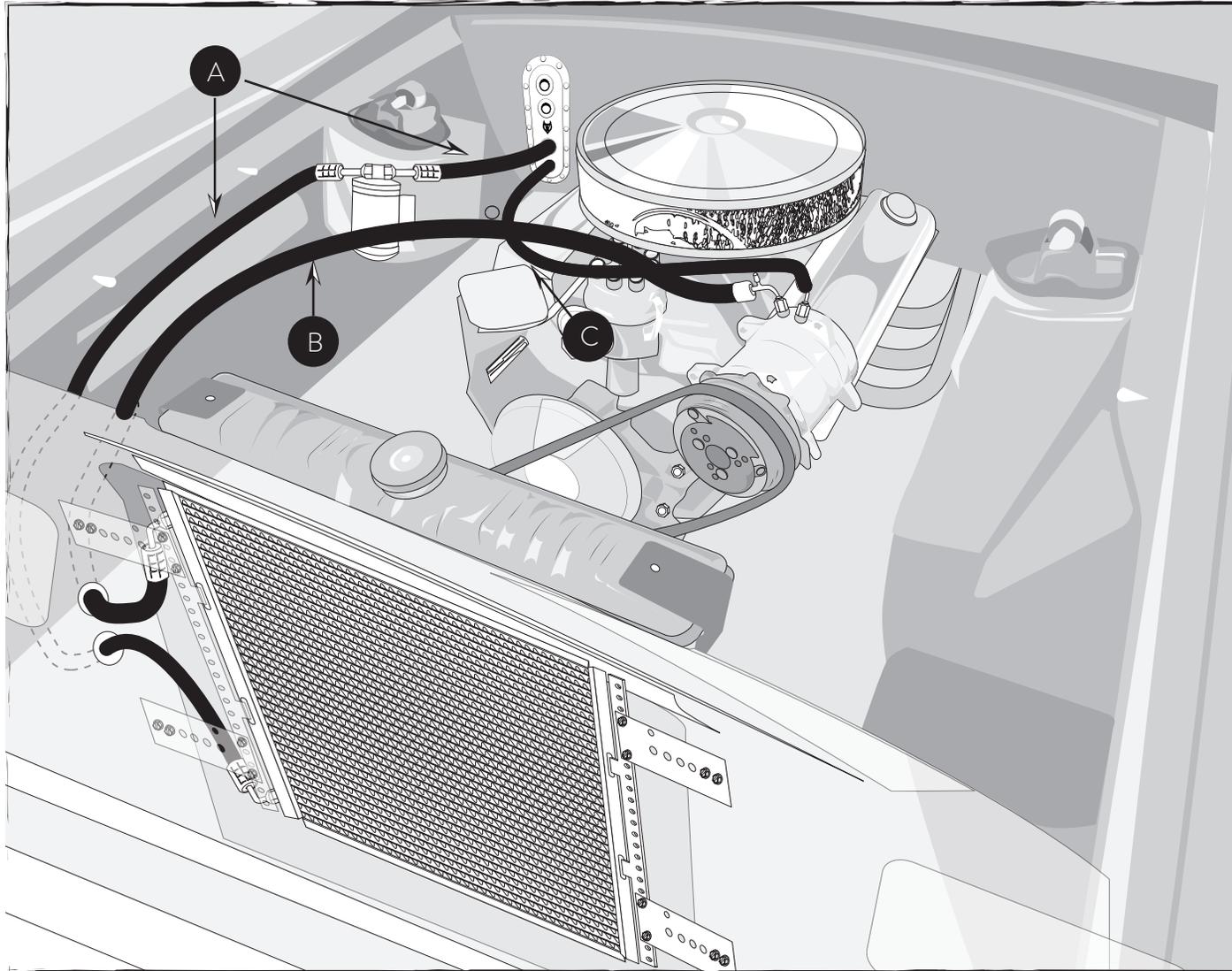
- A: #6 Liquid Hose ( $\frac{5}{16}$ "
- B: #8 Discharge Hose ( $\frac{13}{32}$ "
- C: #10 Suction Hose ( $\frac{1}{2}$ "



Reminder... Use  
two wrenches to  
tighten o-ring  
fittings



## DRIVER SIDE COMPRESSOR HOSE ROUTING

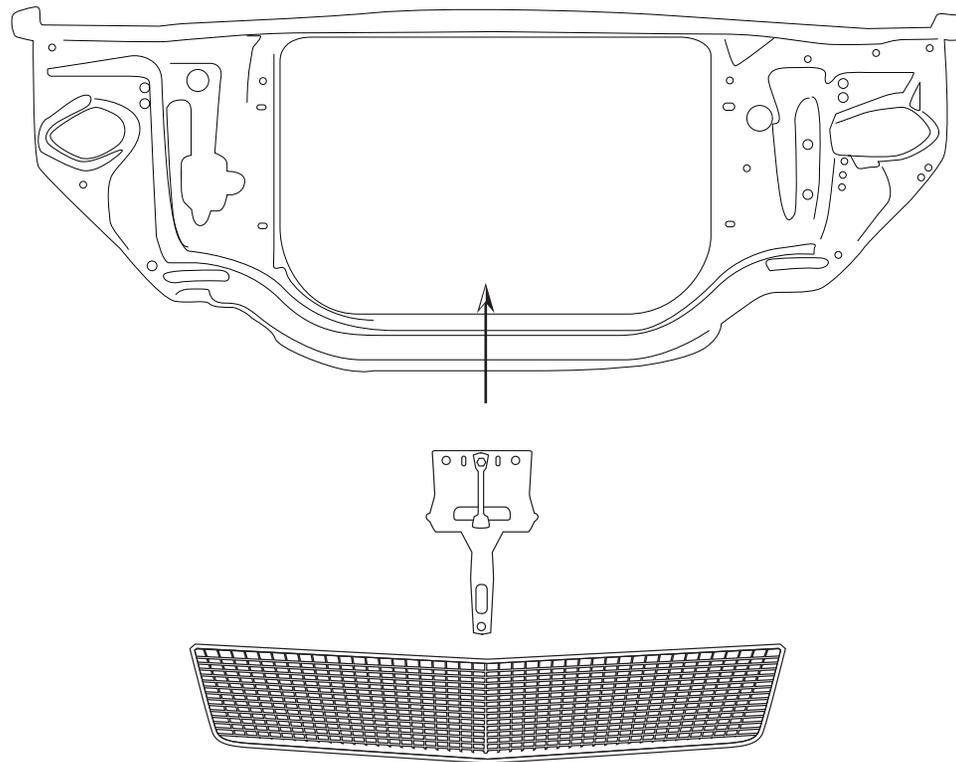


- A: #6 Liquid Hose ( $\frac{5}{16}$ "
- B: #8 Discharge Hose ( $\frac{13}{32}$ "
- C: #10 Suction Hose ( $\frac{1}{2}$ "

Reminder... Use  
two wrenches to  
tighten o-ring  
fittings



Re-install any components that had to be removed during the installation such as hood latch or grill.



## CHARGING STATION INSTRUCTIONS

CHARGING PROCEDURES FOR THIS SYSTEM ARE DIFFERENT THAN MOST MODERN A/C SYSTEMS! AVOID DAMAGING YOUR NEW A/C SYSTEM BY CLOSELY FOLLOWING ALL THESE GUIDELINES! REMEMBER, ALL CHARGING STATIONS CHARGE REFRIGERANT IN LIQUID FORM, WHICH WILL DAMAGE THE COMPRESSOR IF IT IS ADDED WHILE THE VEHICLE IS RUNNING



### **DO NOT CHARGE THIS SYSTEM WITH THE CAR RUNNING!**

Unlike the common procedures used for late model vehicles (that have variable-speed compressors), this RETROFIT system cannot be charged with the car running. THIS IS IMPORTANT... Failure to follow this warning will most likely result in damaging the compressor and voiding the warranty.



### **DO NOT ADD OIL!**

All new compressors from Restomod Air contain a full system charge of oil.



### **DO NOT USE MORE THAN 24 OZ. OF 134A REFRIGERANT!**

1.5 lbs. or 24 oz of R134A is what is required.



### **HAND TURN THE COMPRESSOR 15-20 TIMES AFTER CHARGING!**

Failure to do this may cause the reed valves to become damaged (this damage is NOT covered the warranty).

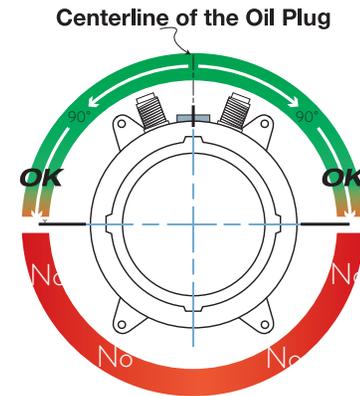
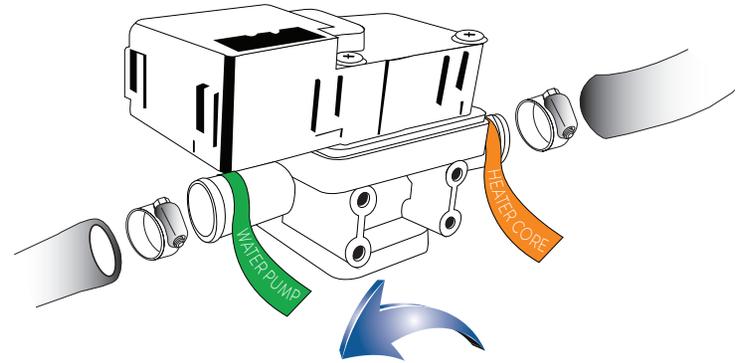


### **BEFORE CHARGING, GO THRU THE CHECK LIST!**

## CHECK LIST:

PLEASE READ THRU EACH PROCEDURE BEFORE CHARGING,  
THEN CHECK OFF EACH ONE IN ORDER.

- Make sure that the new belt is tight.
- Check direction of water valve. The water valve should be connected to the hose going to the water pump.
- Check orientation of compressor. The compressor should not be rotated more than 90° off the centerline of the oil fill plug (during installation or while tightening belt).
- Evacuate the system for a minimum of 30-45 minutes before charging. Longer if possible. This will remove any moisture and reveal any small leaks. Make sure the low-side reaches a minimum of 28-30 inches of vacuum. Failure to evacuate the system will cause inadequate temperatures and premature component failure
- DO NOT ADD OIL! All new compressors from Restomod Air contain a full system charge of oil.
- DO NOT CHARGE SYSTEM IN LIQUID FORM. Unlike later model vehicles, doing so will direct liquid refrigerant into the compressor piston chamber, causing damage to compressor reed valves and/or pistons, as well as potentially seizing the compressor. Doing so voids the warranty.
- This new system requires R134A refrigerant. It will require 1.5 lbs (or 24 oz). ADDING MORE THAN THE RECOMMENDED AMOUNT OF REFRIGERANT WILL NOT LEAD TO COOLER TEMPS! No other refrigerant is advisable for our systems. Use of other refrigerants will VOID the warranty.
- This new compressor **MUST** be hand-turned 15-20 revolutions after charging. Failure to do this may cause the reed valves to become damaged (this damage is NOT covered the warranty).



## HAND CHARGING INSTRUCTIONS

CHARGING PROCEDURES FOR THIS SYSTEM ARE DIFFERENT THAN MOST MODERN A/C SYSTEMS! AVOID DAMAGING YOUR NEW A/C SYSTEM BY CLOSELY FOLLOWING **ALL** THESE GUIDELINES!

WARNING  
1

**DO NOT** ADD OIL!

All new compressors from Restomod Air Auto Air contain a full system charge of oil.

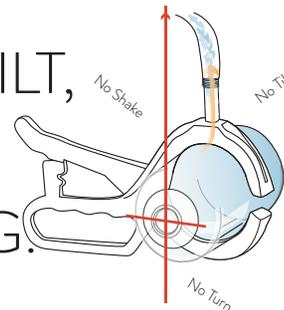
WARNING  
2

**DO NOT** USE MORE THAN 24 oz. OF 134a REFRIGERANT!

1.5 lbs. or 24 oz of R134A is what is required.

WARNING  
3

**DO NOT** SHAKE, TILT,  
OR TURN CAN  
UPSIDE DOWN  
WHILE CHARGING.



Failure to do this may cause the reed valves to become damaged (this damage is NOT covered the warranty). Refrigerant must come out of the top of the can.

WARNING  
4

**BEFORE** CHARGING, GO THRU THE CHECK LIST!

## TEST CONDITIONS

(After system has been fully charged and tested for basic operation)

- Determine the temperature outside of the car
- Close all doors and windows on vehicle
- Place shop fan directly in front of condenser
- Connect gauges or service equipment to high/low charging ports
- Place blower fan switch on medium
- Run engine idle up to approx. 1500 rpm

## THE RESULTS

DATE

OUTSIDE  
TEMP

HIGH-SIDE PRESSURE  
READING (AT ENGINE IDLE)  
TARGET (150-250 PSI)

LOW-SIDE PRESSURE  
READING (AT ENGINE IDLE)  
TARGET (15-25 PSI in a steady state)

NOTES

TECHNICIAN NAME AND SIGNATURE

TEST CONDITIONS USED TO DETERMINE SYSTEM OPERATION (THESE TEST CONDITIONS WILL SIMULATE THE AFFECT OF DRIVING THE VEHICLE AND GIVE THE TECHNICIAN THE THREE CRITICAL READINGS THAT THEY WILL NEED TO DIAGNOSE ANY POTENTIAL PROBLEMS).

- B. CONNECT GAUGES OR SERVICE EQUIPMENT TO HIGH/LOW CHARGING PORTS.
- C. PLACE BLOWER FAN SWITCH ON MEDIUM.
- D. CLOSE ALL DOORS AND WINDOWS ON VEHICLE.
- E. PLACE SHOP FAN IN FRONT OF CONDENSER.
- F. RUN ENGINE IDLE UP TO 1500 RPM.

ACCEPTABLE OPERATING PRESSURE RANGES (R134A TYPE)

1. HIGH-SIDE PRESSURES ( 150-250 PSI ) \*Note- general rule of thumb is two times the ambient (daytime) temperature, plus 15-20%.
2. LOW-SIDE PRESSURES ( 15-25 PSI in a steady state).

CHARGE AS FOLLOWS: R134A = 24 OZ.  
NO ADDITIONAL OIL IS NECESSARY IN OUR NEW COMPRESSORS.

TYPICAL PROBLEMS ENCOUNTERED IN CHARGING SYSTEMS

**NOISY COMPRESSOR.** A noisy compressor is generally caused by charging a compressor with liquid or overcharging

- A. If the system is overcharged both gauges will read abnormally high readings. This is causing a feedback pressure on the compressor causing it to rattle or shake from the increased cylinder head pressures. System must be evacuated and re-charged to exact weight specifications.
- B. Heater control valve installation - Installing the heater control valve in the incorrect hose. Usually when this occurs the system will cool at idle then start to warm up when raising the RPM's of the motor. THE HEATER CONTROL IS A DIRECTIONAL VALVE; MAKE SURE THE WATER FLOW IS WITH THE DIRECTION OF THE ARROW. As the engine heats up that water transfers the heat to the coil, thus overpowering the a/c coil. A leaking or faulty valve will have a more pronounced affect on the unit's cooling ability. Installing the valve improperly (such as having the flow

reversed) will also allow water to flow through, thus inhibiting cooling. Check for heat transfer by disconnecting hoses from the system completely. By running down the road with the hoses looped backed through the motor, you eliminate the possibility of heat transfer to the unit.

- C. Evaporator freezing - Freezing can occur both externally and internally on an evaporator core. External freeze up occurs when the coil cannot effectively displace the condensation on the outside fins and the water forms ice (the evaporator core resembles a block of solid ice), it restricts the flow of air that can pass through it, which gives the illusion of the air not functioning. The common cause of external freezing is the setting of the thermostat and the presence of high humidity in the passenger compartment. All door and window seals should be checked in the event of constant freeze-up. A thermostat is provided with all units to control the cycling of the compressor.
- D. Internal freeze up occurs when there is too much moisture inside the system. The symptoms of internal freeze up often surface after extended highway driving. The volume of air stays constant, but the temperature of the air gradually rises. When this freezing occurs the low side pressure will drop, eventually going into a vacuum. At this point, the system should be checked by a professional who will evacuate the system and the drier will have to be changed.
- E. Inadequate airflow to condenser - The condenser works best in front of the radiator with a large supply of fresh air. Abnormally high pressures will result from improper airflow. Check the airflow requirements by placing a large capacity fan in front of the condenser and running cool water over the surface. If the pressures drop significantly, this will indicate the need for better airflow.
- F. Incorrect or inadequate condenser capacity - Incorrect condenser capacity will cause abnormally high head pressures. A quick test that can be performed is to run cool water over the condenser while the system is operating, if the pressures decrease significantly, it is likely a airflow or capacity problem.
- G. Expansion valve failure - An expansion valve failure is generally caused by dirt or debris entering the system during assembly. If an expansion valve fails it will be indicated by abnormal gauge readings. A valve that is blocked will be indicated by high side that is unusually high, while the low side will be unusually low or may even go into a vacuum. A valve that is stuck open will be indicated by both the high and low pressures rising to unusually high readings, seeming to move toward equal readings on the gauges.
- H. Restrictions in system - A restriction in the cooling system will cause abnormal readings on the gauges. A high-side restriction ( between the compressor and the drier inlet ) will be indicated by the discharge gauges reading excessively high. These simple tests can be performed by a local shop and can help determine the extent of the systems problem.

**PROBLEM:** system is not cooling properly  
**ISSUE:** cold at idle, warmer when raising engine RPM's

### Make sure the Water Valve is positioned correctly

The water valve is a directional valve and should be installed with the arrow pointing towards the water pump, it should be connected to the heater hose that runs from the heater core to the water pump. If the water valve is connected to the incorrect hose it allows water to circulate through the system via the heater core over powering the cooling effect of the A/C coil, (normally the air conditioning is functioning properly).

Step 1: Check placement of the water valve, correct if needed. (In some cases changing the location of the water valve may not fix the above problem.) Continue to next step.

Step 2 If changing the location of the water valve does not rectify the issue, then possibly the water valve is permanently damaged and may need to be replaced. To check the integrity of the water valve completely remove the water hoses for the heater core and "loop" together. (This will remove the heater system completely from the possibilities) If the system now cools, replace the water valve

### Verify Adequate Air Flow to Condenser

For an air conditioning system to function properly there has to be adequate airflow across the condenser. The function of the condenser is to dissipate heat, without proper airflow your system will not cool correctly in the cabin of your vehicle.

Step 1: connect gauges to a/c hoses. The pressures should be: with the ambient temp is 90, low side pressures should be between 15-25 psi, high side pressures should be between 150-250 psi

Step 2: IF the low side pressures are normal and the high side pressures are high then there might be an airflow issue, continue to next step.

To test air flow to Condenser do the following three tests:

1. Place a piece of paper on the condenser with the car in idle and see if paper is held in place.
2. With car in idle, attach gages, and place a large capacity fan in front of the condenser. What happens to the pressures?
3. With car still in idle and gages attached, pour water down the front of the condenser. What happens to the pressures?

If the paper is held in place you are at least getting some air flow. If the high side decreases during test 2 & 3 then your condenser is not getting enough air which is causing your system to not cool properly. To correct this issue you will need a more powerful mechanical fan.

Step 3: Confirm correct Refrigerant charge in System

All of our systems should be charged with 24 oz or 1.8 lbs of R134A Refrigerant only. If overcharged you will need to evacuate the system and recharge with the correct amount.\*

What measurements mean:

Low Temp and High Pressure seem to be equal...

You have a malfunctioning expansion valve that is stuck open.

High Side is extremely high and Low Side is extremely low (possibly into vacuum)...

There is a blockage in the system. Remove hoses and blow compressed air through in both directions. If pressures don't change its possible that your expansion valve is stuck closed and would have to be replaced.

### \*Compressor Concerns:

This is often misdiagnosed as a problem for the system not cooling properly. If you have a noisy compressor it is due to improper charging of refrigerant. An overcharged (more than 24 oz or 1.5 lbs R134A) compressor can cause rattling. If charged with pure liquid there is a high probability you have bent reed valves that are causing tapping sound.

