Six Modifications of the Jaguar Climate Control System

As described in the narrative from

Jag-Lovers

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Modifications to Climate Control

Application

This applies to the Delanair Climate Control, excluding vehicles with convertible tops. Convertibles have different controls. It is important that you understand that the A/C compressor is engaged much of the time. It runs so the A/C can cool the gasoline (to reduce hydrocarbon emissions) and to provide cold air, which is used to extract moisture from the air passing through the climate control. This dehumidification is especially important when defogging the windshield. **Note** that the heater core is providing heat for the defroster at the same time as the A/C is providing cold air. The incoming air is first cooled to extract the water and then it is passed over the heater core and on to the defogger ducts. Defrost is not the only time both the heater and the A/C is used, but it is the easiest scenario to understand.

The heater control valve is vacuum operated. Absent vacuum, it is open. When vacuum is applied, it closes. There is no modulation; the valve is either open or it's closed. This means that the heater core is very hot when heating, so the climate control often blends cooled and heated air.

When the fan control is Off, the climate control moves flaps into a recirculation mode, so no fresh air is available when the fans are Off.

Six ways to alter your Delanair Climate Control

Counting combinations, there are 6 different modifications described.

1. The "Gardner mod" explains how to obtain fresh air ventilation.
2. The "Napoli mod" allows the A/C compressor to be enabled or disabled depending on the position of a switch.
3. Combine the Napoli and Gardner Mods with a single switch.
4. Napoli's version of the Gardner Mod.
5. The "Sawyers mod" improves control over the recirculation flaps.
6. The "Bernett mod" disables the blower fans and A/C compressor.

Systems that do not match the preceding descriptions

If your climate control differs, the following may help.

Gregory Andrachuk:
"*DONE! Some may remember that I complained that my late 82 had the early style vacuum valve, not the AISIN valve, and the vent modification to admit fresh air with the climate control OFF did not work. I procured a used AISIN valve (two, actually) and tried again, using the window master switch as the open/close switch for the fresh air flap. It works PERFECTLY. A gentle waft of fresh air. It worked WITHOUT first turning on the climate control, and although I have not yet tested it extensively, it seems to provide heated air using only the temperature selector, although in observing this, I must say that I had turned the climate control on briefly. Was I just getting the benefit of residual heat in the heater core? In any case, using the master switch, there seemed to be no difference in the sound of the fans. (I believe that Tony Gardner said that one fan would be cut out when the switch was set to open the fresh air flap.) Anyway, it works, and works very well and thanks to Tony Gardner and the other pioneers of this worthwhile modification. The best part, the only thing that encouraged me to do this, is the fact that it is completely reversible with absolutely no permanent change to the system, and no visible alteration. Both important if your car is more than a "driver".*

Shane Mantoszko Describes Something Similar for the Series II:
" With all this discussion on modifying the series 3 climate control, I thought I'd tell the list what modifications I did to my series 2, which is a slightly different system, but very similar, if not identical in its functions.

Firstly, with regards to fresh air coming into the cabin. The series 2 has small mesh inlets above each headlight, with piping running to the foot well of the cabin. In each foot well is a knob which you can pull to open up this inlet, and allow fresh air into the foot wells. It comes in right next to where the blower motors inlet is. Fresh air can also come in via the plenum box, through the grate in front of the windscreen (where the wiper-washer nozzle sits).

The system will open up the flaps which sit on top of the fan blower units, and let fresh air in through the plenum box when using either full heat or full cold operation. All other times, the flaps should be closed, whether the climate control is on or off, thus giving recirculation.

This flap system after some years can be troublesome, so when my guy was re-building my climate control, and re-wiring the whole under dash with all new wiring, connectors and relays etc., I said to him ' since we have the fresh air option already via the top of the headlights, why the hell do I need to get air in through the plenum box ? Lets disconnect that whole part of the climate control, and seal up the flaps on top of the blower motors, so that the climate control works fully with re-circulation, and when I

want fresh air to come in, I'll just pull the vent knobs in the foot well, or open one of the windows if I want high volume fresh air....' made sense to me, and after 6 months of driving with it, I can say that it is just sensational. I am a city boy, and just hated the volume of exhaust fumes which would come in through the climate control.....now I get much less, and just have to push a knob in the foot well to close it off completely. Also, now that the flaps from the plenum box are totally sealed, I don't have to worry about water gushing into the foot well when the drain tubes into the engine bay are blocked up... It will stay in the plenum box until It dribbles through the drains itself, or until I hear the water slushing around and clear the drain tubes out....

Gardner Mod *Series III*

Tony Gardner Adds Fresh Air Control to the SIII. His posting to jag-lovers.org:
"This modification gives the option of having the forward motion of the car push outside air (hot or cold) through the air-conditioning vents with the climate control switch in the off position and the blower fans blissfully silent. The modification is very simple to effect and easily reversible if you do not like it; but you will."

Remove the two screws holding the left side heater louver (at your right knee LHD cars) and then remove the panel by sliding it forward and down, towards the front of the car. Before you is the daunting intricacy of the climate control unit which strikes trepidation into even the most technically competent on this list (be brave, this is easy). Just below the vent aperture is a black box with a tangle of wires from several electrical connections and, just in front of that (towards the engine and to the right of a plastic drain tube) a silver box, about one inch square, with two electrical connections protruding downwards from a black plastic appendage. On my car, the appendage is embossed with the name AISIN. The connection closest to hand has two black wires (the one at the rear two pink). Disconnect the (black wire) connector by pulling straight down. This disables the vacuum solenoid that closes off the air intake (RTC 670 "vacuum valve", if you have a parts book).

You can now go for a drive and see if you like it. If you do, you will probably want to be able to turn it off at some time, in which case, obtain standard male and female, blade type, electrical connectors and mount them at each end of a piece of wire. Install a simple on / off switch in the wire and connect it between the contacts you have separated.

Your car will now give fresh air at outside ambient temperature (this is not a substitute for air conditioning), or heated air, under the following conditions: Set the temperature control to maximum cooling, turn on the climate control and wait until the servo stops whirring indicating the air blend flaps have adjusted. Now turn off the climate control and a gentle breeze will be found blowing through the vents which is proportional to the forward velocity of the car. Opening the roof or a window increases flow. The temp control can also be reset to bring in heated air by switching on the climate control, selecting a higher temperature, and again waiting for the mechanism to adjust before turning it back off. If you have mounted the switch, the ventilation can now be turned on or off without the climate control in operation.

An interesting side effect is that removing the connection not only disables the vacuum solenoid but also one of the climate control blower fans. If you run the climate control as normal, with the ventilation switch on, there is only the noise from one fan and, of course, proportionally less air velocity. Therefore fitting the switch gives you the option of running one or two fans when using the climate control.

I have been using this modification for over a year now without a problem. (Other than the anxiety from hearing subtle engine noises which were not previously discernible with the climate control in operation).

The system is clearly designed with the intention that you will always have the climate control system on when driving; when the system control knob is turned to the "Off" position, the fresh air/recirculation flaps are moved to recirc position, positively closing off the intake of fresh air. Tony Gardner's mod lets you drive along with the climate control system switched off and still have fresh air wafting through the dash vents. The Gardner switch removes the ground from the vacuum solenoid that controls the fresh air flaps, allowing the flaps to open and fresh air to enter the cabin.

The vacuum solenoid in question is readily accessible; simply remove the grille and pad on the left side of the console, and the vacuum solenoid is mounted just forward of the four-relay box. Disconnect the ground wire, and connect it through a switch.

The Gardner switch will hold the fresh air vents open regardless of whether the system is on or off, but when the system is on there isn't much point. During normal operation, the system almost always keeps the fresh air intakes open; the only time they are closed are during max cool and max heat, which are relatively rare. However, as noted above, the Napoli mod may cause the control to run to max cool far more often, so the Gardner mod may come in handy to use in concert with it.

For winter use, Gardner himself provides the following tip: "If the climate control is set to heat (to adjust the flaps) and then switched off, warm air flows through the fresh air ducts. The vent mod does not replace AC, therefore it actually works better in winter than summer." Note that when the system is switched off, the heater valve remains open for coolant to freely flow through the heater core; Gardner's idea of setting the temperature to full heat and then shutting the system off merely leaves the flaps in a position to guide the wafting air through the heater core. If the temperature is set to full cool and the system is shut off, the flaps will remain in a position to bypass the airflow around the heater core.

Napoli's Mod to the Gardner Mod

"Instead of wiring the Gardner switch to cut out the ground, wire it to apply power to the solenoid. Then, whenever you want recirc, regardless of the mode the climate control system is in, you can get it. You also preserve full Gardner functionality with the climate control off --just switch off the switch." Essentially, the regular Gardner mod switch is OPEN/AUTO, while in this scheme it is OPEN/CLOSED - complete manual control of the recirc flap.

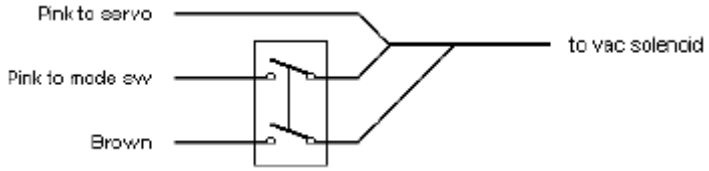
Sawyers Mod

The Sawyers mod is a variation on the Gardner mod, providing improved control over the recirc flaps. It requires a two-pole switch. **Craig Sawyers** says it "does exactly what you want. Position 1, recirc under all conditions. Position 2, fresh air when mode = "off" and normal Delanair operation in any other mode switch position." Since "normal Delanair operation" means that the system is in fresh air mode nearly all the time but will go into recirc mode under the most extreme circumstances, the switch becomes a "fresh air/recirc" switch that the system has the capability of overriding when it really needs to in order to maintain temperature control.

"Unplug the pink connector at the solenoid (it has two pink wires going into it), and unplug the servo multi-way connector on the opposite side of the car. Now chomp one of the wires going into the solenoid female spade connector, and find out which one of the two wires you now have connects to the pink wire on the servo connector. That is the wire you don't want -the one you do want actually goes to microswitch C in the mode switch assembly, which you can't physically get to without dismantling the car. Note that you actually want a break in the correct pink wire -so you might have to resolder the one you just snipped, and snip the other one.

"Now take your two-pole switch and common up the wiper. Connect that common point to the vacuum solenoid end of the correct broken pink wire. Connect the NC (or NO) end of one pole to the other end of the pink wire. Connect the other NC (or NO) to the brown wire mentioned in my earlier post. Now plug both spade connections back onto the vac solenoid.

"Here's what the scheme described above looks like electrically:



"In operation, one switch pole interrupts the +12V feed that comes from the mode switch when in the "off" position. It is really identical to the Garder mod but with the switch in a different wire. The second pole of the switch is used to apply +12V to the solenoid when the mode switch is in any other position. So with both switches open, you get no +12V to the solenoid with the system "off", and the solenoid under servo control with the any other mode position (Gardner when "off", servo control in any other mode position). With both switch poles closed, you get +12V through the pink wire with the mode "off", and +12V from the brown wire in any other mode switch position (recirc no matter what). Just to complete the description, mode microswitch C takes a fused +12V from the fusebox and either connects it to the pink wire when "off" and to the brown wire in any of the other four mode switch positions."

Napoli Mod

John Napoli Adds Manual Compressor Control to the SIII. His posting to jag-lovers.org:
"*Many of us have Gardnerized our cars, and this has proven to be a handy feature. In previous posts, I mentioned that I was going to experiment with compressor cutoffs, the idea being that you could run the climate control system without the compressor running. I performed this mod on my 84 S3 XJ6, and have found it to provide greater system flexibility and as much as 3 more miles per gallon. I did it by adding a switch in series to the compressor circuit. The approach I took was almost identical to that used to do the Gardner mod:*

Remove the right hand console panel (the one under the instrument panel). Remove the right side under scuttle panel. Locate the inline fuse for the compressor -- it is a standard white inline fuse holder attached to the climate control system housing with a clamp. (It is located up and to the right of the air flap rods.)"

gypsy adds:
On my 85 California Vanden Plas, the 10 amp inline fuse is affixed, with a phillips (PoziDriv?) screw and a clamp, to the right side of the climate control near the vent that blows on the passenger's knee. This is not the 15 amp #13 fuse! Now might be a good time to replace the filter behind the vent.

"Remove the clamp and remove the fuse. Start the car and turn on your climate control. If you have the right fuse, the compressor won't be running. Replace the fuse and the compressor starts. Switch off the engine -- now you know you're in the right place.

The long side of the fuse holder has a yellow wire with a black tracer coming out of it that leads to a white female spade connector. Remove that connector from the device its attached to. Notice that the connector has two yellow/black wires attached to it. We only care about the wire that leads to the fuse holder.

Cut the yellow/black wire that runs between the fuse holder and the connector right in the middle. Crimp on a female spade lug to one of the ends, and a male spade lug to the other. (This makes it easy to add the switch and also makes this mod reversible if you decide to uninstall later - -- just plug these two together.) If you are doing this with the fuse removed from the fuse holder, which gives you more slack to work with while you are doing this, be careful about the spring in the fuse holder that will want to pull the little stub end of wire out of your hands before you affix the connector.

Now, prepare another wire just like the one that you prepared for your Gardner mod, namely, a suitable length of zip cord. One end gets another male-female pair of spade connectors, and the other end gets whatever you need to attach it to your switch (a pair of females in my case). Plug the male-female end of the wire to the female-male connectors you added to the yellow/black wire.

I added a small 4 rocker switch panel from Pep Boys (8 bucks or thereabouts) inside my center console, since I didn't want to lose the functionality of the window lock switch, and I wanted more switches, anyway. Fish the wire through with a wire coat hanger. Plug in your switch and try it out. Replace the two panels you removed.

Results: this mod adds nice flexibility. Many days or evenings where it is warm enough for forced air circulation, but cool enough not to need the A/C, has made me appreciate the option of turning off the compressor and saving gasoline.. (Watch your computer with the compressor on and off -- you'll see a significant saving. I have averaged up to 3 mpg more over a tankful of gas.) And, of course, come winter the compressor can remain idle (except for a spin every couple of weeks to keep the seals moist).

I tend to keep the Gardner switch on all the time so the car always gets air from the outside, and use the compressor cutout switch as needed whenever I switch the climate control system on.

My next thought is to add a timer delay to the mix to cycle the compressor on and off while driving. More on this at a future date.....

I would definitely recommend this modification to all."

The idea of this mod is simple enough: provide a switch to enable operating the climate control system without the compressor when cooling is not needed. John Napoli says, "You are basically adding a switch in series to the inline fuse for the compressor located on the transmission tunnel near the air flap linkages." The wire in question is a GN wire.

Note that operating with the compressor off will not only result in no cooling, but will eliminate the ability to dehumidify as well. In high humidity situations, you will probably need to turn the compressor back on to prevent window fogging and other humidity problems. You will definitely need it on if you use "Defrost" mode to clear condensation on the inside of the windshield.

Also note that operation of the system in hot weather with the compressor off might cause the "Auto" mode to increase fan speeds, since it's trying to cool and the servo is moving to ever more powerful cooling modes to try to lower the temperature. However, normally the occupants will want to switch the compressor on long before this happens. Even if it did happen, it's simple enough to switch to "Low" mode.

The stock system will shut off the compressor under either of two conditions:

1. The air coming through the evaporator coil is too cold
2. The system is calling for max heat

Hence, the Napoli mod should not actually increase the heating capacity of the system. When max heat is needed, the compressor is off anyway. If this mod does

noticeably improve heating performance, there is something wrong in the control system. Adjust the flaps.

Gardner/Napoli Mod Combination

Tom Bernett was concerned about locating a profusion of switches in his XJ6. "If you combine both of these mods on the same switch (double pole, the circuits must be kept separate!) you can eliminate one of the switches and simplify operation. In one position the switch would make both the Gardner and Napoli circuits (just as in the factory configuration), in the other position the switch would break both circuits (invoking both the Gardner and Napoli mods). Here is the way this works under the 3 main operating modes of the A/C system:

A/C System Off. The normal factory system configuration includes vacuum solenoid energized (fresh air flaps closed), and no power to compressor of course (except late XJ-S convertibles). If you open the combination switch (Gardner and Napoli circuits), vacuum solenoid loses its ground (fresh air flaps open). Napoli circuit has no effect since there is no power to compressor anyway. If you close the combination switch, the vacuum solenoid closes fresh air flaps (just like factory configuration), and makes the Napoli circuit (which has no effect since the A/C system is off and no power is available to the compressor).

A/C System On. Normal system configuration (except at full cooling) includes vacuum solenoid de-energized (fresh air flaps open), and power available to compressor. Opening the combination switch cuts power to the compressor (just like the solo Napoli switch), and has no effect on the vacuum solenoid which is de-energized anyway (except at full cooling, see below). Closing the combination switch allows power to the compressor, and makes the circuit for the vacuum solenoid (which is de-energized anyway so there is no effect).

A/C System in Full Cooling. At full cooling the combination switch will be closed of course, so you'd have power to the compressor and the vacuum solenoid energized to close the fresh air flaps for recirc and max cooling.

"As I said earlier, I'd rather not add another switch which isn't necessary and which requires additional thought and manual intervention (lessee... if I have the Gardner switch closed, should I open the Napoli switch, etc.?) It seems easier to say "I want fresh air only, open the combination switch with the A/C system off" or "I want everything but compressor, open the switch with A/C system on." or "I want normal operation, close the switch."

Bennett Mod

Tom Bernett explains his mod: "The Gardner mod opens the fresh air vents with the system turned off. My mod disables the fans and compressor with the system turned on. So I have fresh air and control of cabin temperature using the temp control knob.

"My mod requires switching open two circuits; one at the Water Valve Temperature Switch, and another at the feed to the Water Temperature By-Pass Switch in the servo unit (the brown wire at connector P2 near the servo)." Bernett describes how to test this operational mode by merely disconnecting two wires, so you can decide for yourself if you like it well enough to go ahead and install a switch:

1. Remove the left hand console side casing and the under scuttle casing. The Water Temperature Switch is located above the black foot well vent. It's attached to a water pipe and has two connectors attached to it. One connector has two brown wires, the other has two brown w/ yellow stripe wires. Undo the connector with the brown/yellow wires.

   gypsy adds: This disables the blowers and compressor in heating mode.

2. Remove the right hand console side casing. Find connector P2. It's located down low and aft. It's a circular white connector, maybe an inch in diameter with about 10 wires. Cut the brown wire between the connector and the servo unit. Cut it in the middle so you'll be able to connect to it later. ***Careful***, don't cut the brown/yellow wire by mistake. You want the solid brown one.

   gypsy adds: This disables the blowers and compressor in cooling mode.

"That's it. Try it out. Turn the ignition on and the mode switch to Auto. If you have the Gardner and/or Napoli mods, switch those off. The servo unit should respond to the temp control knob, the blowers and compressor should be off, and if you're moving, fresh air, conditioned according to the setting of the temp control knob, will be flowing through the dash and foot well vents. Defrost position on the mode switch should still function.

"Why it works: The system is designed such that the heating mode is disabled (no blowers or compressor) until the coolant comes up to temperature. This prevents a blast of cold air in your face when you first start the car on a cold morning. After several minutes of running, the coolant warms up and the system clicks into action. This is controlled by the Water Temperature Switch. This switch closes when the coolant reaches 40°C/103°F and allows the system to operate normally.

"Now, just as you don't want a blast of cold air in a cold car, you do want a blast of air immediately when you start up a car that's been sitting in the sun on a hot day. This is accomplished by a Water Temp By-pass Switch and some fan switches in the servo unit. These are powered when the system is in cooling mode no matter what the

coolant temperature is. So they override the above Water Temperature Switch. These switches are powered via the brown wire at connector P2.

"So, opening the circuit at the Water Temperature Switch disables the blowers and compressor in heating mode, and cutting the brown wire at connector P2 disables the blowers and compressor in cooling mode. In both modes the temp control knob, in-car and ambient temperature sensors, servo motor, fresh air flaps, etc. still function.

"All that remains is to come up with a convenient way of doing the above switching. I'm presently operating the mod with a double pole toggle switch. Opening the switch shuts down the blower fans and A/C compressor, but still keeps the fresh air flowing and the temperature control knob and servo unit functional. Close the switch and the system goes back to normal operation.

"I envision using this mod as my on/off switch. I'll leave the mode switch in Auto, and this switch open in all but extreme conditions. When I need max heat or A/C, I'll close my switch and the system will operate normally with both blower fans and A/C compressor."

Switches

Kyle Chatman Recommends an Alternative Switching Arrangement
"*I would like to share my method of adding switches with which I am pleased. I bought mini toggle switches and mounted them on a plexiglass "table" that fits inside the ash tray. (By table, I mean a flat top plate and two supporting plates, one near each end with holes drilled through for the wires.) With the plexiglass mounted flush against the underside of the chrome cigarette supporting piece (piece with funny dish- shaped support), the ashtray cover can be opened and closed, without interference, as you prefer."*

gypsy adds
The chrome top part of the (removable) ashtray can be slid off the bottom ashtray part. Exercise care so you don't bend either part. Separating these two pieces allows you to mount the switches below the chrome top piece, inside the ashtray part. However, I just removed the ashtray and made a "table" out of aluminum channel, stowing the ashtray in case I ever want to revert this. The ashtray holder/frame is about 1 5/8" deep by 1 1/4" wide and is open enough to allow the wires to pass though. My table is 4 3/8" long and is held in by the existing spring clip on the side of the frame. I have no trouble tightening the brace that Chatman refers to below. 3 amp, 125 VAC. 13/64" mounting hole sub-mini switches can be obtained from Amazon SPDT DPDT. I make no assertion that a 3 amp rating is sufficient. Make sure your switches do not get warm while conducting.

"*I usually leave it open because it looks James Bondish and my life can use a little safe and harmless excitement. My mounting has two switches because I added the modifications one at a time. Also, except for drilling holes in the ash can piece for wires to come through, there is no permanent change. Should not be a problem as even smokers leave their Jaguars to light-up, right? 8). The only "problem" I have is that I can't tighten the brace that holds the ashtray firmly in place. The location is perfect for shutting-off the compressor when the AC is on to leave traffic lights more quickly, to attack that hill more forcefully, or to pass that car more safely. I also suspect that a car thief would at least think twice about taking the car or radio. Let me know if you want to try it but don't understand my description.*

"

Greg Price:
"*I just finished performing Tony Gardner's fresh air mod on my '85 SIII XJ6. Everything works as specified. I routed two wires from the "AISIN" solenoid to the master electrical switch (the top center button on the console). Now the master electrical switch operates my fresh air vent, instead of locking the window buttons. If you do this, you will need to jumper the two wires you take off of the master electrical switch, or your windows won't operate. Thanks a bunch, Tony!!!!*"
