

Vintage Air Install in a 1977 Datsun 280z

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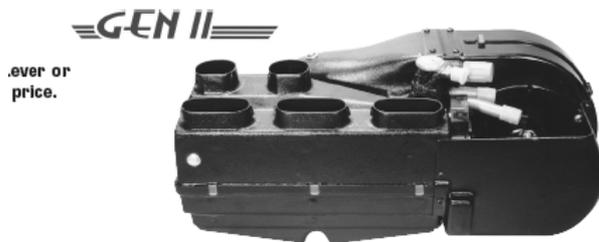
Introduction

This document covers the installation of a Vintage Air Gen-II Compac HCD (Heat Cool and Defrost) system into a 1977 280z.

NONE of the stock Datsun HVAC components are used in this installation. All components are supplied by Vintage Air and replace all stock HVAC parts. The only exception is the dash air outlet vents at the center and at each end of the dash.

Vintage Air Components

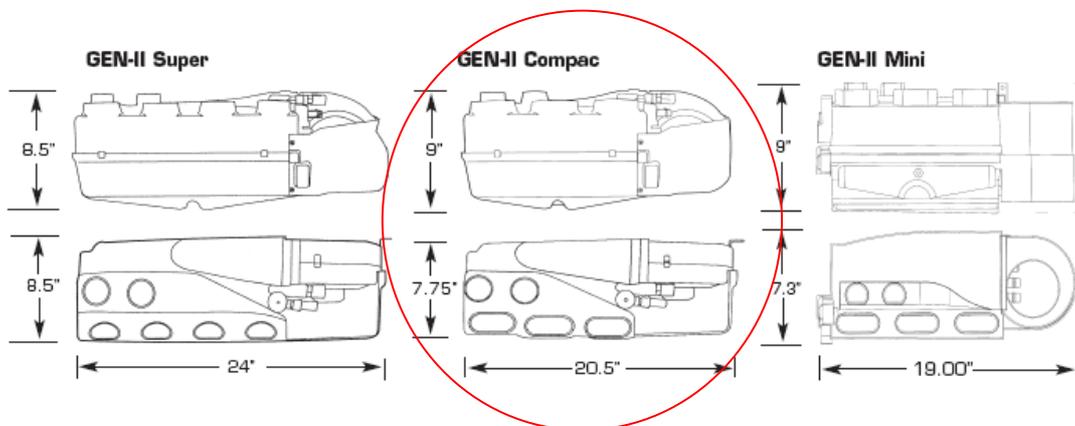
<http://www.vintageair.com/>



68000 Series - GEN-II Compac - Specify Heat & Cool or Heat, Cool & Defrost model.



491200-RUA 4 Knob Streamline Panel
5.318" wide x 1" tall. Polished Face and Knobs.





You need the Double V Groove pulleys. Your choice of standard or polished.

508 Compressor 134a

04808-VUA Double V groove pulley-standard finish
04808-VUQ Double V groove pulley-polished finish

Reference Material

AC Fittings

Red Dot black hose crimp fittings catalogue

<http://www.rdac.com/Pages/catalog/Ecat/Ecat70.pdf>

Most fittings can be found at large AC shops in major centers. Fittings are in the \$5-\$10 range, so don't worry about getting the exact fittings from VA.

AeroQuip AC Hose

E-Z Clip

NEW! - E-Z Clip Aeroquip Lines & Fittings

This new refrigerant hose and fitting program is the way to go! Now you can complete the entire line fabrication, routing and crimping in your own garage. The unique E-Z Clip fittings are easy to make up and the smaller diameter hose allows for tighter turns and neater routing than before.

- Reduced size and superior flexibility allows for installation in tight quarters and takes up less area.
- Easy assembly in the field or garage with clip tool (pliers)
- Maximum resistance to moisture ingestion.
- Light weight, rugged hose material.
- Nickel plated steel fittings.



EZ-Clip System Line Sizes

Line Size	Inner Diameter (I.D.)	Outer Diameter (O.D.)
#6	.31" I.D.	.58" O.D.
#8	.41" I.D.	.70" O.D.
#10	.50" I.D.	.78" O.D.

	#6 Hose	#8 Hose	#10 Hose		#6 Hose fitting	#8 Hose fitting	#10 Hose fitting
A/C Hose	318600-VUR	318800-VUR	318000-VUR				
Straight Splice 134a service port	347560-VUR	347580-VUR	347500-VUR	90 Degree	347360-VUR	347380-VUR	347300-VUR
Straight 134a service port	347160-VUR	347180-VUR	347100-VUR	90 Degree 134a service port	347361-VUR	347381-VUR	347301-VUR
Straight w/ Switch port	347561-VUR	N/A	N/A	Cage	347960-VUR	347980-VUR	347900-VUR
45 Degree	347260-VUR	347280-VUR	347200-VUR	Clip	347962-VUR	347982-VUR	347902-VUR
Clip Connecting Pliers 420000-VUR				Hose Cutter 420001-VUR			



Each fitting connection is made with the proper fitting, one cage, and two cage clips. Order one cage and two clips for each fitting (not included).

Simply slip two clips over the hose end, insert fitting, press cage over hose and into the recessed groove on the fitting. Then move the cage clips over the cage and close the clips with the Aeroquip connecting pliers #420000-VUR.

Braided Stainless

Braided Stainless Steel Aeroquip Lines & Fittings

We are pleased to now offer genuine Aeroquip A/C hose and fittings. We will stock #6, #8, and #10 hose in bulk and the fittings will be sold individually as specified by your customers installation. We think this product is the best quality products for pro-style flexible line routing.



- Designed specifically for A/C applications
- Nylon tube covered with fine braid stainless steel
- Nickel plated reusable steel fittings
- Charge ports available on fittings
- Female O-ring pilot terminal ends for precise connection with existing A/C components.
- O-ring seal between the hose and fitting nipple increases fitting and hose assembly integrity

	#6 Hose	#8 Hose	#10 Hose		#6 Hose fitting	#8 Hose fitting	#10 Hose fitting
A/C Hose	36906-VUR	36908-VUR	36910-VUR				
Straight Hose to Hose 134a service port	36445-VUR	36547-VUR	36647-VUR	90 Degree 134a service port	36444-VUR	36545-VUR	36645-VUR
Straight 134a service port	36440-VUR	36540-VUR	36640-VUR	135 Degree	N/A	36543-VUR	36643-VUR
45 Degree	36441-VUR	36541-VUR	36641-VUR	135 Degree 134a service port	N/A	36546-VUR	36646-VUR
90 Degree	36442-VUR	36542-VUR	36642-VUR	Brass Ferrules	36006-VUR	36008-VUR	36610-VUR

Vintage also offers "U-bend-Em" solid lines

"U-Bend-Em" Universal Length Aluminum Refrigerant Lines

STRAIGHT sections of aluminum refrigerant line with swaged o-ring ends (male on one end-female on the opposite end. You form to desired shape using proper tubing bender.

Vintage Air HVAC Installation Instructions

Step 1. Remove all old HVAC components

Remove the dash by following these items in order

- Remove the center console
- Remove heater/AC control panel bezel including central air outlet.
- Remove the steering wheel.
- Remove glove box door and liner.
- Disconnect colored dash wiring harness connectors on right through glove box hole. (3 for 77-78, 5 or 6 for 75-76)
- Remove (2) 8mm steering column mounting bolts under dash (4 for 240z). Pull steering column down some.
- Disconnect speedo cable from back of speedo.
- Disconnect hood opening handle mount and left and right vent control knob mounts.
- Take off dash filler trim panel between glass and dash
- Remove all bolts (6mm) from brackets holding trans tunnel to dash. Remove brackets from dash.
- Remove (1) 6mm bolt each side (where vent knobs were) from underneath dash.
- Remove (8) 6mm bolts at top of dash just below glass that connect dash to firewall.
- Dash should fall into your lap now. Remove and put aside.

Drain the rad.

Remove heater hoses from engine to fire wall

Remove all AC components in the engine bay (if equipped)

- Compressor, idler and brackets.
- Condenser rad in front of engine rad
- AC Drier on passenger side
- All AC hoses and hard tubing.
- Vacuum storage bottle, vacuum lines, solenoids etc to do AC in engine bay.

Remove old Heater core blower fan AC from under dash.

- Remove all connecting cables, wires, and vacuum lines.
- Remove fan from housing.
- Un-bolt fan housing from firewall, then remove fan housing.
- Remove heater hose (right), AC connections (left, if present), unbolt center HVAC unit from floor and firewall, remove and toss.
-

Step 2. Mount Compressor

The mounting of the new Sanden 508 compressor is the most time consuming job.

Decision 1. Where to mount it.

Most will opt for mounting in the “stock” location, ie, driver side low against the block.



The other option may be passenger side high, above the alternator, where ZX has the power steering pump, or where the old 240Z AC York compressor was mounted.

Decisions depend on clearance with Turbo, AFM, IC and air intake piping etc. Heat is also a consideration from Turbo and headers when mounting on the driver side. Insulation and or heat shielding may be required.

In either case, you will need to create a bracket or modify a stock bracket to mount the compressor, as well as invent a way to tighten the belt. Vintage Air has “universal brackets” that may be a good starting point, but you will be fabricating some of the bracket, which likely means cutting, grinding and welding.

Vintage Air has some other possibly interesting solutions.



15815-VUB Adapts York
bracket to Sanden compressor



15115-VUB Universal
Compressor Bracket

The York adapter bracket may bolt or easily attach to the stock ZX bracket, or the universal bracket seems to provide a great starting point for a fabricated bracket that does not require an idler pulley.

The slickest way seems to be using a ZX AC compressor bracket (shown above). It also has an integral idler pulley that makes the belt tightening trivial. It bolts directly to any L6 block. The only trick is mounting the compressor to the bracket such that the idler and harmonic balancer pulleys are lined up.

The picture above shows the solution, not all the details.

Adapting the bracket.

There are four sets of mounting ears/tabs on the compressor. The compressor must be mounted such that the centerline between the two outlets is no more than 90 degrees from vertical either way. I chose to keep the outlets pointing up, so the mounting holes chose themselves.

The two mounting holes in the Sanden compressor need to be drilled out to 12mm. The top stock bracket holes accept 12mm hardware. If you wanted to use 10mm bolts, it would likely work, but I'm no fan of slop in this bolt. Find/make a 12mm bolt about 7" long. 12mm threaded rod would work fine.

The bolt goes through from the front, thru the compressor housing, then the first hole in the bracket, etc. Notice you will have to grind away metal around the bracket holes for clearance.

Forward/back pulley line up required two 7/16 washers (1/8 inch) between the compressor front hole and bracket front hole.



This also results in the idler pulley being forward 1/8" too far. The bracket with the three holes that the idler pulley mounts on then must be shortened by this amount to line its pulley up with the compressor and crank pulley.

I used an 1/8" thick cutoff wheel on my angle grinder to cut through the 3 legs of the bracket, then just welded it back together! Simple! Remember to leave all 3 legs bolted to the bracket when you cut it off, then ensure the pulley is parallel to its original position when you weld it back together.

One more trick. The head of the 12mm bolt was JUST a bit big to pass by the rim of the AC pulleys as the bolt was inserted into the mounting holes (of course...). I chose to grind down ONE flat on the bolt head so that it would clear the pulleys, leaving 5 so that a wrench will still work. You just have to rotate the bolt to the right spot when you put it in.

Another solution is to insert the bolt from the rear, and make it just the right length to place a nut on the front. This requires you mount the compressor to the bracket, then mount the bracket to the block. The engine mount is in the way. Your choice.

Mounting the bottom of the compressor

You need to attach the BOTTOM of the compressor to the bracket as well. The idler does the belt tensioning, so the compressor must be solidly mounted to the bracket, and not allowed to rotate. I used one of the un-used compressor mounting tabs on the bottom, and one of the un-used horizontal bracket holes, and fabbed up a 3/4" x 1/8" steel bracket to join them. No wimpy twisted 1/8" aluminum here. Make this strong. My blue bracket is shown below.



Harmonic Balancer

Your harmonic balancer must have a free pulley to drive the AC compressor. Sorry, no single groove Euro dampers need apply. The MSA [Performance Harmonic Damper](#) is not suitable.



Performance Harmonic Damper. 70-83 Z/ZX

Code: **10-2139**

Price: **\$89.95**

Quantity in Basket: *none*

Step 3. Mount Evaporator case under dash

This step is not simple. You are trying to satisfy many constraints

1. The unit must be level left-to-right AND front-to-back. There is a sloped drain pan and outlet tube molded into the bottom of the evaporator case that must allow condensation to drain freely.
2. It has to fit between the trans tunnel below and the cowl above, and the vent outlets must have clearance above them to allow the vent piping to clear the cowl and run to the outlets.
3. It must fit behind the dash that will be mounted back in front of it.
4. The AC and heater hoses must be able to wrap around it to get to the firewall, where they must pass through and be clear of things on the engine side (like the battery!).

The standard black A/C hoses are very thick and stiff. Making this 90° bend around the fan case was not easy!



This picture shows my final location. It does not appear level, but it is.

This location was determined by several test fittings with the dash in and out. It required slight modifications to the two dash mounting braces that run from the two tabs seen here sticking out of the trans tunnel, up to the dash frame. There were essentially cut in half length wise (top to bottom), leaving one mounting hole at the trans end, to allow the two aluminum brackets you see that use one hole each to fit. More fabrication.

Above the interference with the cowl was the main point of contention. If I had my way, I would have done a little dolly work on the cowl to raise the roof so to speak to get the case farther back.

What to do with the old Fresh Air vent opening

Don't forget to plug the fresh air vent passage in the underside of the cowl.



The Vintage air system has no ability to use outside air as the source for heat or AC, it uses inside air only. Just like being on re-circulation all the time. If you are very good with sheet metal, I suppose you could build a box between the fan inlet and some modified version of your vent opening, with an air valve to open or close it, but that would be quite the task.

Just plug the hole. I used a sheet of tar/Aluminum foil sound deadening material. It is very sticky and adheres and seals well. We were doing sound damping installation for the rest of car while the dash was out.

Step 4. Route the AC hoses

Routing the thick black AC hose was the most time consuming. After mocking it up, you have to take the hose to an AC shop for crimping.

Considerations are

1. Condenser rad has both outlets on one side. Passenger or driver?
2. Where to pass the lines thru firewall?
3. The drier and safety switch have to be mounted in the #6 high side pressure hose.
4. Wiring must be run from the safety switch and compressor.
5. Turbo and exhaust heat on driver side.
6. The #10 low side hose was only long enough to get from the compressor to the fire wall if you go around the back of the engine on driver side.

The choice was easy to make in our case as the compressor was mounted driver side. Had the compressor been mounted passenger side, other than the really hard bracket fab, the hoses would have been run with shorter pieces and would have fewer heat issues.

The condenser rad has the outlets on the passenger side
The drier mounts on the passenger shock tower
The safety switch is next to the drier and by the fan relays.

Firewall holes seem to need to be on passenger side due to location and direction of outlets on under dash evap box.

Hose Routings



Service port was placed in line up by the head for easy access. Had to buy a new fitting to do this (#8 splice w/ R134 service port). Original high side port on compressor outlet fitting conflicts with low side service port.



1. #8 from high side compressor outlet to #8 fitting on condenser rad up from compressor, in front of rad, across to passenger side with splice w/R134 service port, over and down through wiring access hole in rad support, to condenser.
2. # 6 hose from lower condenser rad outlet to safety switch.
3. # 6 hose from safety switch to drier
4. #6 hose from drier to #6 firewall bulkhead connector
5. #6 hose from cabin side #6 bulkhead connector to expansion valve on evaporator case.
6. #10 hose from lo outlet side of evaporator case to #10 firewall bulkhead connector
7. #10 hose from engine side #10 firewall bulkhead connector to low side inlet on compressor.

Total 14 crimps to complete.

Hose fittings

There were the fittings we used with the component locations chosen as indicated.

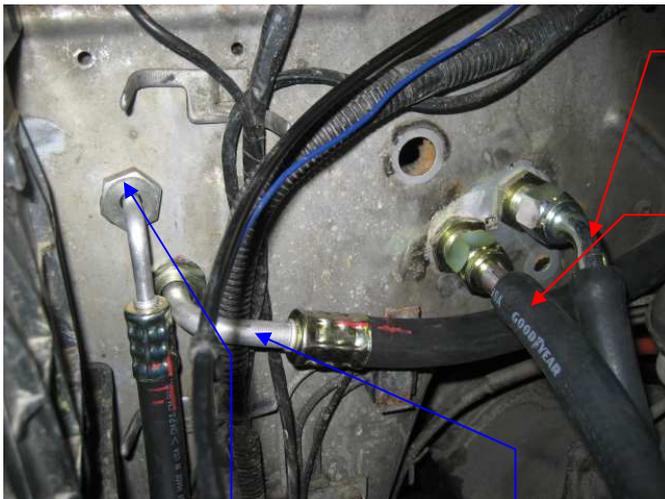
- 2 - #6 straight O-Ring to #6 hose
- 3 - #6 45° O-Ring to #6 hose
- 1 - #6 90° O-Ring to #6 hose bulkhead fitting

- 1 - #8 45° O-Ring to #8 Hose
- 1 - #8 90° O-Ring to #8 Hose (@ compressor instead of supplied 135° with service port)
- 1 - #8 splice with R134a service port

- 2- #10 straight O-Ring to #10 hose
- 1- #10 135 °O-Ring to #10 hose with R134a service port (@ compressor)
- 1 - #10 90° O-Ring to #10 hose bulkhead fitting

Hose Routing Pictures

Firewall routing.

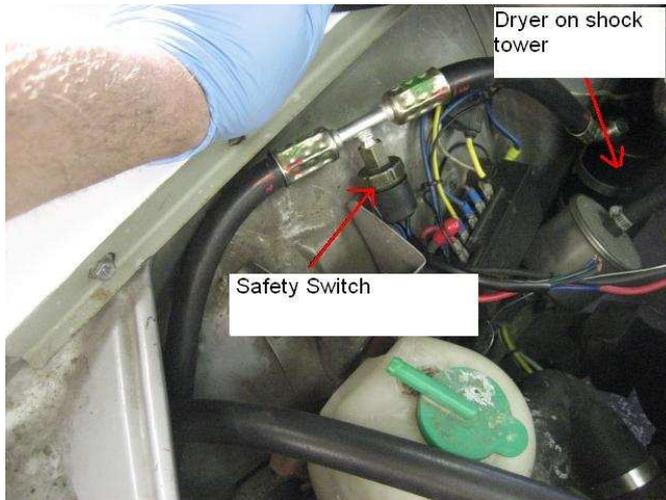


5/8" Heater hose pressure side to heater valve. Comes from BACK of head fitting.

5/8" Heater hose return side from heater core. Goes to front of head, suction fitting.

#6 high side from dryer

#10 return line to compressor



The safety switch can be anywhere in the #6 hi side hose between the condenser rad and the evaporator inlet under the dash.

It was convenient to mount it on the passenger side wheel well near the electric fan controller, as the safety switch controls both the compressor clutch wire, and the electric fan. If the pressure gets to high, it first turns on the fan, then if still higher, it turns of the compressor clutch.

This shows the Condenser rad fittings on passenger side with 45deg fittings.



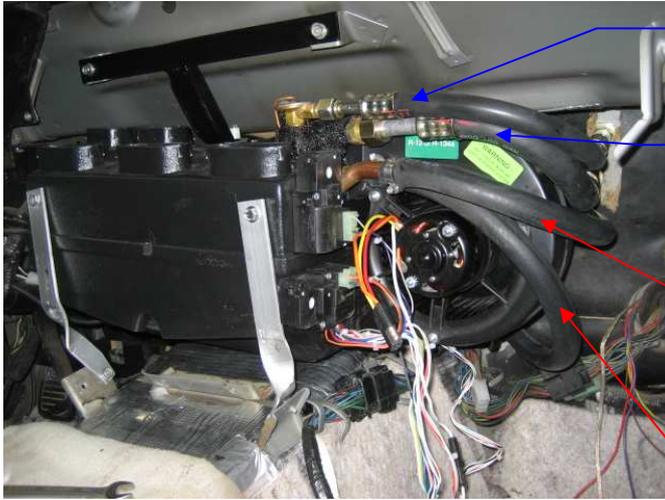
The Compressor hose fittings. #8 90 deg on outlet, #10 135 deg with service port on inlet.



#10 return hose running along firewall behind engine. Note the heat insulation wrap. It is run behind the brake master heat shield and down low along the frame rail to maximize the distance to the turbo and exhaust manifold.



Hose routings under the dash. AC hoses on top, rad hoses below



#6 hose high side into expansion valve

#10 hose low side return

#10 heater hose return

#10 heater hose inlet from servo heater valve hidden behind case.

Step 5. Route the Heater hoses

After seeing the AC hose fittings, I decided to use additional #10 bulk head fitting to run the heater hoses through the fire wall. I sources them from a local AC supply shop.

All heater hose is 5/8".

The stock holes for the heater are close to where you need them, but not quite. I was able to use the lower of the two. Plug off the other.

The consideration here is the location of the heater valve on the cabin side of the firewall. I have it tucked between the firewall and the case of the evaporator, pointing downwards. The close clearance requires that BOTH heater hose connections to have 90 fittings that force the hose downward immediately after coming through the firewall.



Taken from low in the passenger foot well looking up towards the heater line entry points, high on the firewall, you see the servo controlled heater valve.

The mounting position of the heater valve really does not matter, EXCEPT that you must keep the motor and electronics on the valve safe from becoming wet in the event of a leaky connection or hose!



VA indicates that the control box should be ABOVE the valve. Beside is next best.

For the heater hoses, I used a #10 90° bulkhead fitting and a #10 45° bulkhead fitting. The 45° makes the inlet side point right at the fitting on the back of the head if you rotate it clockwise slightly to make its outlet point upward at 45°.

You have remove the outer crimp sleeve from the fittings so that you can use a hose clamp on the hose. Dremel with a cut off wheel to the rescue. Vintage Has a full line of heater fittings you want to fancy.

Remember, the outlet at the back of the head near the firewall is the high pressure "Source" of the hot water, the "Return" or "Suction" side is up front on the front cover where the long heater hose and the lower rad hose connect. Just think that the water pump has to suck water from the bottom of the rad to get the flow path clear in your mind.

The heater valve must be on the high pressure SOURCE side of the heater water line. It has an arrow on the body of the valve to show the required direction of water flow. In my installation, water passes DOWN through it.

Note also which copper inlet line on the evaporator heater tubes is the INLET side. This comes from the heater valve. This is the pipe closest to the fan. The tube is labeled.

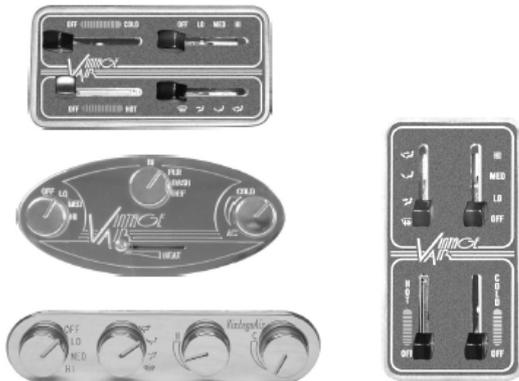
Options

Vintage Air sells very pretty shiny bulk head plates to run both or either of the AC or heater lines through. They also sell dedicated hard lines and fittings for the heater lines as well. Check out their catalogue.

Step 6. Fabricate a new control panel mounting

This part is where you get to be very creative.

Depending on the controls you choose from Vintage Air, the logical (means simple) place is to replace the stock controls with the new control panel



The control panel on the 260/280 is very simple as you have a large rectangular opening to fill with the panel and controls of your choice after removing the stockers.

Here we see the space in the console trim plate that has the opening for the stock slider controls.



The opening is not perfectly rectangular. It tapers slightly top to bottom. It also has tapered sides, forming a funnel as you go deeper into the dash, and the back of the opening is not parallel to the front. I fabricated a plate that fits just inside the opening and has a slight top to bottom side taper to fit.



With the controls mounted in the center of the plate, they stick upward into the rear of the plate as the back of the opening is not parallel with the front.



I perhaps should have mounted them lower on the plate so the rear of the controls clears better, but the control panel would not be centered vertically.

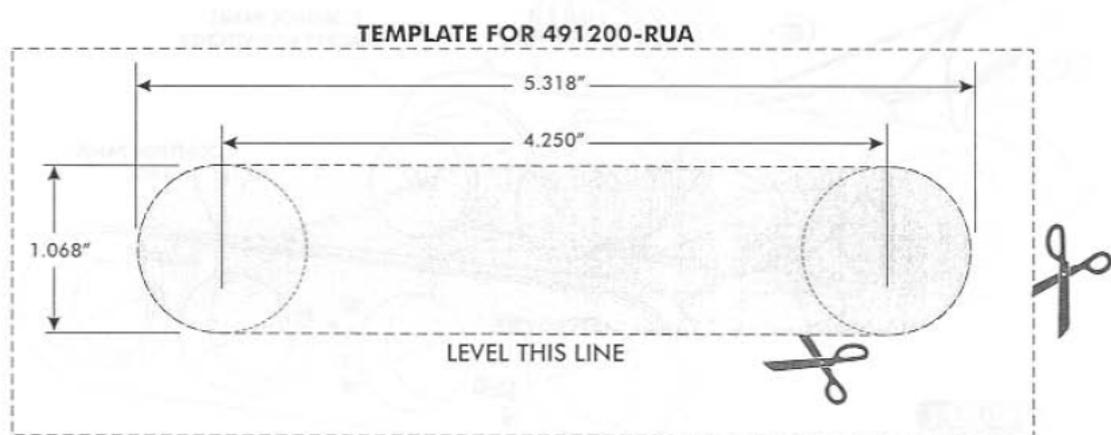
I used 1/16" aluminum plate to fit the opening, and planned to have it held in place by a pair of through bolts to support bars in the back. The two machine screws need a flat head, and the plate must be countersunk to accept the heads for a smooth look.

The tapered shape of the opening at the back in two dimensions means the holes through the bar are angled just so, then tapped with a 10-24 tap to match the 2" stainless flat head machine screws. #8 would have been adequate as well.

Mounting the control panel in the plate

The requirements for the cut out opening in the trim panel for the control panel is **very** exacting. Here is the layout from the Vintage Air Instructions.

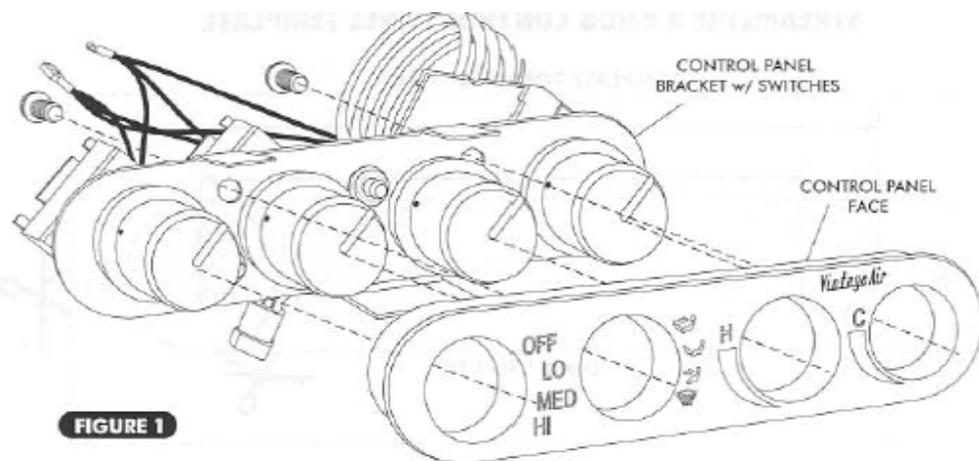
STREAMLINE 4 KNOB CONTROL PANEL TEMPLATE



Yes, **5.318 wide x 1.068** high is the requirement.

I drilled two 1" holes 4.250 inches apart (my 1.068" bit was at the cleaners....), cut out the scrap between them, then filed, and filed, and Dremel'd, and filed the opening until I reached the final dimensions.

The knob panel comes apart in two sections, that when re-assembled, it traps the mounting plate between the halves.



The panel halves are made to trap a 1/16" thick face plate material but can be modified for up to 1/8" material by filing off the tabs that trap the panel.

Beautifully made, but very damn precise! Fab of this part, including painting (the panel ended up black) required 4 hours.

Knob Lighting

These knobs are back lit. The barrel part of the knobs is translucent. The wiring for the four them needs to be connected to your dash lights. See the wiring section for details.

Step 7. Run the new dash vent hoses

The Gen-II Compac unit has 5 outlets on top, two defrost in the back, three AC in the front. There are two heater only outlets on the bottom. This matches well with the three 240/280 dash and two defroster outlets.

The sizing of the supplied 2.5" hose was shockingly perfect to fit onto the defroster ducts and onto the dash vents at each end of the dash.

The only fabrication is a connection to the center vent, which has no stock provision for a round pipe. See below.

Important!! Air flow through these coil accordion hoses is vastly improved if the hoses are pulled tight and kept short. The inside surface becomes quite flat and smooth when the hoses are pulled to maximum tension.

Defrost

The shown defrost tubing routing is okay but not ideal. The problem is the routing and complexity of the bends that had to be made, which creates friction in the air flow.



A much better solution might be either of these generic universal defrost ducts from Vintage Air.

They both have SIDE entry which makes the runs much shorter and smoother.



63375-VUE Universal defrost ducts. (Pair) 6.5"x3.25"



63380-VCE Compact universal defrost ducts. (Pair) 6.5" x 2.5"

They are not as wide as the stock outlets, not sure what the air flow patterns are like. Mounting them will require more fabrication and clearance checks with the dash.

Perhaps grafting a side entry pipe on to the stock defrost vents would be the "best" but also the most work.

Air Conditioning Outlets

Dash eyeball end vents

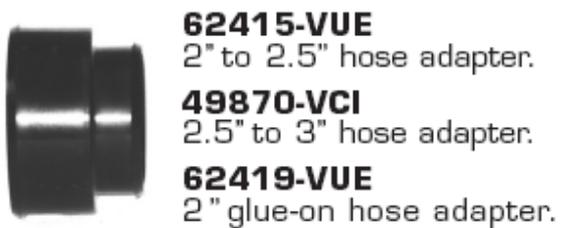
The outlets at the ends of the dash have a perfect 2.5" fit to the piping. I did put a clamp on the hose, just for security.

Follow the stock routing to get the central outlets.



You will need to adapt to 3" pipe near the evaporator duct outlets.

Vintage air has these fittings available, but I had to dig up some vacuum tubing adaptors I had laying around. That is what is spliced in with the red tape above.



The run to the right side must stay above the glove box, so run with the smaller diameter piping all the way to jus before the central unit vent outlet before adapting to 3"



Dash Central Vent

The central vent outlets on the 280 are much larger than on 240, which is a good thing. The stock air box that sits immediately behind the dash vents has three connections. The two round ones to each side run to the side eyeball vents, and must be abandoned. Plug them off anyway you see fit, just make sure they are sealed.

I even cut them both off flush with the box, there is clearance issues putting this in from the front if you do not.



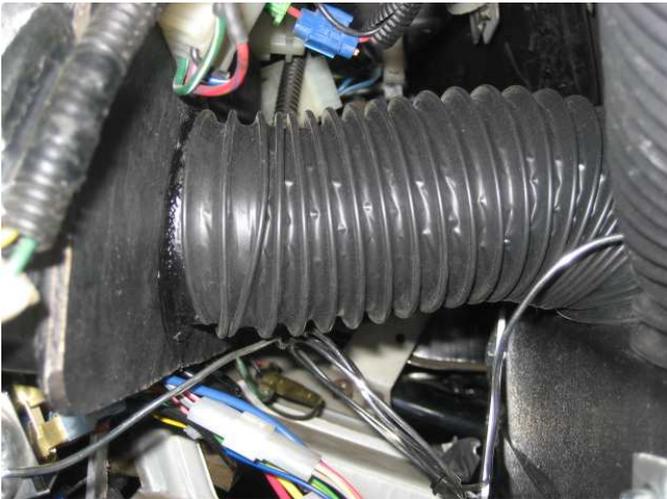
The single air connection is from the back. To connect the currently wide open rectangle on the back to the 3" hose, I first made a flat plate to cover the opening,, and put a 2.5" hole in it, and glued on a short 2.5" aluminum pipe section I had laying around (Intercooler piping actually). I used black seam sealer as the glue/caulking, any good silicon will do nicely. Seam sealer just dries fast and is super tough.

Here it is mounted in the dash picture taken through the glove box hole, and initially connected to the center outlet on the evaporator.



Notice the hole is WAY too long. This was just a test fit.

Here the hose is cut to length, stretched to fit. Nice straight shot out the dash vent.



Here you can see the hole in the panel from the vent side. Should have painted the inside black!
Dang!



Step 8 Wire the system.

Deciding where to take power to drive the system and mounting their breaker and relays are the required tasks.

Power supply

The system requires four external power supply connections.

1. Battery supply.

A circuit capable of handling 30 amp supply. They supply a 30amp breaker that has to be mounted and connected directly to the battery.

2. +12 ignition on source.

The stock power supply to the fan is the best source of this power supply. You can retain the stock fuse this way. You just need to find the right pin on the old connector that hooked up to the

3. Ground

The ground terminal must be connected so a secure clean metal ground point.

4. Panel lighting source

The instructions do not mention the lighting for the dash panel knobs. You need to find a dash light wire. Instructions below.

General Wiring

The blower fan requires that two supplied relays be mounted and wired.

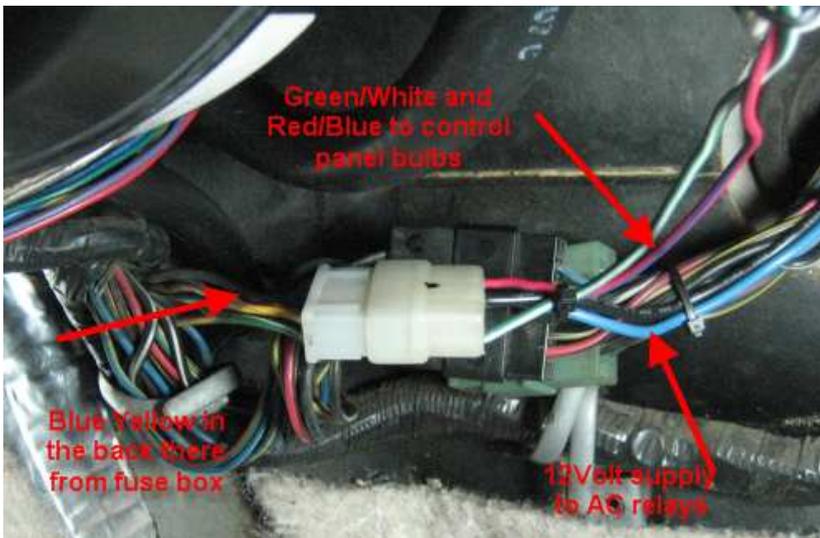
I placed them on the side of the dash harness connector block. The 30 amp breaker is also mounted there.



The low and medium speeds are fed directly from the fan switch, but the top speed is fed via a relay, as apparently the current requirements are too high for the switch....



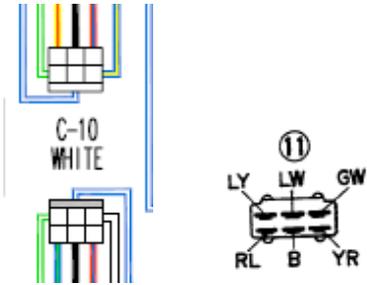
The stock connector is used to grab the +12volt switched power, and the dash lighting output.



The harness connector left side

Blue Yellow: 12 volt supply from fuse panel
 Green White: Dash light 12V when lights are on
 Black: Ground

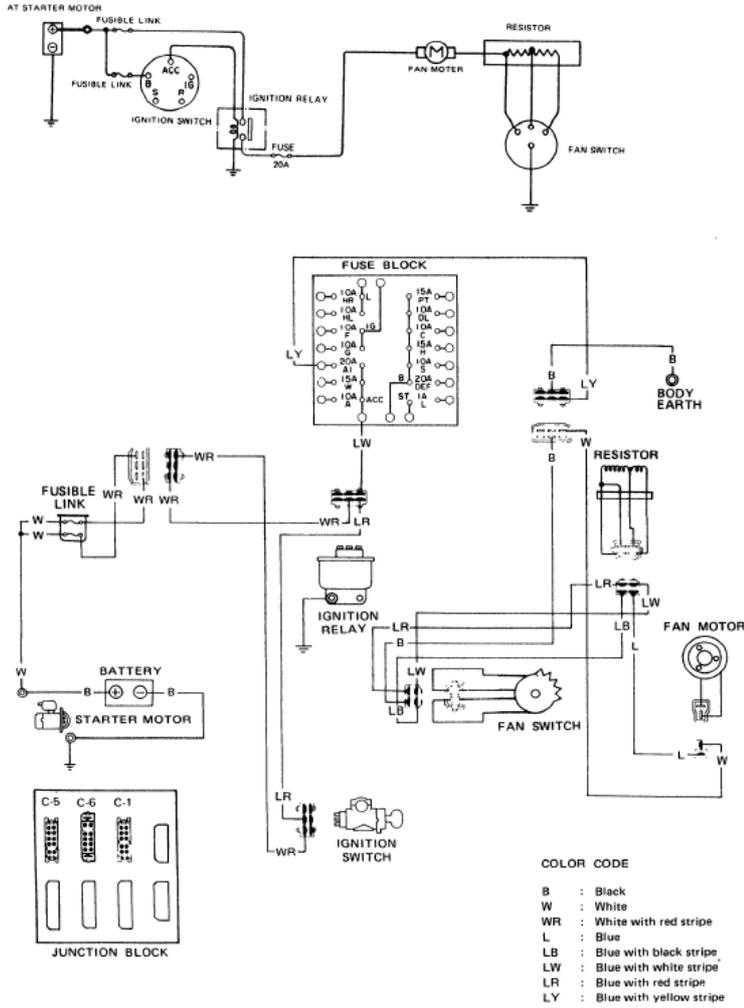
Red Blue: Dash light ground via the dimmer.



The 77 FSM has a great page on wiring for the stock heat and AC

Body Electrical System

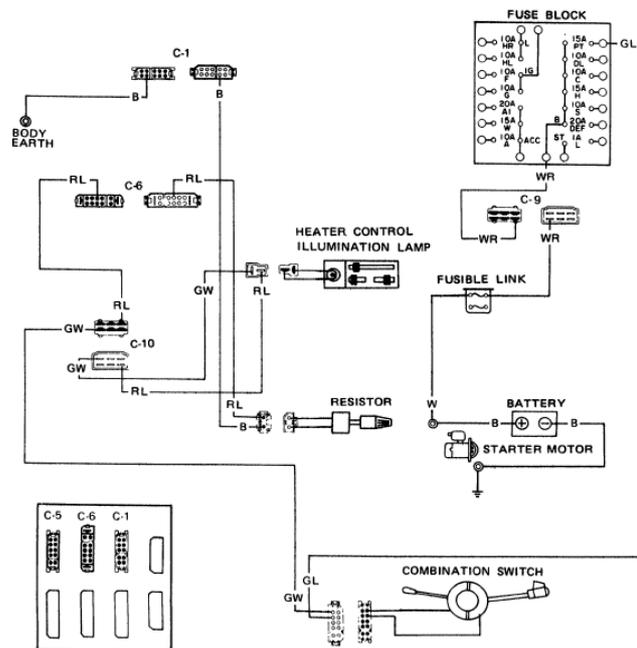
Heater



BE677B

Fig. BE-106 Circuit diagram for heater

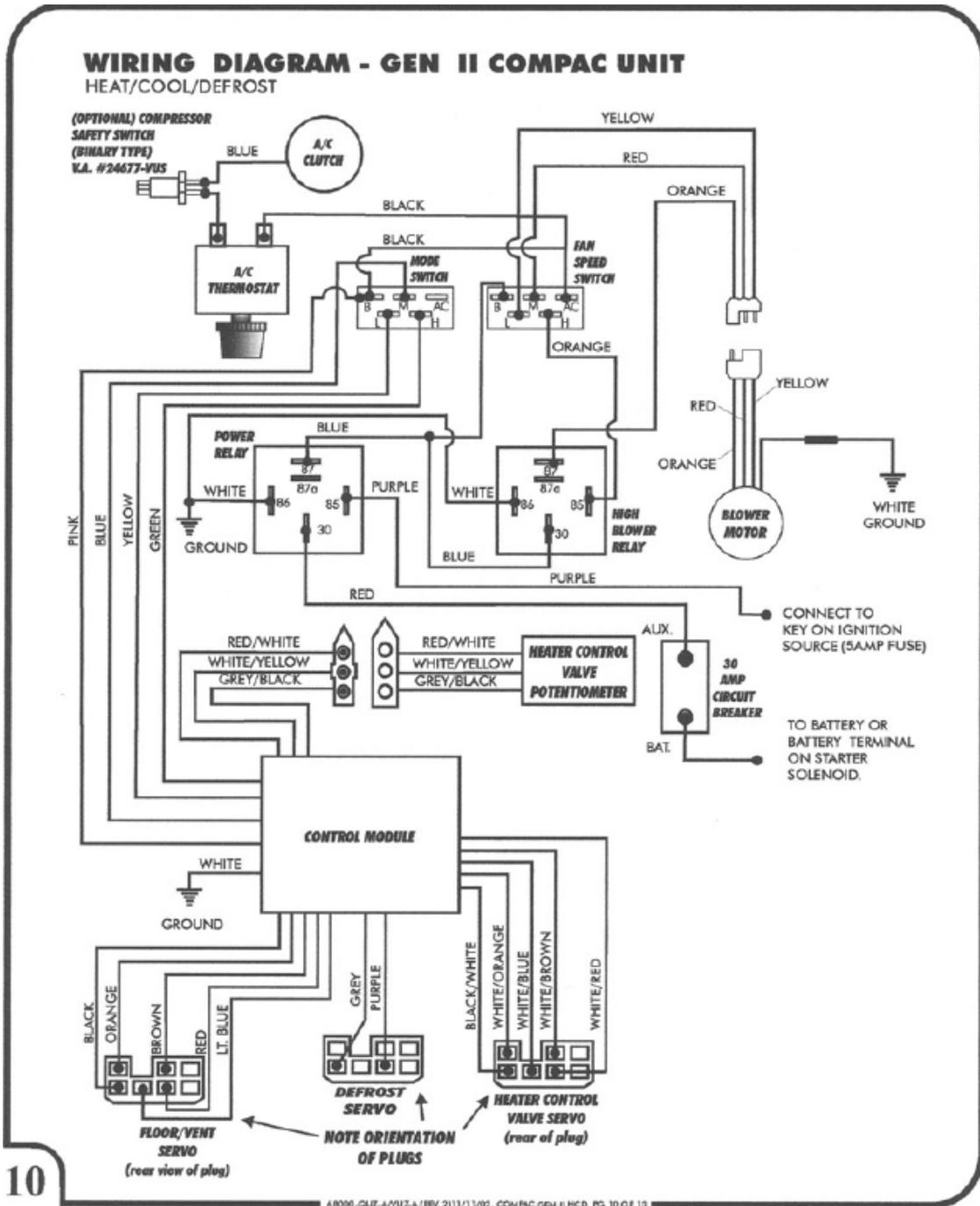
The dash lighting circuit



Shows that the bulbs have 12 volts on one side at all times, when the market or head lights are on. The other side of all bulbs goes to ground THROUGH the dash light brightness resistor.

So to make your VA knob lighting dimm with the rest of the dash bulbs, take the Green White and Red Blue wires, to connect to the bulb wires on the control panel.

If you ground one side of the bulbs, and just use the Green/White wire to power them, that works too, except they will not dim with the rest of the dash bulbs



Mounting of components

Control Panel

Step 9. Charge the system.