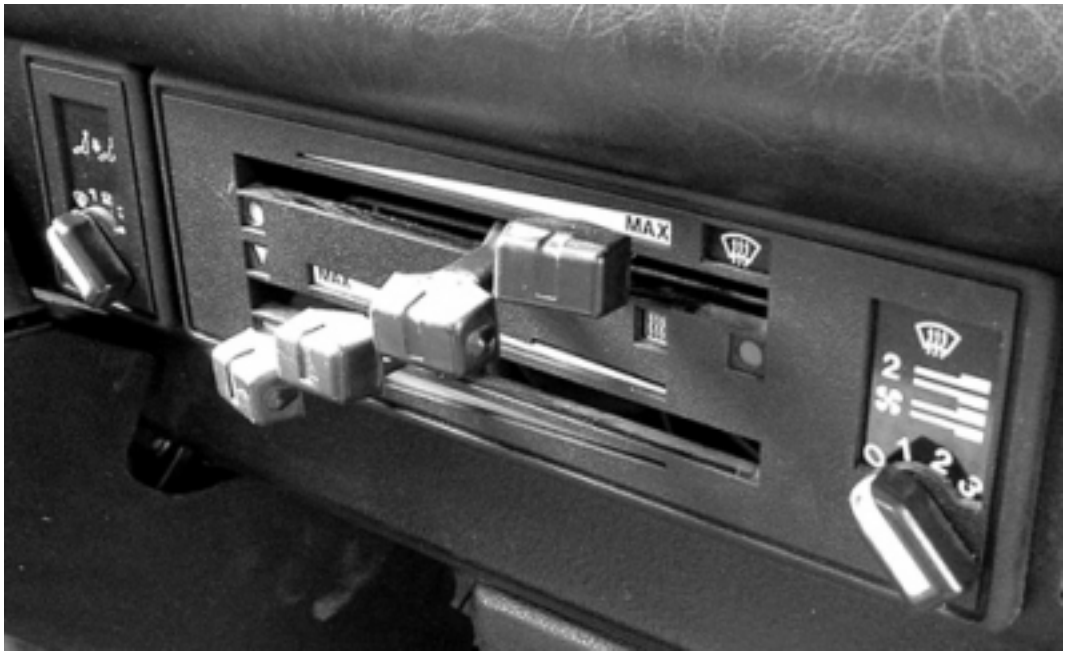
Ventilation: Heat and A/C in the Vanagon Explained

The ventilation system in Vanagons has always been somewhat confusing. Fresh ambient air ventilation is controlled by the four slide levers and rotary fan knob on the dashboard, right next to the radio. These levers have nothing to do with air conditioning if your Vanagon is so equipped. A/C will be addressed later in this article.

Fresh ambient air enters the vehicle through the front radiator grille between the headlights. Behind the radiator grill is a smaller grill (about 2" x 24") for fresh air intake, attached to a duct welded to the body. Fresh air flows through this duct to an air distribution box, which is about 1' x 1' x 2' in size, and is buried in the dashboard, dead center about a foot below the windshield. This air distribution box has several cable controlled flaps on it, and it houses an electric "squirrel cage" fan which is controlled by the rotary fan knob to the right of the slide levers. On all water-cooled models it also houses a small radiator called a "heater core." There are cables attached to the four slide levers that control the amount, temperature, and direction of fresh air that comes into the vehicle:



TOP LEVER: The "defrost" lever. This lever operates a cable that moves flaps in the air distribution box, increasing or decreasing fresh airflow to the windshield and front door windows. The air flows via the four air ducts on the top surface of the dashboard (numbered "1" and "2" in your owner's manual, page 45). The air controlled by this lever can be either cool or heated air, depending on where the second lever is positioned.

SECOND LEVER: The next lever down is the "heater" lever. It operates a cable that controls the heater valve(s). On air-cooled models, there are two cables that are about a mile long and go all the way back to the engine heater "flaps" on the heater boxes mounted to the engine, one on each side. On water-cooled models, this lever controls a single cable that is only about three feet long and operates a water "heater valve," located right behind the radiator cooling fan outside the vehicle (or right behind the glove box inside the vehicle on 1982 water-cooled diesel models). In either case, this lever controls the *temperature* of the air entering the vehicle.

THIRD LEVER: This lever operates a cable that moves flaps in the air distribution box, increasing or decreasing air flow to your feet. This air flows via an air duct assembly just in front of the gear shift lever. On some diesel models there is a false floor down the aisle way which ducts air to the rear passenger area. (On 83-91 water-cooled gasoline powered Vanagons, there is an entirely separate heater under the rear bench seat for the rear passenger area, the operation of which is described in your owner's manual on page 46.) The air controlled by the third lever can be either ambient or heated air, depending on where the second lever is positioned.

BOTTOM LEVER: This is the rear passenger fresh air control lever. This lever operates a cable that moves flaps in the air distribution box under the dashboard, increasing or decreasing fresh airflow to the rear passenger area. Fresh air that enters the air distribution box is diverted to metal ducts under the dashboard which conduct air to the right and left front door jambs. In the front left and right forward door jams there are rectangular gaskets that connect the doors to these ducts. There are still more ducts welded inside each front door through which air flows and exits out of the rear door jamb, through a funny looking plastic oval grill thingy with a furry seal around it. You can see this when you open the door and look just under the door latch. Then the air flows up inside the body section behind the front doors, and then rearward into the fresh air ducts along the roof in the rear passenger area. On camper models, the left steel duct under the dashboard is plugged so air can't flow through the left door. This is because, on campers, there are no air vents in the rear passenger area above the stove and fridge galley. You will find the oval grill thingy missing on the left door (see pic #1 below). I wish I had a dollar for every time a camper owner insisted on buying an oval furry vent thingy for the left door because it was "missing." It is *supposed* to be missing!

So, what about the two vents on either end of the dashboard facing rearward? You know, the ones with the little adjustable diffusers and up/down levers on them (see pic #2 above). Well, those little guys are their own bosses. They have fresh air coming into them all the time, regardless of lever position. If you flip the little lever on them down it opens the vent and you get air. If you put the little lever up, it closes the vent and you get nothing. So you say, "Duh, this is all obvious stuff, tell me something I don't know!" Okay, here it is: On '80-'87 models, only fresh, ambient temperature air flowed from these vents, regardless of what position air temperature control lever #2 was in. That is, you could have the heater blasting, but still have COOL air coming out of these vents. However, starting in 1988, the temperature of the air coming from these vents was controlled by temp lever #2. So, on '88-'91 models, if you had the heat on, *all* the air coming into the vehicle was heated. This kinda sucks. There have been many instances where I, as the driver, was the only one awake, the kids and wife sawing logs. They wanted the heater blasting so they could sleep, which is understandable. But as the *driver*, it was sure nice at 2AM to have that nice cool air blasting me in the face from the side vent to keep me awake!

So far we have only discussed how air ENTERS the vehicle. Of course, no air can come IN unless air goes OUT. This is called “flow-through ventilation,” which all vehicles have to some degree. Prior to 1988, if all windows were closed, the only way air could get out was through little exit vents located on the rear lower corner of the front door interior panels. These are the plastic vent assemblies with the little blue slide lever.

These vents allowed air to exit the interior. Sliding the lever toward the front of the vehicle opens the vent, rearward closes it. On the leading edge of the doors, in the door jam, there are three oval holes that open into this hollow space of the door itself. As a Vanagon plows through the air, air flows around the vehicle creating low-pressure zones near the front door jam areas. VW engineers realized this and used this low pressure to suck air out of the interior of the vehicle. Air flows from the inside of the vehicle through the little vent at the rear end of the front doors, through the hollow door itself, into the door jam area, and out of the body gap between the front door and front quarter panel. Genius, you say. But what about the rear passengers, you say? And why, in 1988, did VW put a rubber seal at this body gap, thus blocking all airflow through it?

The flow through ventilation scheme completely changed and improved in 1988. This change coincided with the introduction of the switch from chrome (or black) steel bumpers to the fiberglass "big bumpers" and the accompanying front spoiler. In 1988 the rear-most side windows have an added vent along the rear edge. It was necessary to shorten the glass in order to make room for this vent as the opening in the body stayed the same. These vents are air EXIT vents.

Interestingly, the little grills on the front door panels remained, but if you remove them you will see the passageway behind them is sealed, and there is no blue slide lever. The seal at the door gap area was put there probably for reduced noise. I installed these seals on my 1987 Vanagon, and added the rear vents too. It actually lowered the wind noise a little, and the rear vents improved air flow inside the vehicle, especially for the rear passengers. And now I have the best of both worlds: improved flow-through ventilation and cool air from the dash vents! You can say you knew me when I was nobody…

AIR CONDITIONING IN VANAGONS:
OK, so what about AC. Factory installed air conditioning in Vanagons is a completely separate system than the fresh air system. All air-conditioned air is RECIRCULATED air. That is, all the air that is cooled is air that is scooped up from inside the vehicle, cooled, and re-circulated back inside the vehicle. It does not work like most other vehicles where one can choose OUTSIDE or INSIDE air to be cooled. There were two different factory installed AC systems for non pop-top Vanagons, and two for pop-tops.

Vanagon non pop-top factory A/C:
1980-1984: On early non pop top Vanagons up to about 1984, the air conditioning ducting was a plastic monstrosity that came up the driver's side of the vehicle just behind the driver's front door, and up over the across the ceiling to the passenger side. The evaporator (the heat exchanger that converts warm air to cold) was inside this section. Right above the isle way there was a "T", and ducting ran forward between the driver and passenger to windshield to another "T", and then side to side. This system worked OK.

1985-1991:Starting in 1985, the evaporator was moved all the way to the back, running side to side just in front of the rear window. A duct similar to the early systems ran side to side up front above the rear-view mirror where the A/C control knobs were located. A long duct ran down the middle of the ceiling back to the evaporator housing. This system was awesome, and kept the interior of even dark colored Vanagons cool, even in ambient temperatures of well over 100 degrees F.

Pop-top Vanagon factory A/C:
1984-1986: On these year models, the air conditioning evaporator was located inside what would normally be the rear cabinet above the rear seat. Instead of the little cabinet door that flips down there was a grill assembly installed. This system did not work very well. See picture below.

1987-1991: Factory A/C was improved in 1987, which coincided with the switch in the campers from a tan colored interior to gray. On 87-91 pop-top Vanagons without A/C, the rear cabinet was the same shape and size as the 80-86. With factory A/C, the entire rear cabinet assembly changed. Whereas the pre-87 system was basically a converted cabinet, the new system had an additional duct assembly that came right up to the edge of the rear ceiling, thus getting much closer to the front passengers. This system also used a larger evaporator and evaporator fans, a larger condenser with a more powerful radiator fan, and a larger A/C compressor (7-cylinder instead of 5 cylinder). This system worked OK, but still was nothing to write home about. The people in the back seat would be deafened from the roar of the more powerful evaporator fans, and frozen solid from the increased airflow. The folks in the front seat by comparison would be barely comfortable. However, this system when operating properly will keep the interior cool, and is fine for two people traveling in the FRONT seats. See picture below.

Vanagon aftermarket or "dealer installed" A/C:
There was another A/C system available for the Vanagon that was installed at the dealer. This was an

in-dash system. This system placed the evaporator in the dashboard behind the glove box. The outer dashboard vents, instead of being plumbed to the fresh air distribution box, were plumbed to the A/C evaporator. In addition to these vents, two more vents were added either where the radio usually goes, or right next to the radio. If the radio hole was used, the radio was relocated in a plastic enclosure down on the floor in front of the gearshift lever face-up. This system had an overall lower output, but the cold air it did produce was pumped straight at you, so it actually cooled your hot body instantly, as opposed to having to wait for the rear-only A/C to cool the ENTIRE interior. These systems are very rare. We have seen maybe one out of one hundred vehicles with this system.

Changing Vanagon A/C Over To 134a Refrigerant

All new air conditioning systems in automobiles operate with the new, non-ozone eating R134a instead of the old R12 “Freon”. (Note: “Freon” is a Du-Pont trade name for R12 refrigerant, just like “Band-Aid” is a trade name of the Band-Aid company for a bandage). It is because it is more environmentally friendly that R134a is used, and why everyone is pushing R134a conversion “kits”. The problem is that R134a has about 85% the cooling capability of R12. A/C systems designed to use R134a have a different, much more efficient manifold type “parallel-flow” condenser as opposed to R12 systems “series-flow” condenser. These “conversion kits” are nothing more than a set of fitting adapters, and R134a refrigerant and oil. On the late model non-pop top Vanagons simply converting to R134a works fine because these vehicles have more than enough capacity. So giving up 15% efficiency is not big deal. On pop-top Vanagons where the A/C already sucks this conversion makes the AC even worse. The problem with is that it is next to impossible to get the AC system in a Vanagon--with it's several miles of hose and multiple O-ring connections--to not leak AT ALL. And, there is no "stop-leak" that is compatible with R12. So, even if you step-up and pay for every hose and O-ring to be replaced in your Vanagon, the most you will get out of a charge of R12 is about 2 years, and 8-12 months is not uncommon. "No big deal" you might say, but at almost $5 per ounce, and with a capacity of 52 ounces, this gets pretty pricey. Plus, the stuff eats ozone. So lately, we have just been switching all Vanagons over to R134a at about $1 per ounce (and the filling capacity using R134a is less than R12), with sealant, and just telling our customers to "grit an bare it!". Like I have always said, if excellent AC is a must-have for you, you just might be a Eurovan person... Maybe eventually we will get up the gumption to have a new condenser for Vanagons made in the more efficient parallel flow design. This, however, will be a very expensive project, and is in line behind about 100 other more pressing Vanagon improvements. So, open the windows and don't hold your breath.

So you say, "OK, whatever, give me R134a, it won't be as cold, but at least the stuff is cheap and does not eat ozone if/when it leaks out. I can live with that". There is one more problem, however. The other problem is that the lubricity of R134a and the oil that is compatible with R134a (ester mineral oil) is not as good as the R12 and petroleum based oil with which it is compatible. The result is that the moving parts of the compressor, which rely on these lubricating qualities, suffers. And the result of that is a shorter life for the compressor. Whereas one could expect 10 to 15 years of service from a compressor running on R12, it is not uncommon to have to replace a compressor running on R134a in 5 to 8 years. You just can’t win... Bottom line: AC is a bitch!