# Heater Valve

Ring-spanner modified by grinding away part of the ring to be able to fit the bolt heads with replacement valves:

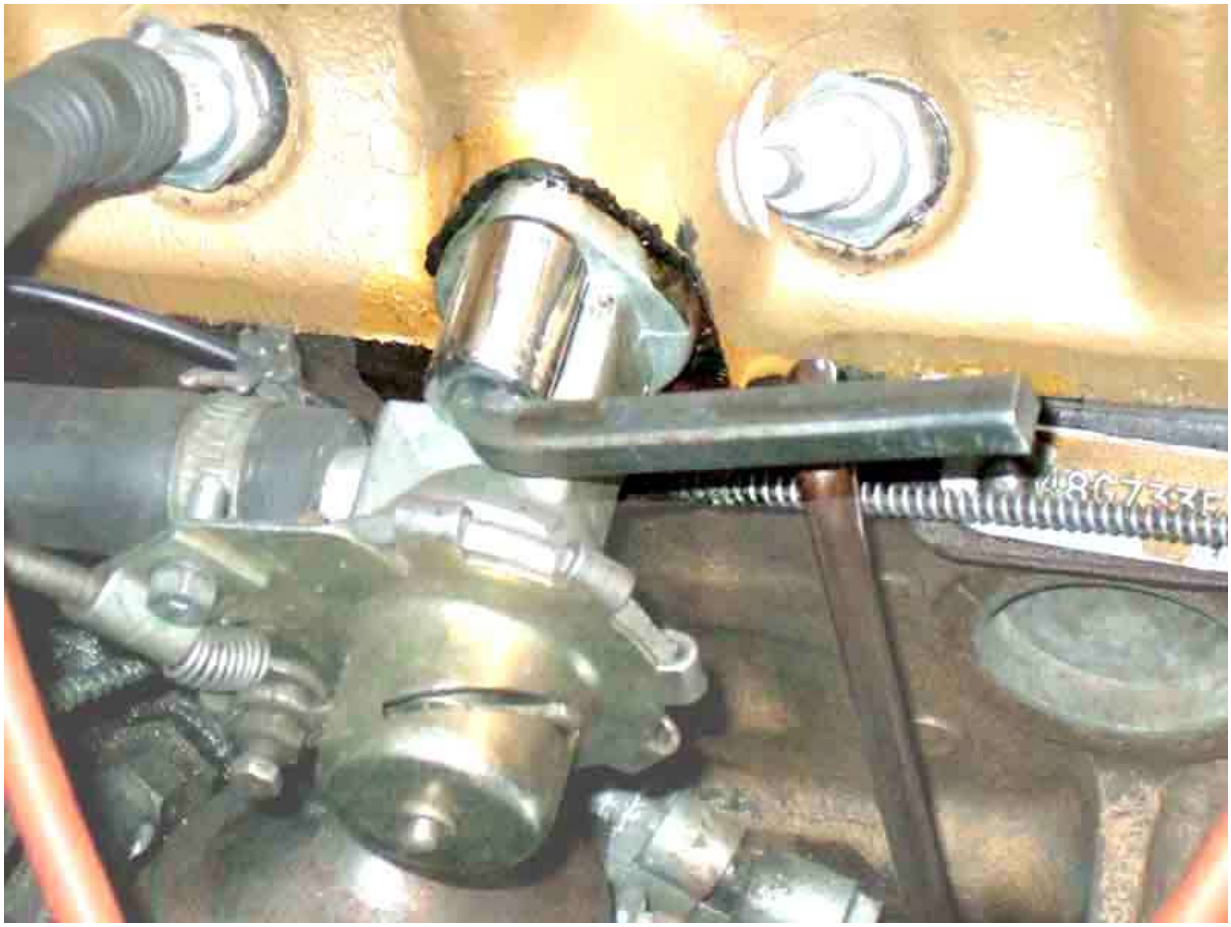

Door handle spindle (7mm or 8mm will suit) with 1/4" drive 7/16" socket:

Bent to shape:

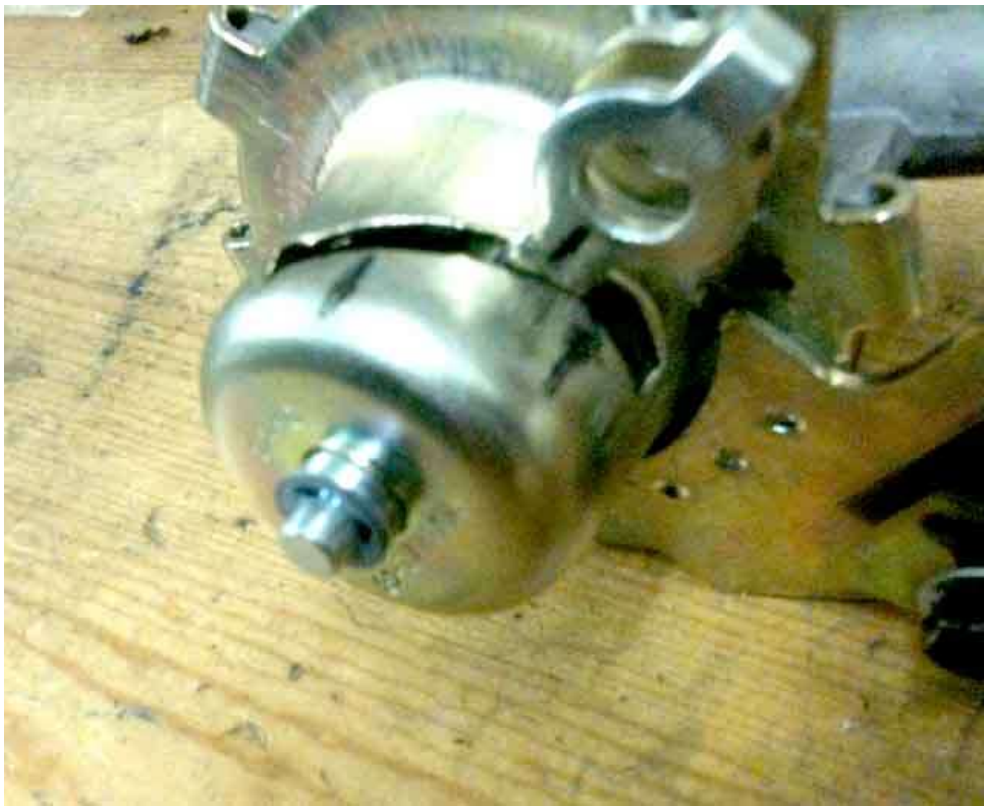
Filed to size and cut to length:

Fitted to socket (also suitable for seat runner stop blocks):

Just the job:

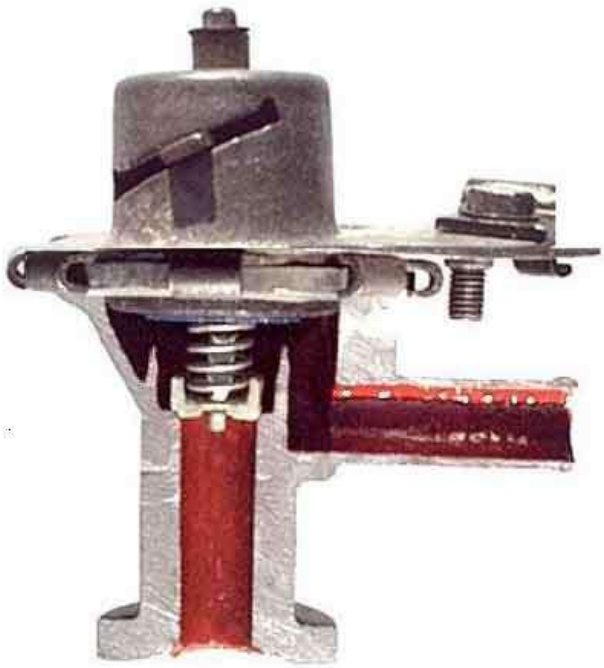


Marks showing the fully open (from a maximum flow point of view) and fully closed points of Michael Beswick's new valve:



Possible 'summer' and 'winter' settings - 'summer off' on the left, then 'summer on', then 'winter off' and lastly 'winter on' on the right. However as previously said the valve has to be moved quite a bit towards 'off' before the heat from the vents starts to reduce:

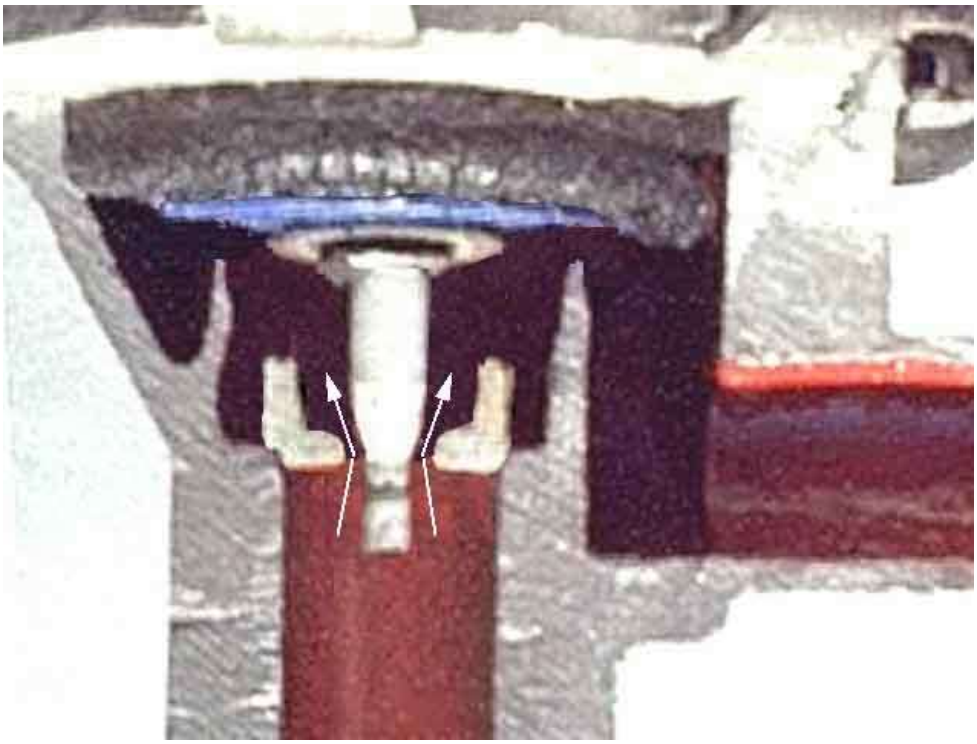
A sectioned original valve:



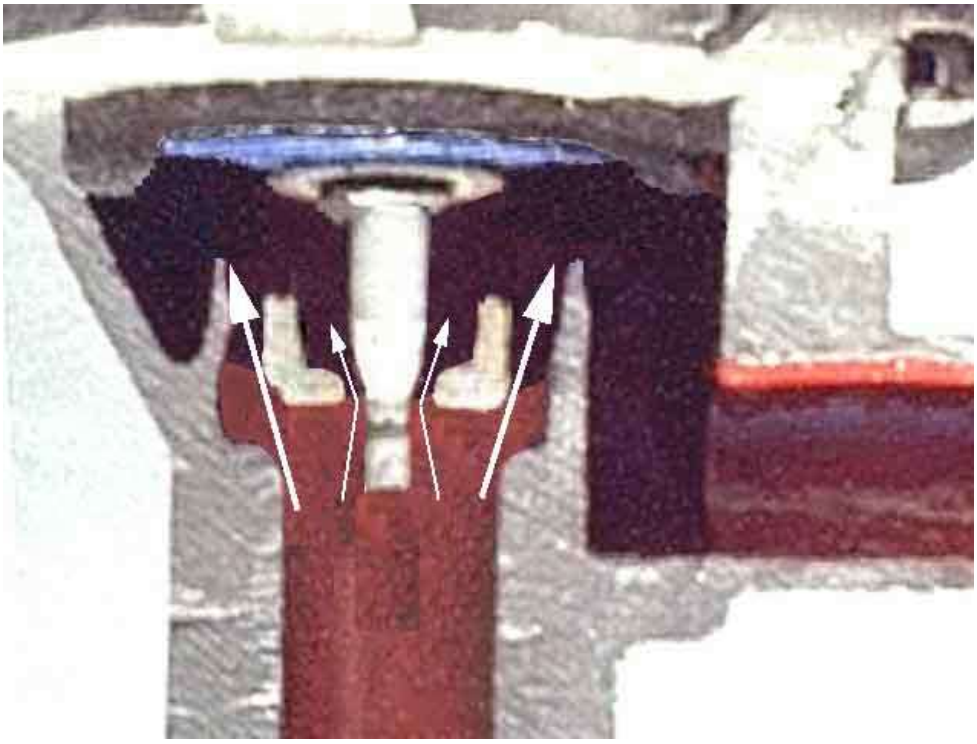
If you look at Bob's drawings he depicts his pin as straight and fairly close-fitting through the centre of his cup, whereas the picture below shows my pin is tapered, and the hole in the centre of my cup (yellow and partly cut away in the inset) is much bigger. No circlip was fitted to my pin, it may have corroded away, certainly the cup and its seat were quite heavily corroded. It doesn't seem to need a circlip, the spring is a push-fit onto the diaphragm and into the cup and so lifts the cup off its seat as the valve is opened more than half-way. The pressure of coolant flow from the water pump will also tend to open the coarse-control valve as spring pressure is relaxed:

The first stage is the rubber diaphragm (blue in the picture below) which presses down on the end of the 'pipe' the cup sits in, to completely prevent any flow - the shut-off. As well as this the cup is sitting on its seat (coarse control) and the widest part of the pin is in the hole in the cup (fine control):

As the valve begins to open the blue diaphragm lifts off its seat opening the shut-off, but the cup remains on its seat so the coarse-control valve is still closed. As the pin, attached to the diaphragm, rises through the cup the taper narrows giving a very gradual increase in flow through the valve. This image shows the valve about half open (operating lever about mid-way in its travel) with the fine control fully open but the coarse control still closed:



The third stage is where the valve opens sufficiently to lift the cup off its seat and coolant begins to flow past it giving a rapid increase in flow - the coarse control. The fine-control valve is still fully open and the diaphragm valve is now fully open and the maximum flow is passing through the valve:



If you imagine that that coolant only flows past the raised cup and not through its middle then you would be right in thinking that the first half of valve travel, whilst opening the shut-off valve, does not allow any coolant flow and so is wasted movement, plus the valve won't open as far as it could. Adding washers **will** cause the pin to start lifting the cup valve off its seat almost as soon as the diaphragm starts moving and so give earlier flow as well as a greater maximum flow, but the washers will block the fine-control valve altogether which will result in there being very little control movement between OFF and HOT i.e. no WARM. Someone else has also opined that if the corroding away of the circlip is not uncommon you wouldn't want a bunch of washers circulating round your engine:

Kelvin Dodd of Moss Motors (USA) has posted this picture of a dismantled valve:

My most recent failure dismantled, the diaphragm is very securely attached to the spindle, not separate as Kelvin shows:

A flange on the end of the spindle fits into a cavity in the diaphragm - partially removed:

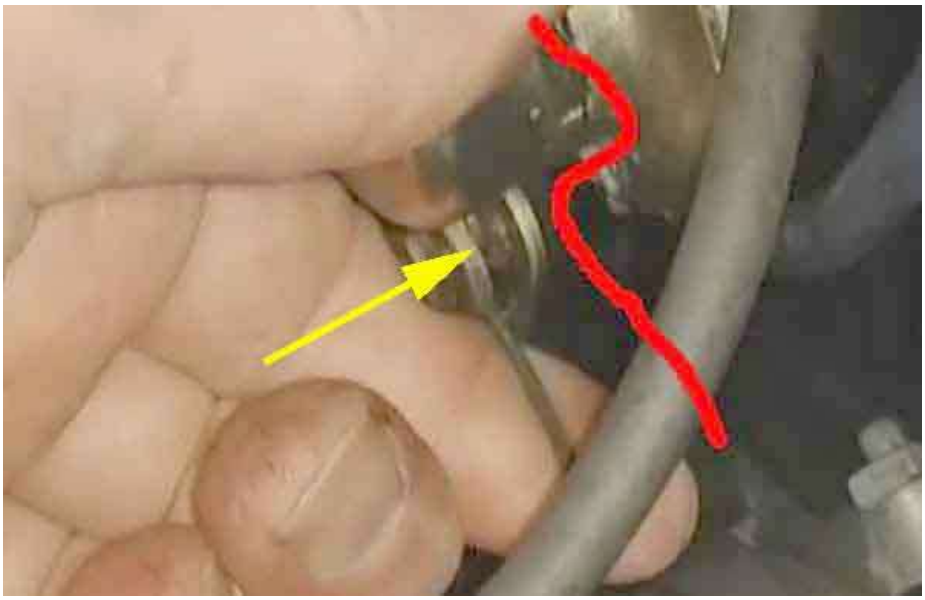
Fully removed:

Kelvin was of the opinion that failures from leakage could be due to the closed valve pushing the diaphragm tightly onto the seat, it sticking there, to be ripped as the valve was opened. But as Kelvin shows it that cannot happen if the diaphragm is not attached to the spindle. I had to fully dismantle the upper part of the valve and lever the spindle flange out of the diaphragm as it was tightly fitted. Maybe Kelvin's being new and perhaps softer rubber it pulled apart without the extra dismantling. But even then unless the diaphragm rips right through at the seat, and that is the thickest part, it would not leak, and mine have split in the bellows section between the seat and where it is clamped to the casting.

A 'push-off' spring on the cable between the outer and inner clamps. This is nearly fully compressed when the valve is closed ...

... and taking up about 4/5ths of the space when the valve is open. If the spring were stretched out to have a longer free length then it may well push the valve open even more. Some people get hot under the collar (boom boom) about getting the valve fully open, but on both my cars you have to close the heat control beyond WARM i.e. more than half-way before getting any noticeable reduction in heat output so I really don't think it is necessary:

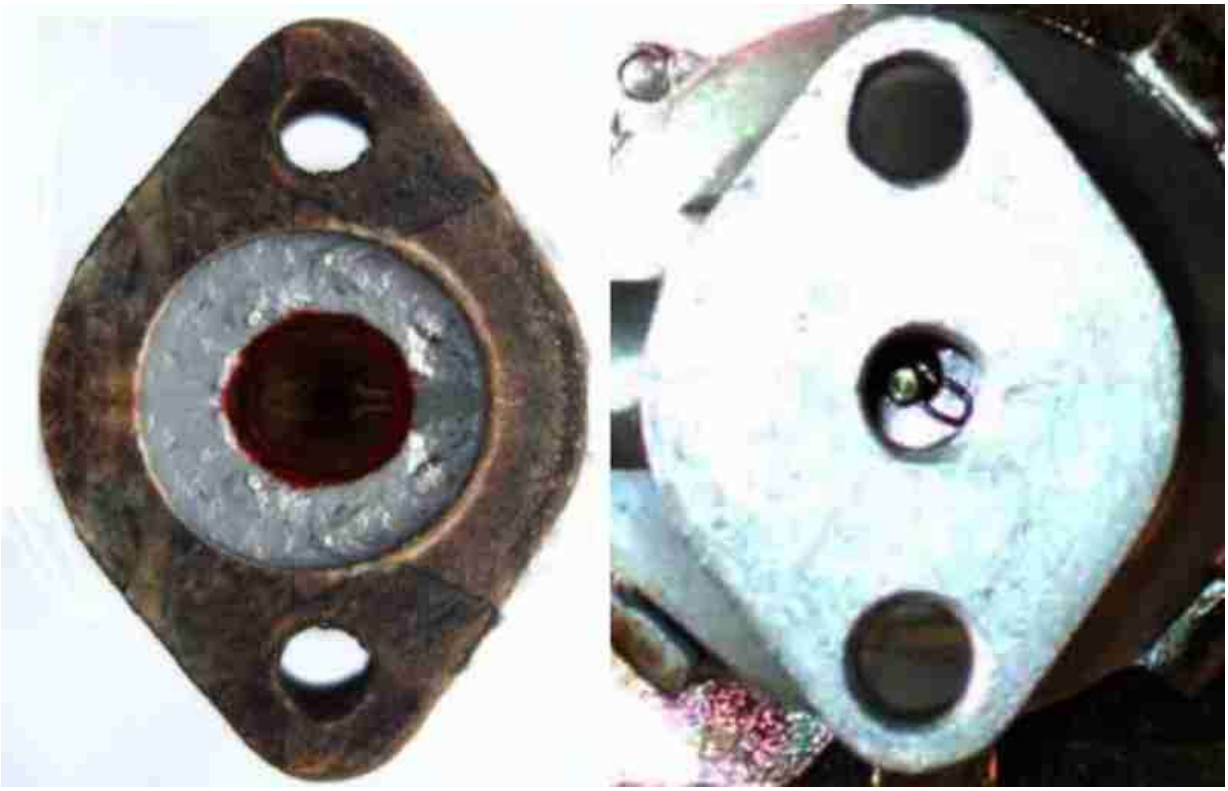
The two pictures above show the correct trunnion, but here a different type has been used with a clamping nut which has allowed the whole thing to turn while tightening the nut so bending the solid inner wires into an 'S' shape. It's just possible to see (arrow) how the inner is bent at a 90 degree angle to go down through the hole in the trunnion, then bent back up at another 90 degree angle underneath, as the red line depicts. This prevents the inner from being removed: *(Bill Etter)*



Trunnion kit 24G1482K should be used in this position, the hex on the body allows it to be held still while tightening the screw, which will prevent the inner being bent into that 'S' shape: *(Moss Europe)*

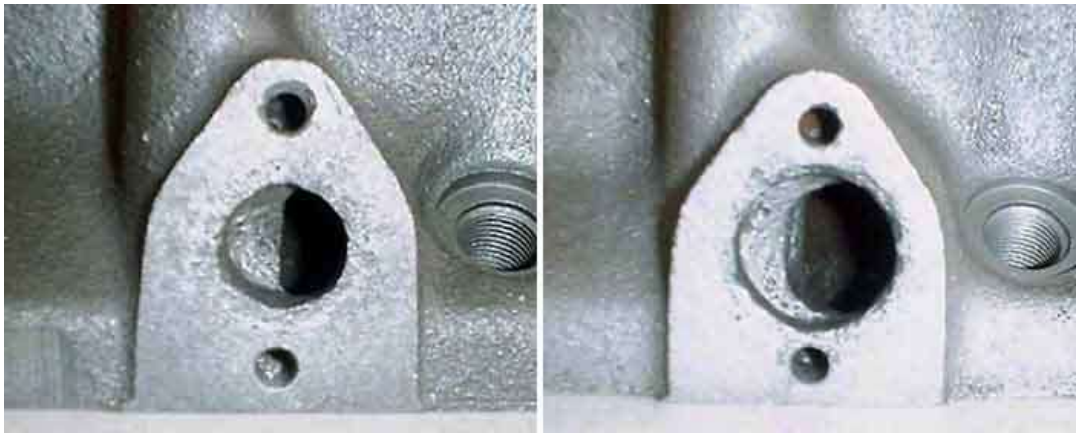

The correct gasket laid over the flange on the heater valve. The hole in the gasket is about the same size as that in the head, with that in the heater flange being very much smaller. This greatly reduces the available area to clamp the gasket and form a good seal. It also allows corrosion to develop on the face of the heater flange which can 'burrow' under through what clamping area there is to cause a leak:

The inlet port on the replacements that have been available for some years has got noticeably smaller when compared to an original that had inlet and outlet the same size, as well as the body getting fatter so you can't get a ring spanner on the screw heads:



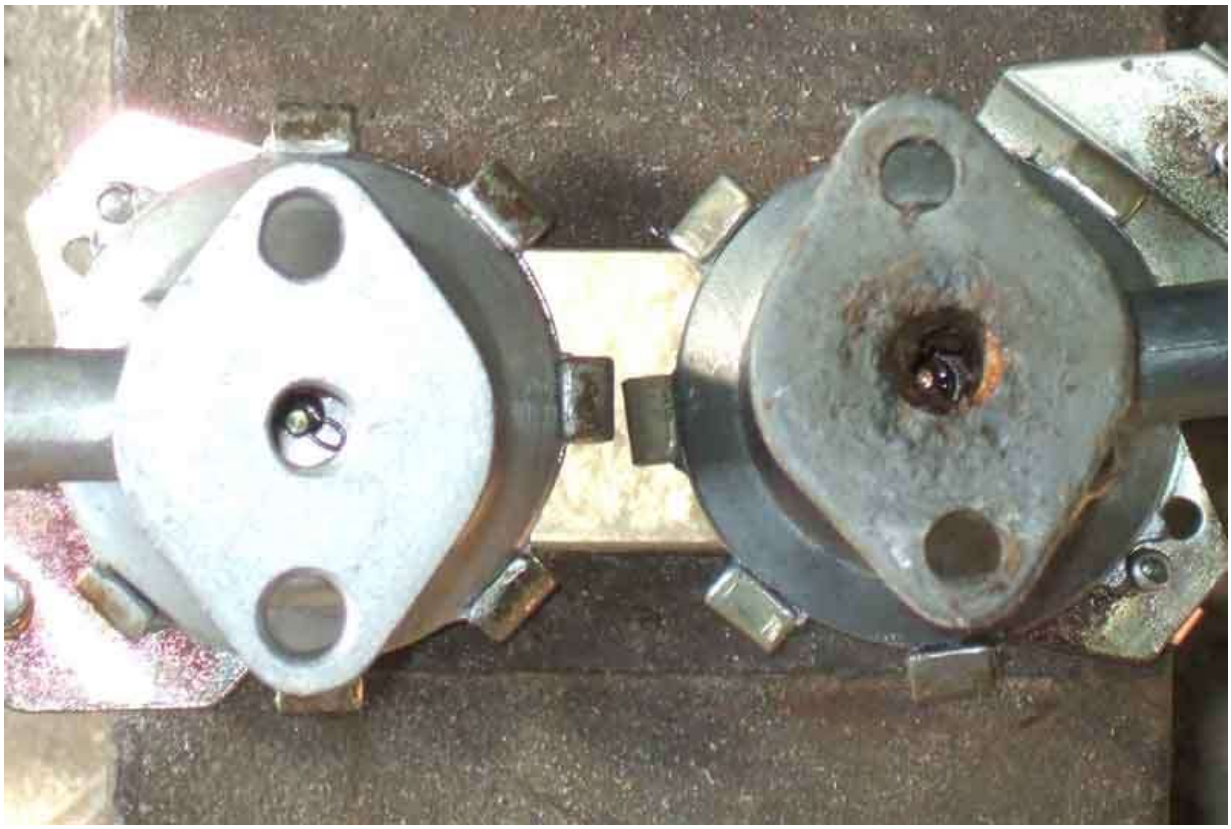
Moss Europe show two 4-cylinder valves one with the original part number (£18, left) and one classed as 'aftermarket' with a Z suffix (£15 right), the difference seeming to be that the aftermarket has a chamfered inlet, and maybe a rougher texture:

Heater ports in 'early' (left) and later (right) heads, from Sean Brown's *Flowspeed.com*. Sean dates the change to the 12H-2923 head introduced in 1972. British Automotive agrees and says they were fitted to 18V584/585/672/673 engines, although Clausager dates those engines to August 1971 i.e. the start of the 1972 model year. Both the above web sites refer to North American engines only, although the Non-NA 18V581/582/583 engines were brought in at the same time, Clausager lumps all the 18V58n engines together so one can assume UK engines are the same. My 1973-model 18V582 is like that, although it is a Gold Seal replacement engine (albeit the correct equivalent) so could have a later head anyway. Sean Brown attributes the change to making it easier to remove casting sand. As far as I know only the 'later' gasket with the large hole (12H3868) is available, indeed that is the only one listed in the Parts Catalogue:



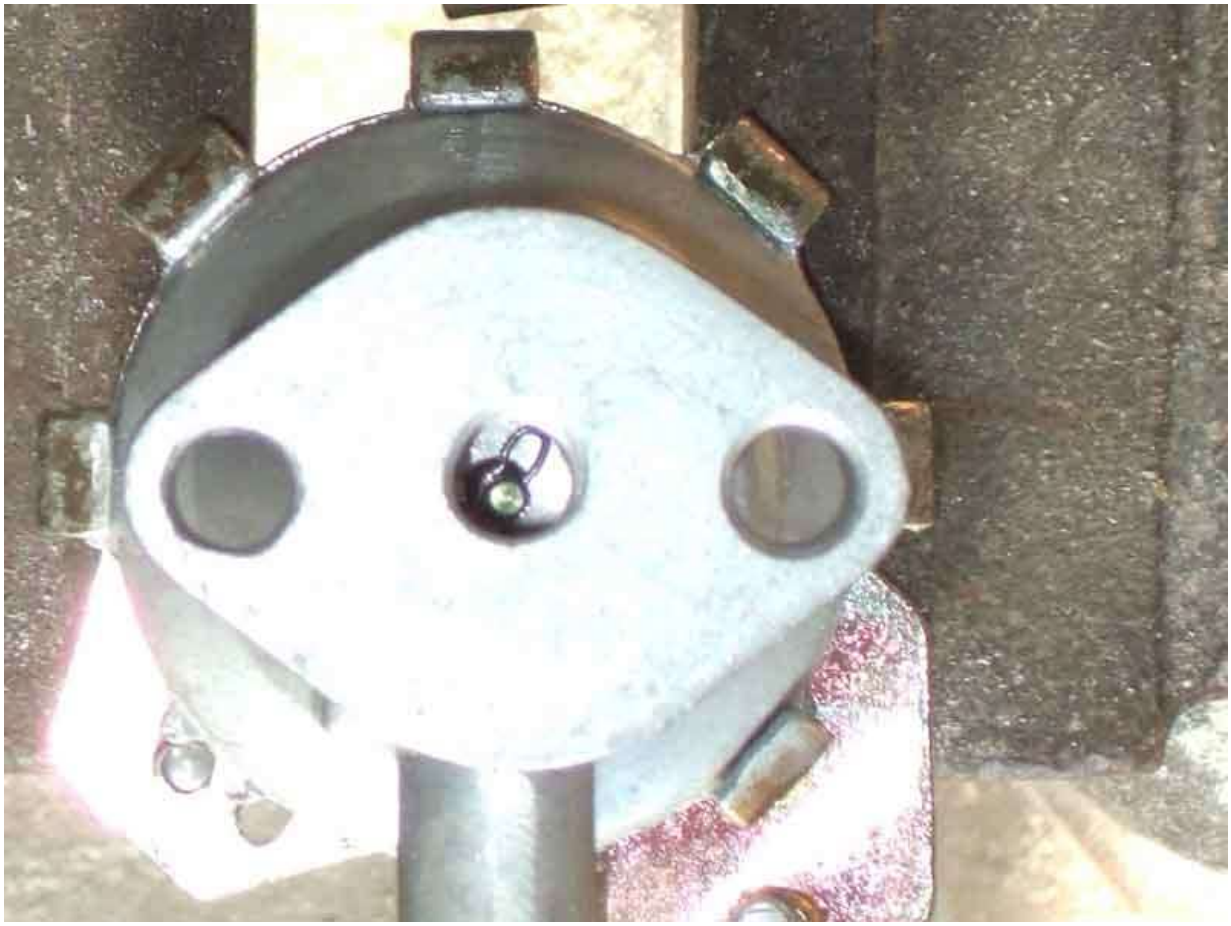
**April 2011:** Small tear in one of the folds of the diaphragm in the nine year-old valve. What this shows is that with the valve fully closed the diaphragm will still leak coolant from the flow pipe to the heater matrix. But if you remove that hose from the valve and block it off with, say, a spare spark plug and the clip then you should be leak free:

The new (left) and 'nine year' valve showing slight corrosion on the face of the flange ...



... and also the seat the rubber diaphragm closes onto to fully cut-off flow (arrowed):

Wire spring-clip on the new valve ...

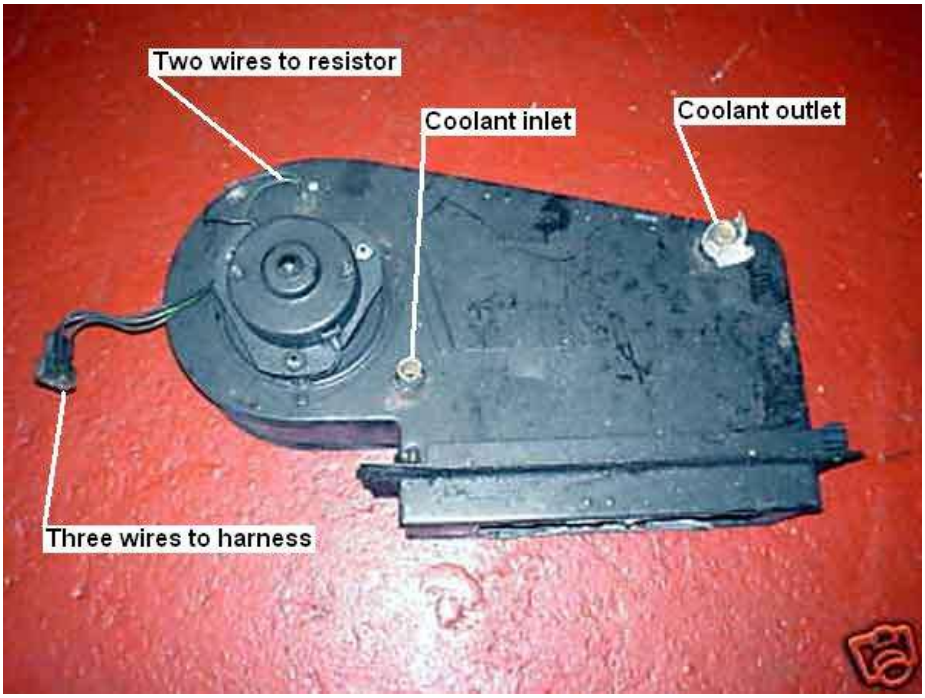


... and circlip on the old:

New valve with the lever fouling the rivet:

# Heater Unit

The heater unit. This is a 77 and later version with the two-speed resistor fitted inside the heater unit. The earlier single-speed is much the same but without the resistor wiring and just two wires connecting to the main harness with bullets instead of a 3-pin plug and socket. (Image from Paul Depper)

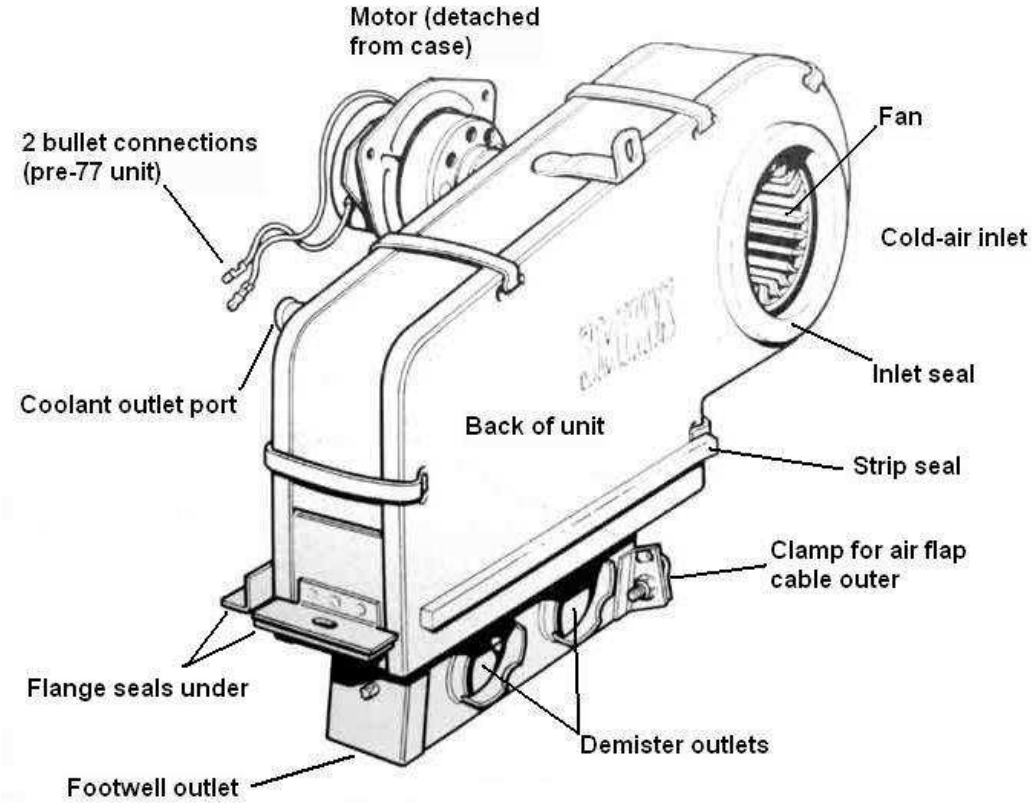



People have wondered why the inlet is at the bottom and the outlet at the top when natural convection works the other way. That's because the heater doesn't work by convection but by pumped flow, and the other way round that flow would have to push air downwards through the matrix when refilling a drained system. As it is the air rises as coolant is introduced and is flushed out without specialised bleeding techniques. The flow is sufficient to push the air along the return pipe above the rocker cover and down into the bottom hose, and from there to the top of the radiator.

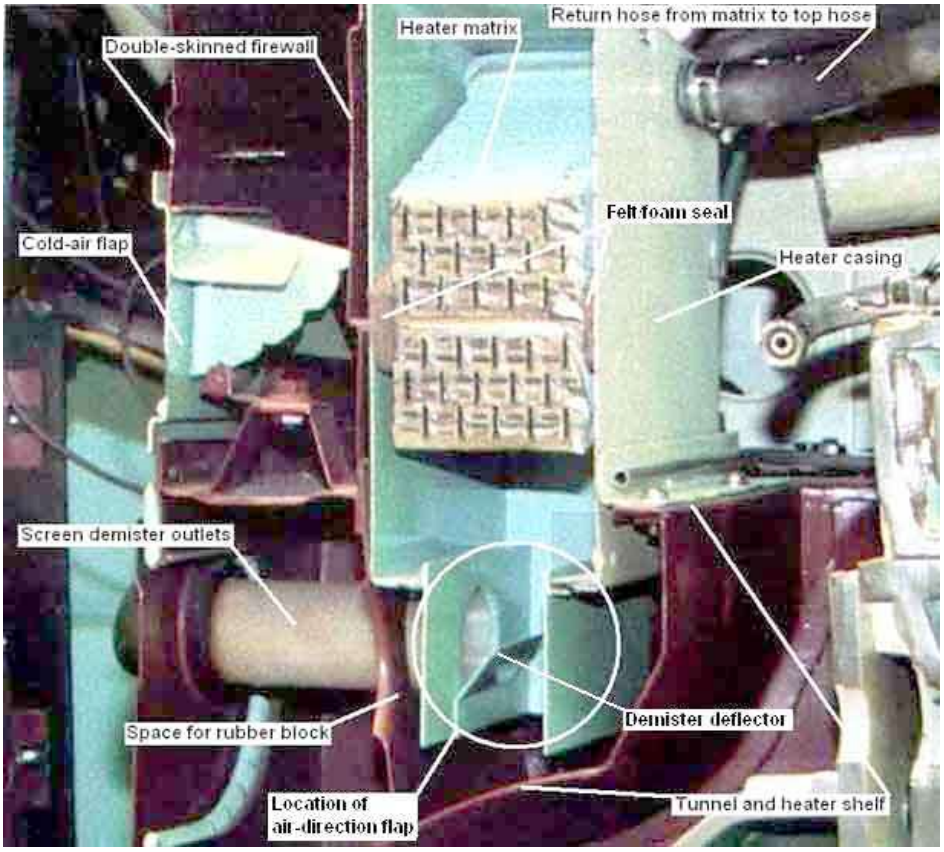
Resistor unit inside the casing of 2-speed heaters. (Photo from Ashley Hinton)


Back of the heater unit, pre-77 with just two bullets connecting the motor to the main harness. This is a very early unit, later units had a mesh screen over the cold air inlet to prevent leaves entering from the air-box and clogging the heater unit. The

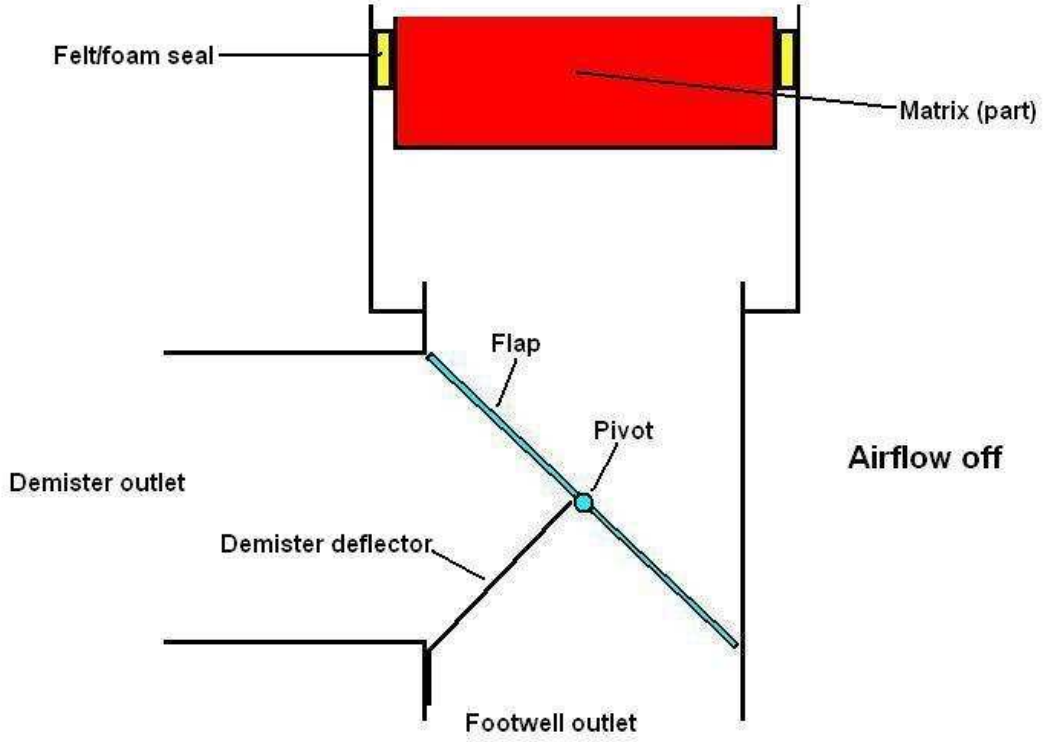
circular seal prevents fumes from the engine compartment being drawn into the passenger compartment, and gets the maximum benefit from the ram effect while moving. (Image from Leyland Parts Catalogue)



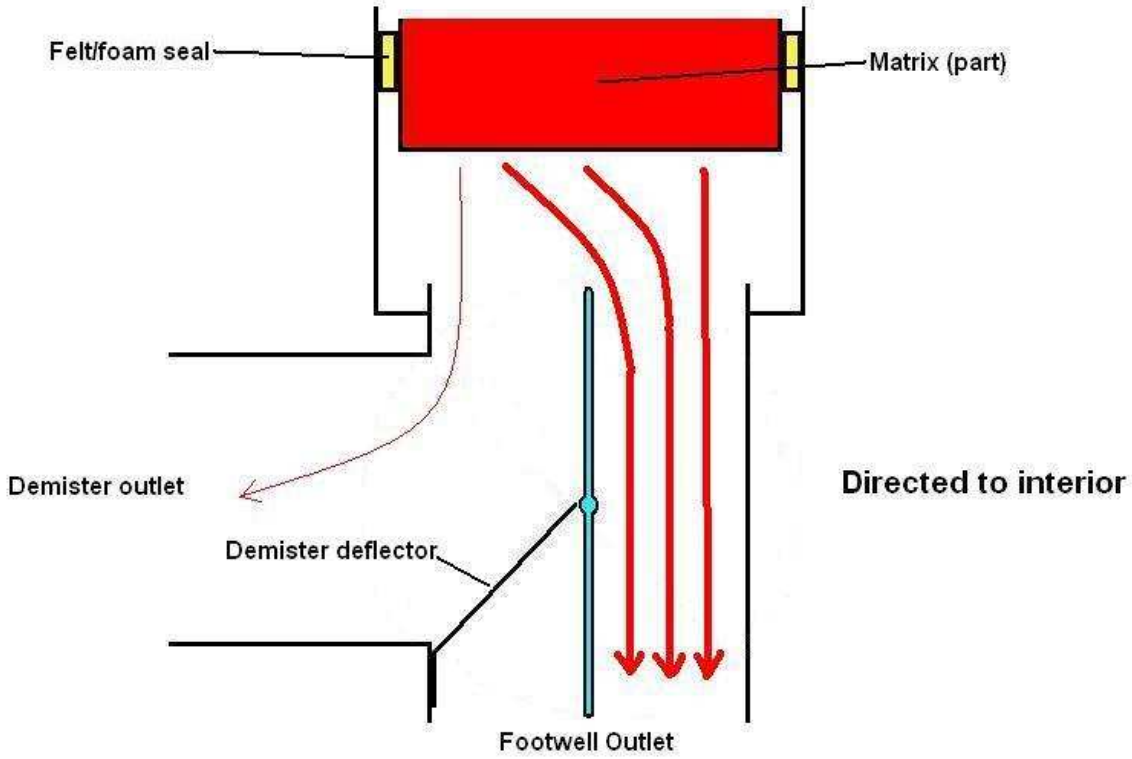

Clausager has this very useful photo of the Gaydon cut-away engine on page 62 which shows the heater tucked away in the corner of the picture. I've labelled it with its main components and the body structure around it, plus the separately operated cold-air flap. Unfortunately the air direction flap appears to be missing from the heater unit.



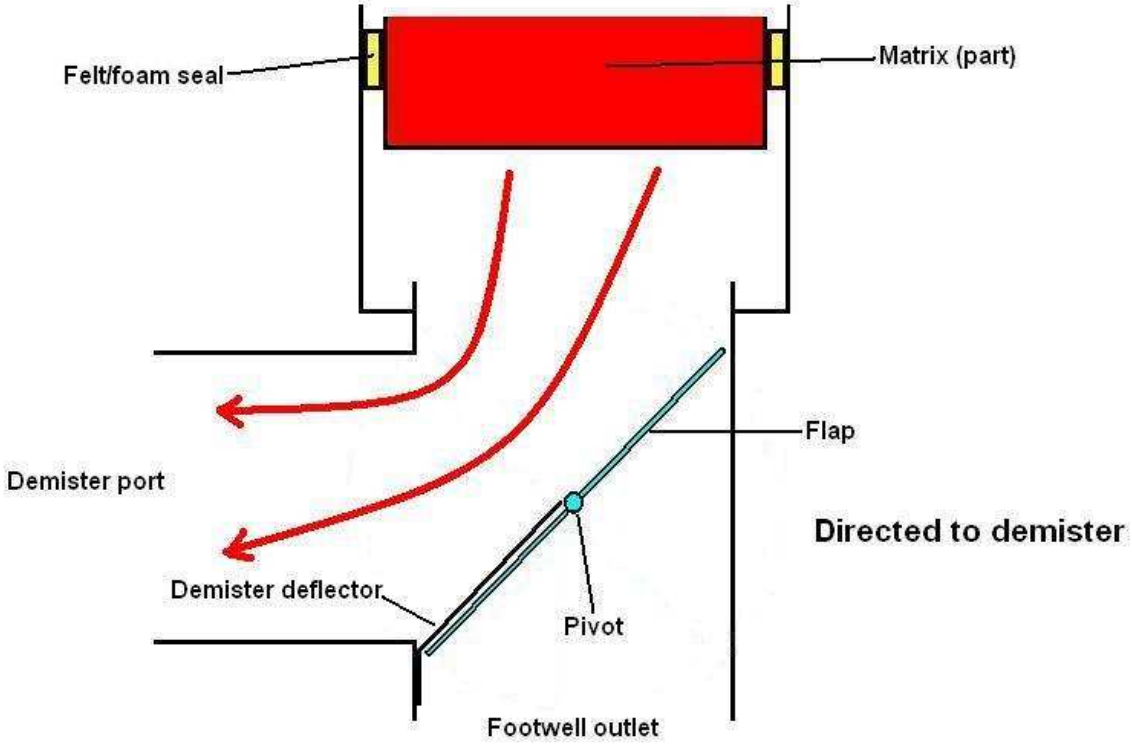

The next three pictures show how the air flap controls direction. In this position both demister and footwell vents are closed off.



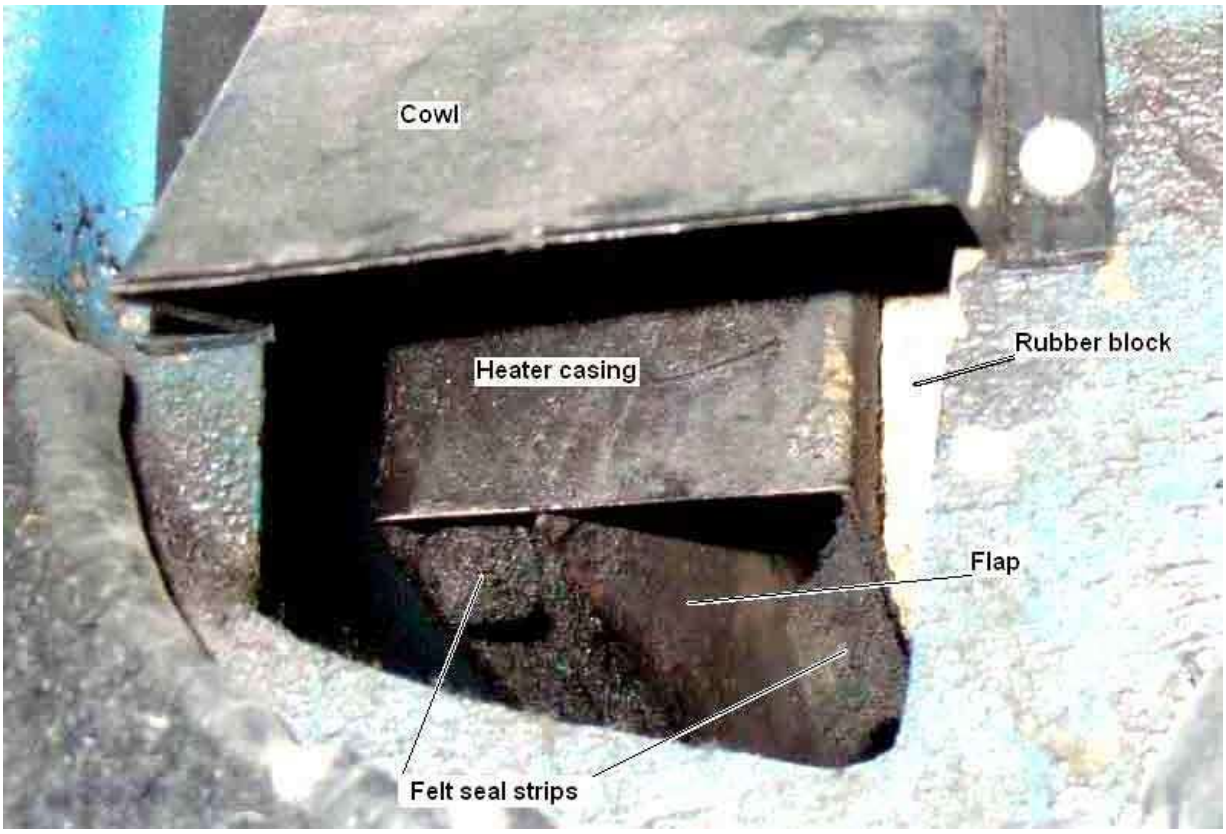

In the central position of the dash control the flap is straight up and down. On the face of it this appears to direct air to both demister and footwell. However the longer, narrower and more tortuous past to the demister means relatively little air escapes this way (it can be felt), the majority does flow to the footwell. The demister deflectors are only positioned immediately in front of the outlets, so either side of those air is going to go straight down anyway.




Flap turned to the other extremity closing off the footwell vent, all air being directed to the demisters. This begs the question of why the demister deflectors are there at all, as the flap in this position makes them redundant. You could say that they found some air to the demisters all the time was beneficial in keeping them clear, and the deflectors were needed to make sure some got through. But that is surely asking a lot for BL/Smiths in the 60s!



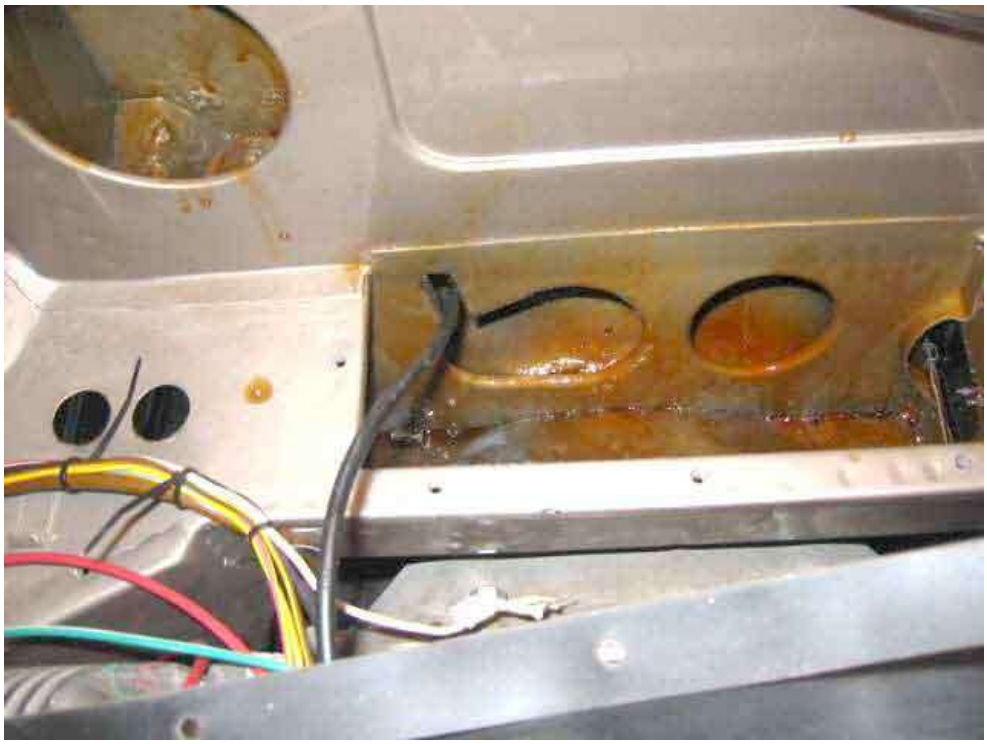

The passenger side in the V8. The flap is shown in the Interior position i.e. more or less straight up and down. You can also see some felt strips which are beginning to come adrift.



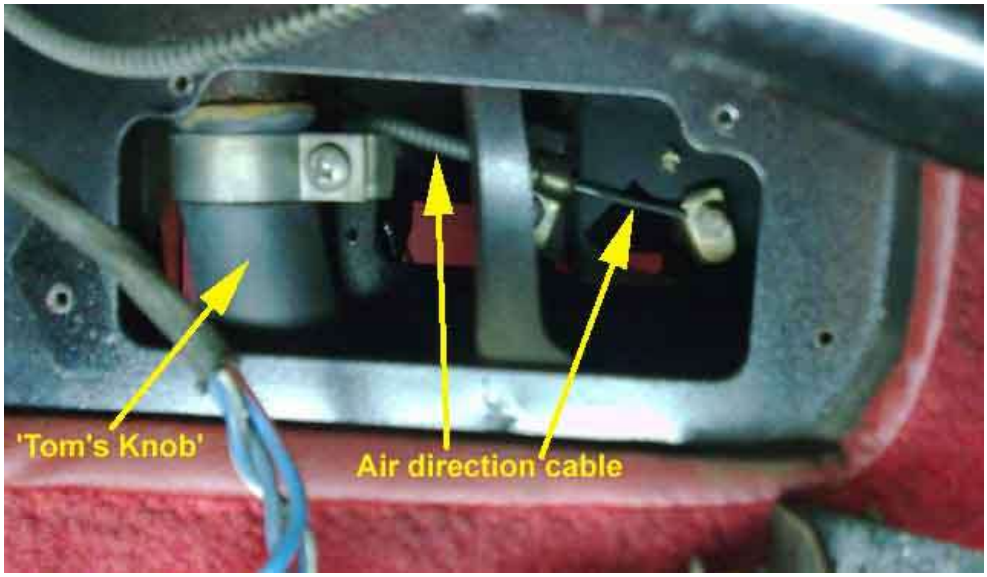

Mk1 roadster showing the screen demister outlets on the heater unit, air direction cable to the right, support plate for straight pipes and flexible hoses removed (*image from Dave O'Neil*). This 'egg-shaped' hole for the right-hand demister tube and direction cable makes it very difficult to fit the heater with the cable already attached to the heater unit.

Unlike this later arrangement with the separate tall slot, possibly from 1970 or 71 when changes were made to the heater ducts. This also clearly shows the recess for the rubber block that surrounds the demister tubes and cables ...

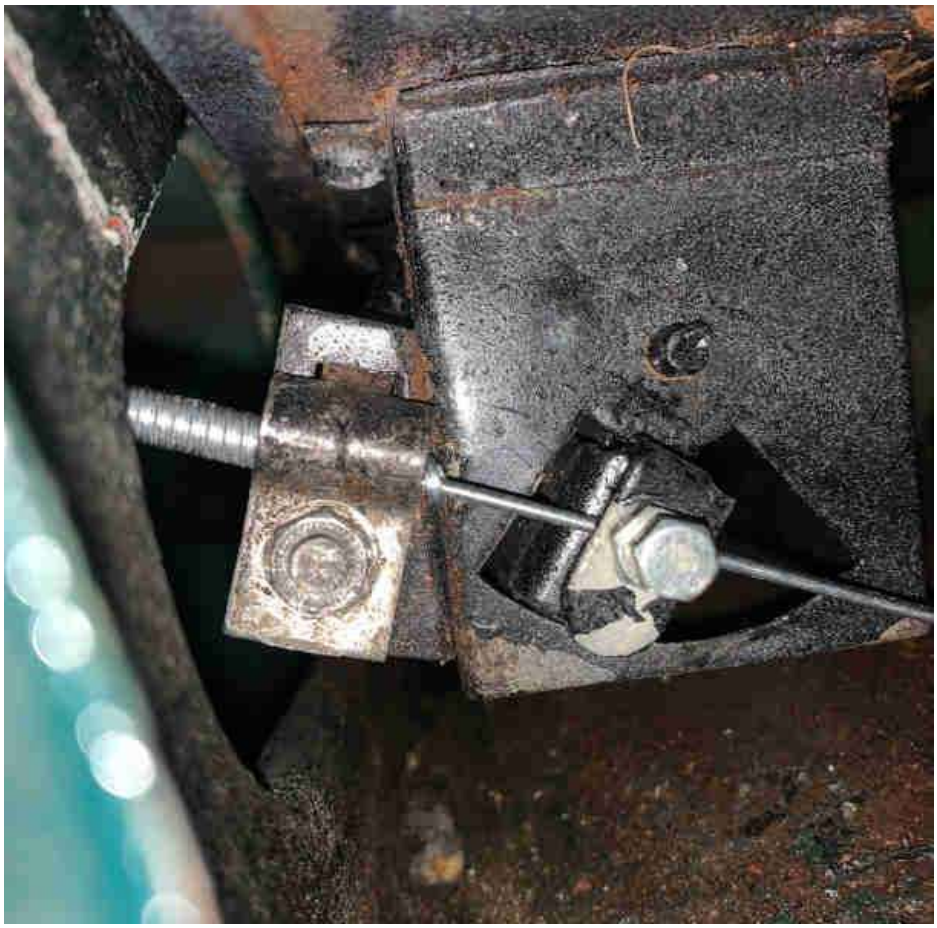
... compare with the earlier flat surface here. Cutting a slot up from the side of the earlier egg-shaped hole to where the top of the later separate slot is, to allow the heater unit to be refitted with the cable already attached. (*Chicagoland MG Club, scroll down to 'P.P.S. - Oct 09, 2003'*)



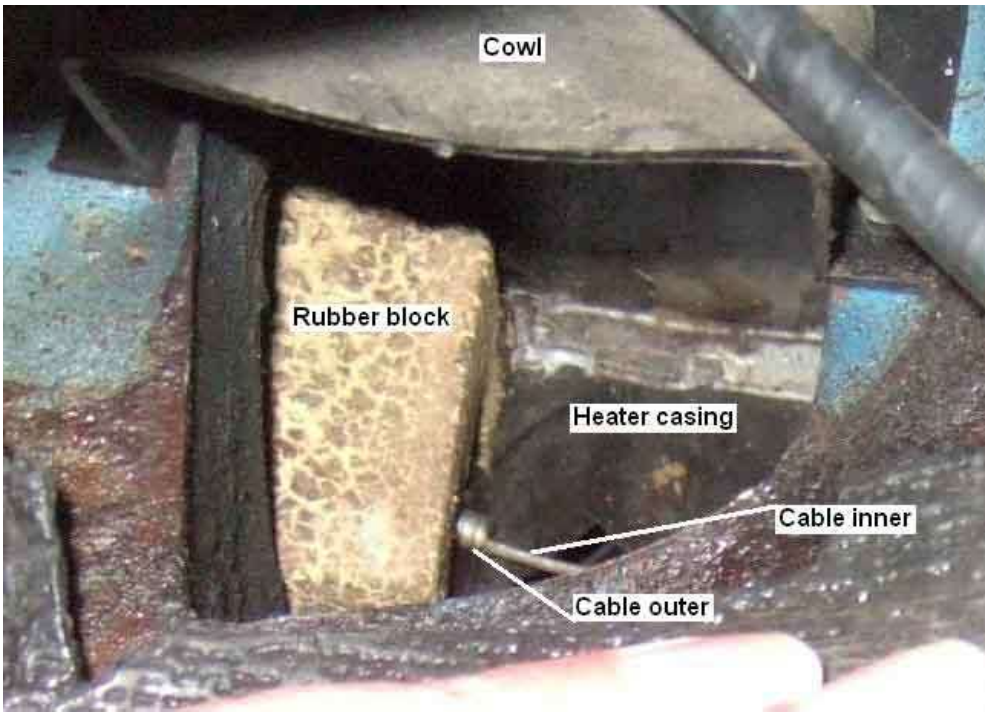
The off-side footwell and the cable for the air flap - earlier arrangement with the adjustable footwell vents. Just about possible to reattach the cable with the heater in position.




Another view from Pete Curtis. Pete writes "Definitely a two person job so had to rope in the youngest (bribed with a hour driving lesson) to adjust the cable inner from the dash end. Used a new cable which was much smoother and didn't have a kink like the previous photo where it had been secured previously. Using the magnifying app on the phone wedged up against the vent hole was much more comfortable than trying to wedge my head into the small space. In all I've probably spent about 4 hours trying to poke a wire through a tiny hole. My wife can't work out why I'm so elated now it's done. Thanks for all the advice." I suggested slackening the trunnion screw at the control end, withdraw the inner until the end was just short of the trunnion in the heater flap, then use long-nosed pliers to push the end of the inner through the hole in the trunnion. Someone else suggested using a nut driver to hold the trunnion in the correct position while doing that. Another possibility is to remove the pedals to give better access on an RHD. Once you have got the cover off (which can be tricky in itself) pre-77 cars only have a single pivot-bolt through the clutch and brake pedals so it is relatively simple to disconnect the clevis pins and return springs and withdraw the bolt towards the heater to lift out the pedals - I have certainly had Bee's clutch pedal out more than once that way:

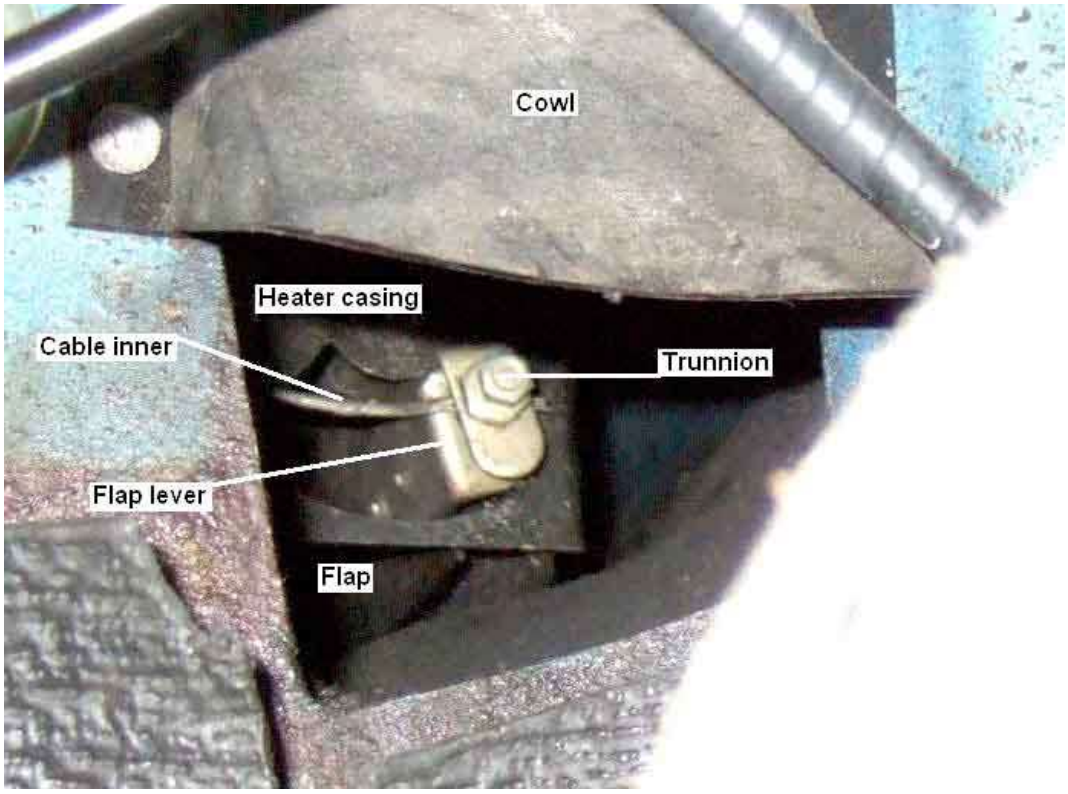


The later arrangement with the fixed footwell cowl and rubber block. It can only be shown in two separate pictures on an RHD as the pedals get in the way. Note the rubber block, the clamp for outer is covered by it, making undoing or fastening without cutting into the block impossible.



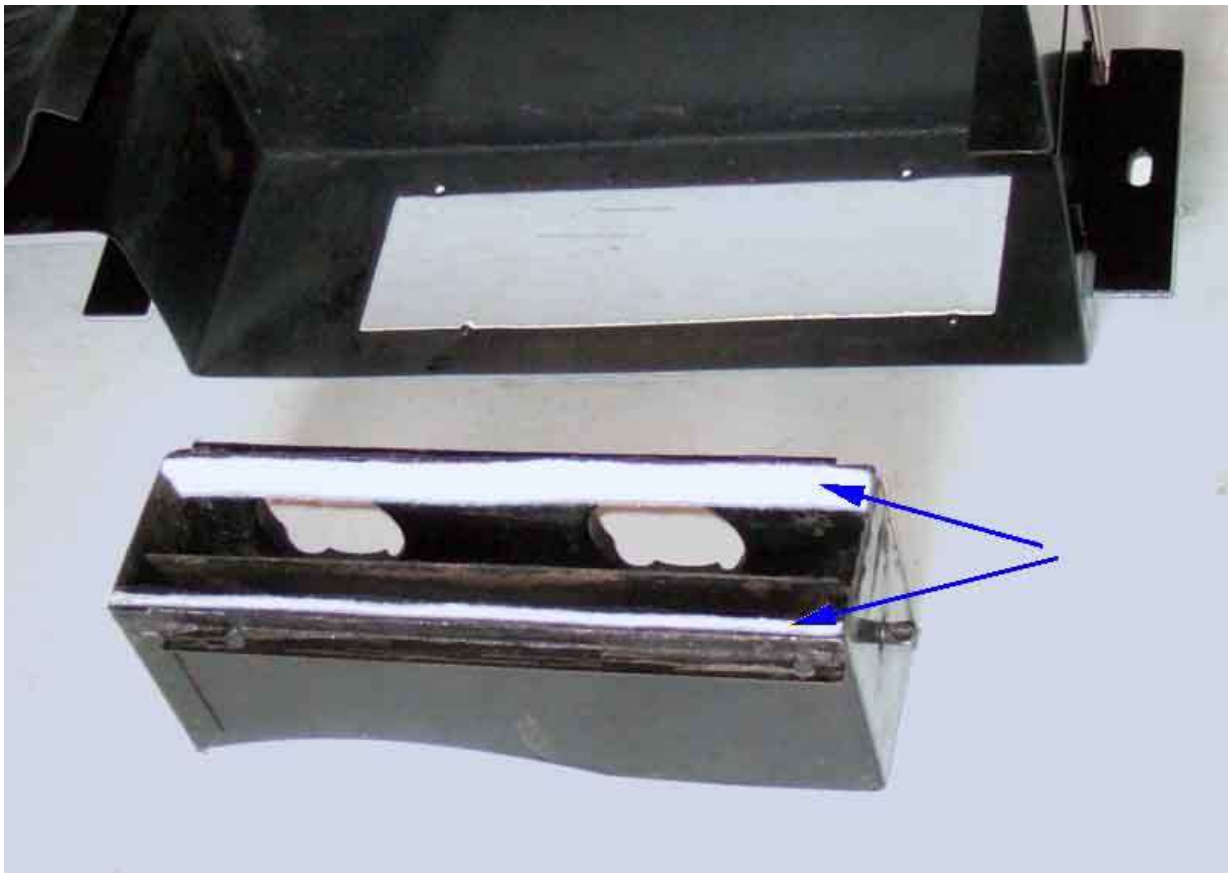

The inner fastening to the flap lever, shown in the Off position. This looks to be more accessible but I can only just get a finger-tip to it, although access would be better with the cowl removed. You would still need to manipulate the end of the cable with a pair of very long nosed pliers, and the trunnion with a nut driver on an extension, you wouldn't be able to see the hole in the trunnion, and the pedals on an RHD prevent you looking straight into the space! All in all a difficult proposition even if you were only replacing the inner. This seems to be a stranded inner, but logic dictates that it should be solid as it has to push the flap closed as well as pull it open, and there is no spring to aid closing. I must be fortunate in that this flap is very easy to move. Interestingly my mate Terry with a 73/74 reports that his also seems to be stranded as is my 73 roadster, whereas his replacement from the MGOC (original chopped off both ends when the heater was removed by a PO) is solid. I've come to the

conclusion that a stranded cable is fitted as these are much more flexible, as the cable has to cross from one side to the other behind the dash to get from the heater unit to the dash control.




Vee's footwell channel, with the felt strips loose and partly blocking air-flow. I removed six, which seems overkill, in one position there was one on the movable flap and another on the side of the channel it moved against.

The section that contains the air-direction flap is screwed to the bottom of the main case, so can be removed making cleaning and replacing the felt easier. I used 3mm felt from a hobby-shop and felt (ho ho) that four pieces stuck to both sides of the channel top (arrowed) and bottom was thick enough to form a seal with the moveable flap at either of its extremities of movement, with minimal restriction.



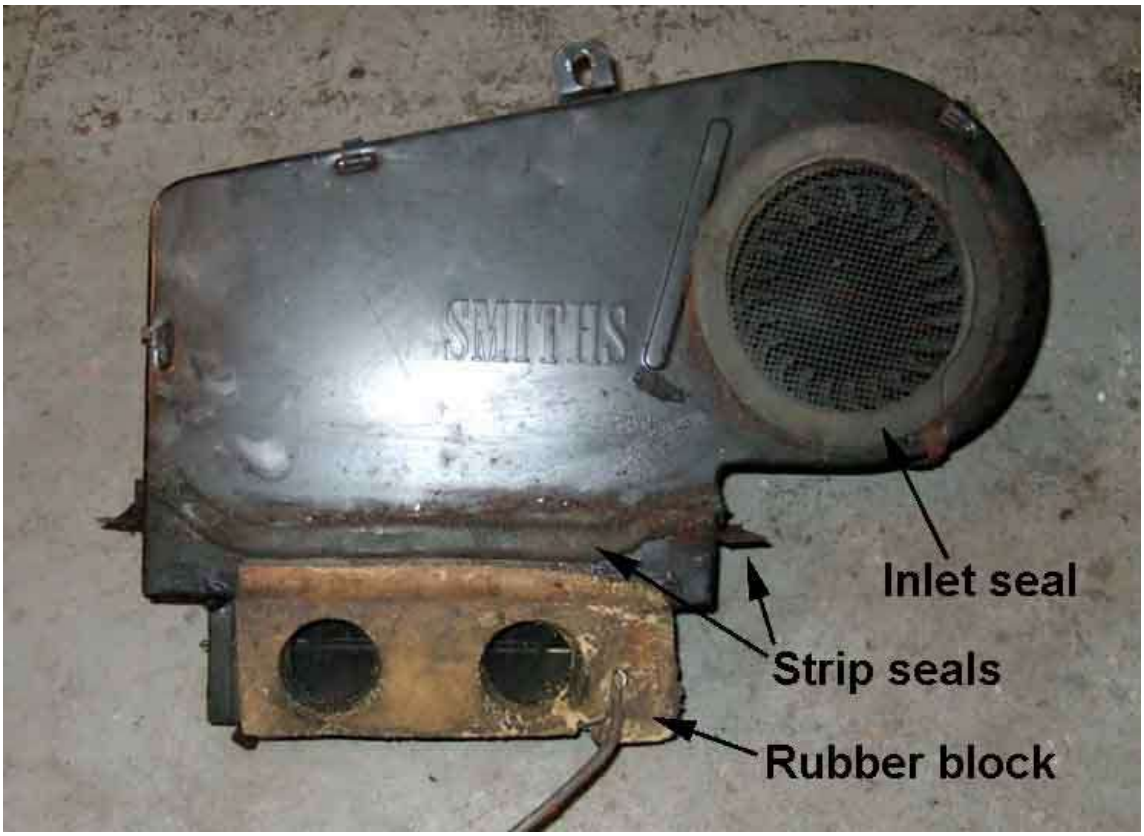
The foam seal that goes between the back of the heater casing and the bulkhead to seal the air inlet. *Photo from Ashley Hinton*. However this is low-density, the original is either rubber or high-density foam and more robust, so when refurbing Vee's heater I left it in place.

The seal around the matrix. Seals the ends as well as the sides, so air can only pass through the heater by going through the matrix core.


The grommets (7H1993) round the matrix ports

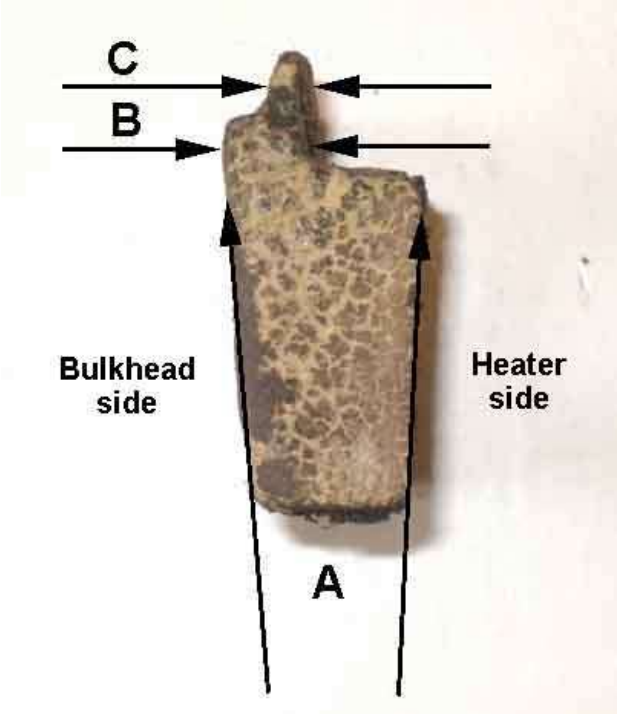
The dreaded rubber block that goes between the lower back of the heater box and the inner bulkhead (Watford Classic Cars).


At first I though Vee's would be reusable, saving me some grief. But on trying to remove it carefully to clean the case it was crumbling. Note the strip seal just above the rubber block, which together with three other pieces under the flanges that screw to the bulkhead shelf prevent engine bay fumes getting into the cabin. Certainly the one on the back is rubber or high-density foam, if I found anything under the flanges it just crumbled away as I scraped it. Replacements for these are also low-density foam, but I have some sticky-backed high-density strip which is more robust. Looking at the whole shebang I don't think the rubber block does anything more than wedge the heater unit into the bulkhead cavity to stop it rattling, and to seal the demister pipes. It can't seal against engine bay fumes as it doesn't go the whole width of the heater, let alone the cavity, it's the four strip seals that do that.




Engine compartment side, on Vee (1975), corrugated tubing visible behind the panel. These just push into the rubber block which fits into a recess in the bulkhead.


The block gets thicker towards the top, so has to be compressed more and more to fit into the recess. At point 'B' it is being compressed by half to the thickness at 'C'.




'A' is the thinner part of the block that is above the recess. There may be some scope for thinning the block at the shaded areas, so there is less to compress.

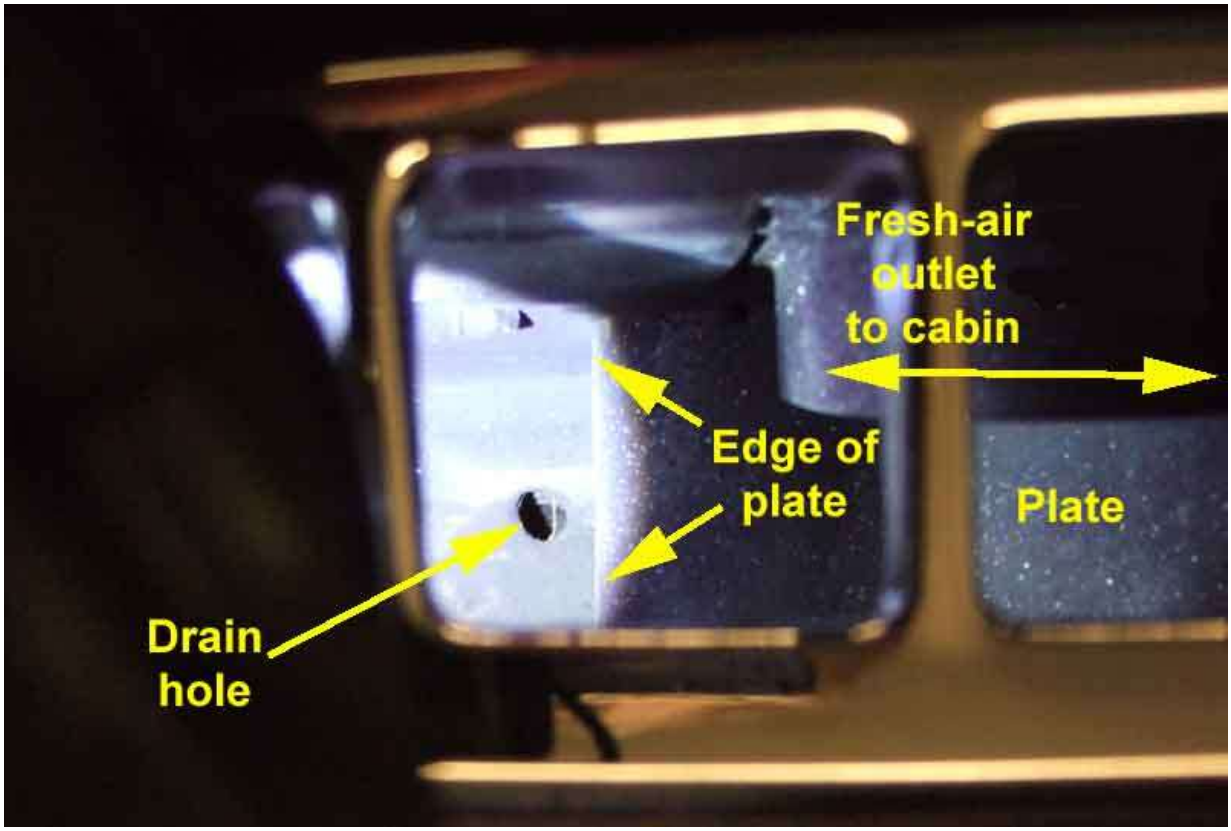

New block trimmed with a craft knife, leaving the full thickness of the material around the vent holes. As suspected the bottom of the heater was 1/4" forwards of where it needed to be to be pushed down into the cavity. But daubing both the face of the block and the back of the cavity with Swarfega as a lubricant, as well as reducing the thickness over most of the upper edge, allowed me to wedge the left-hand corner in:

After that pressing down and wiggling got the rest of the bottom of the heater into the cavity, then pushing straight down was relatively easy - especially with no engine!

# Heater box drain

Showing a rod inserted in the drain hole in relation to the grill apertures - 1973 model:

View from above. There is a plate between the fresh-air outlets and the bottom of the air-box, but that stops short of covering the drain hole:

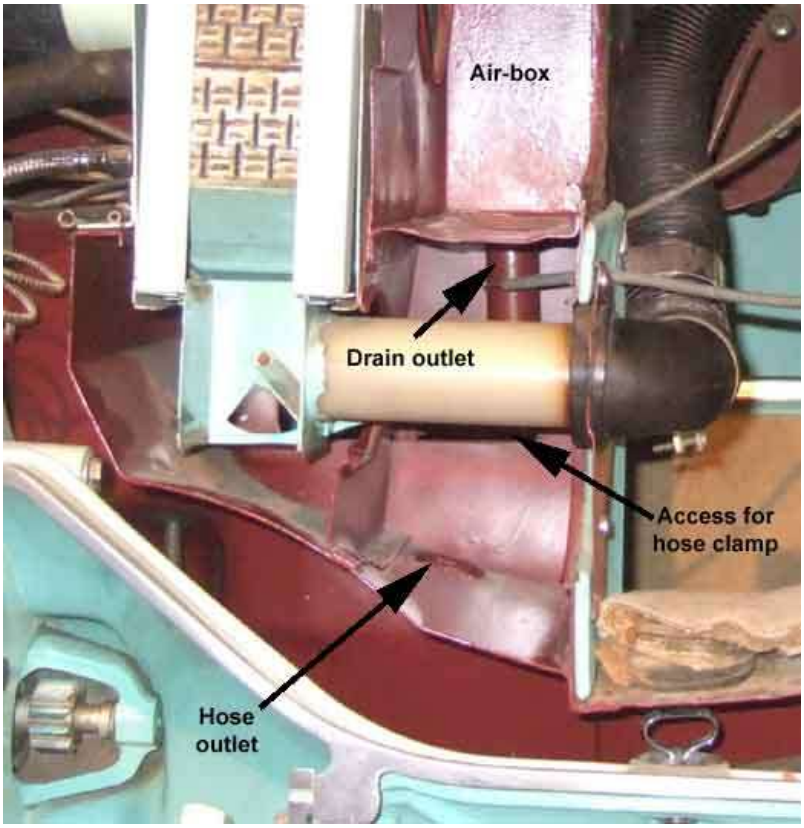



Earlier cars had a sort of 'leaf-trap' as seen here on The British Motor Museum Gaydon MGB cut-away. This restricts access to the drain hole somewhat ...

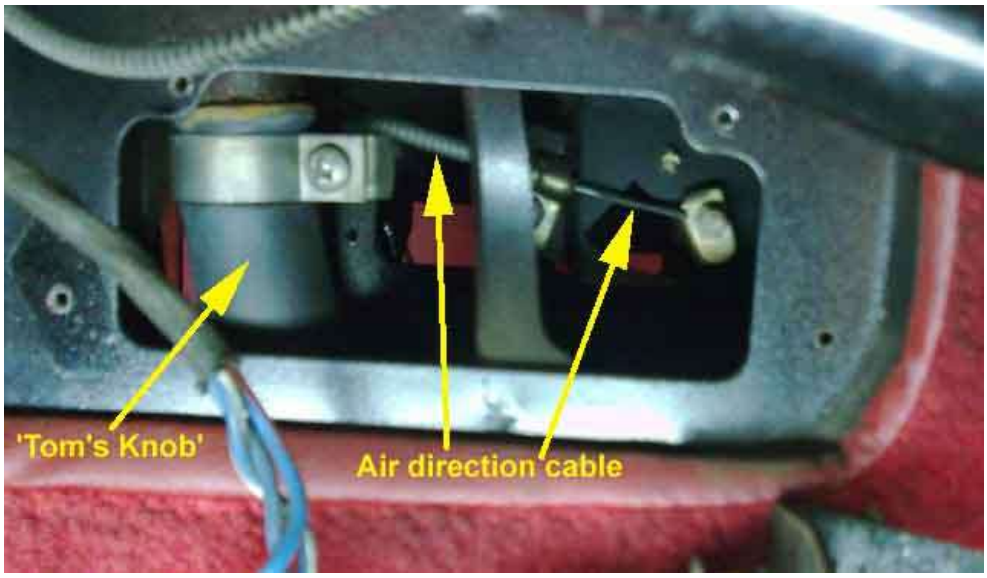

... but it's still just possible. There is an after-market mesh screen that goes under the grille to prevent debris entering in the first place, although since I've only had to do Bee's once in 26 years soon after purchase, and Vee's not at all, I haven't bothered. The grille has to be removed to fit it:


Showing the original spire clip (arrowed) pushed onto the peg of the grille to retain it. These can be tricky to remove except by levering the grille up, which makes them ping into the bottom of the box, although on Vee I was able to lever them down with a small screwdriver through the holes in the grille and capture them on a finger-tip. These have been replaced with plastic sockets which push into the holes from above, then the grille pegs push down into them. Similar sockets are used for badges on the boot lid. Much easier to deal with, but unfortunately it does need a bigger hole as it has to accommodate the socket plus the pin, a bit of a beggar on a freshly repainted body if you didn't open them out before painting. It does also mean that the grille can be removed relatively easily - good if you are doing it, not so much if a tea-leaf is doing it.:

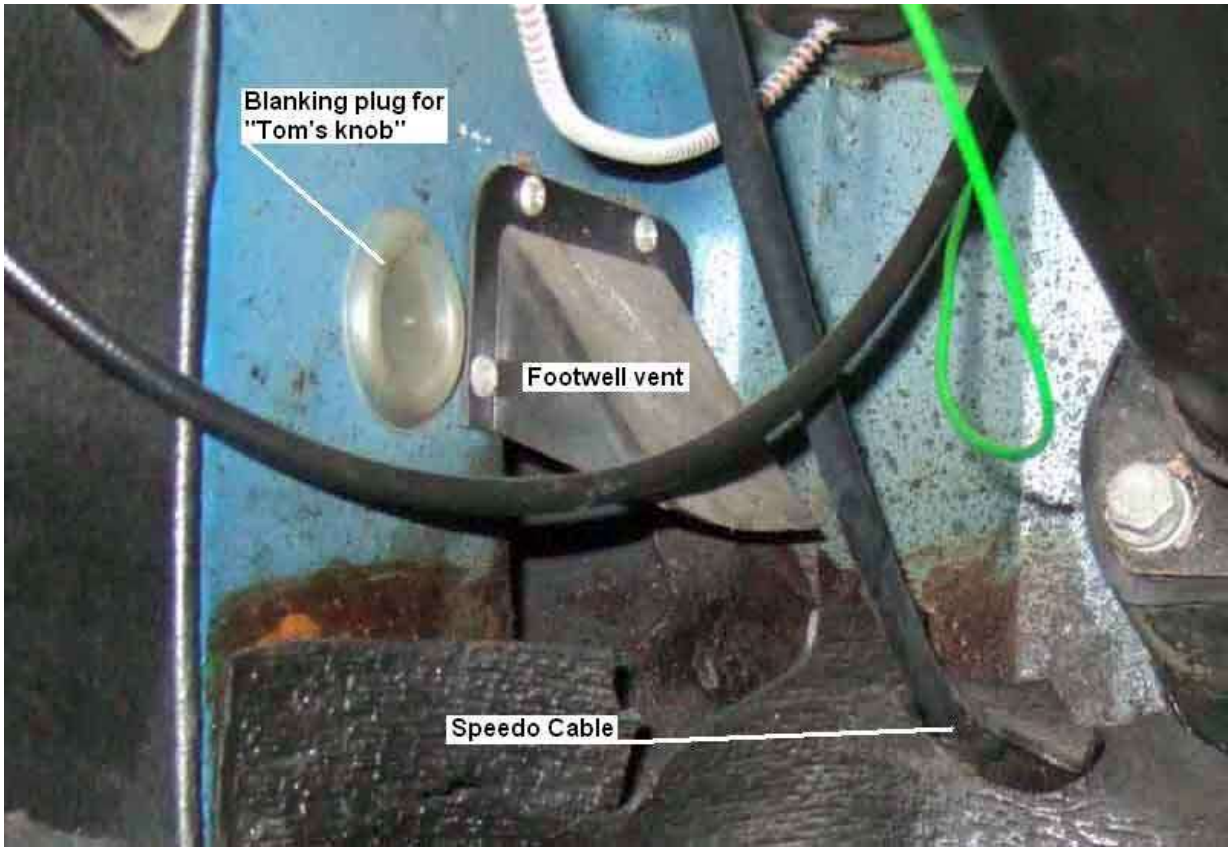
The British Motor Museum Gaydon MGB cut-away showing the metal spigot for the drain tube, the double-skin over the transmission tunnel, and the hole in the lower skin the drain tube exits through. If the metal spigot rots away water will tend to lie in the double-skin and eventually rot through to the cabin. If that happens probably the easiest solution is to drill a drain hole at the lowest point, although that will require engine and gearbox removal. It **may** be possible to repair the bottom of the air-box and the drain tube by removing the demister tube and trim panels behind the console:




The clip attaching "Tom's Knob" (AHC321) to the drain tube at the bottom of the air-box, clearly visible on cars with the adjustable footwell vents (up to August 1970), as well as the air direction cable attached to the air flap (*Dave O'Neil*):




Showing the plastic blanking plug that gives access to the clip securing the drain hose to the bottom of the air-box on cars with the fixed footwell vents (August 1970-on). In either case you need to be very careful leaning on the Jubilee clip when loosening or tightening. If the bottom of the air-box has been weakened by corrosion you could push the metal tube over and have a much bigger job on your hands as the bottom of the airbox is pretty-well completely inaccessible from below. If water leaks from above the hose it lies in the box section between tunnel and air-box and from there gets into the cabin:




'Tom's knob' (arrowed) as seen from below, the hole just above the arrow is for the gearbox dipstick rubber bung (image 'borrowed' from www.vord.net):

Vee's 'knob', the first clear view I've had now the engine is out. Obviously missing the restrictor at the bottom, and cut short, in fact it looks more like a standard piece of hose as the one above seems to be tapered:

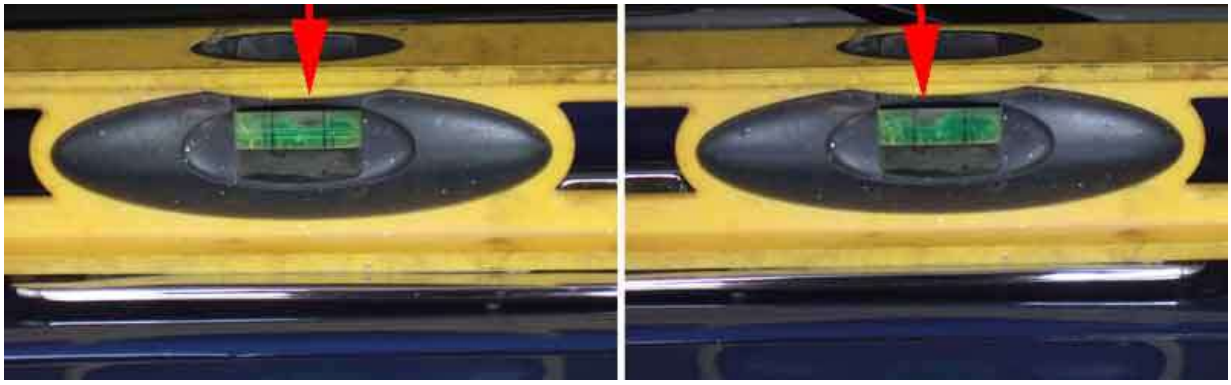
Unavailable for many years, Brown and Gammons are showing a modified version available (left), albeit on 'stock alert' i.e. not currently available. Although as one person has said: "If I'd known how much trouble it would be to fit it, if I hadn't had to replace it I wouldn't have bothered!". The original hose is shown on the right, maybe explaining how it gained its colloquial name:

# Heater Intake Grille

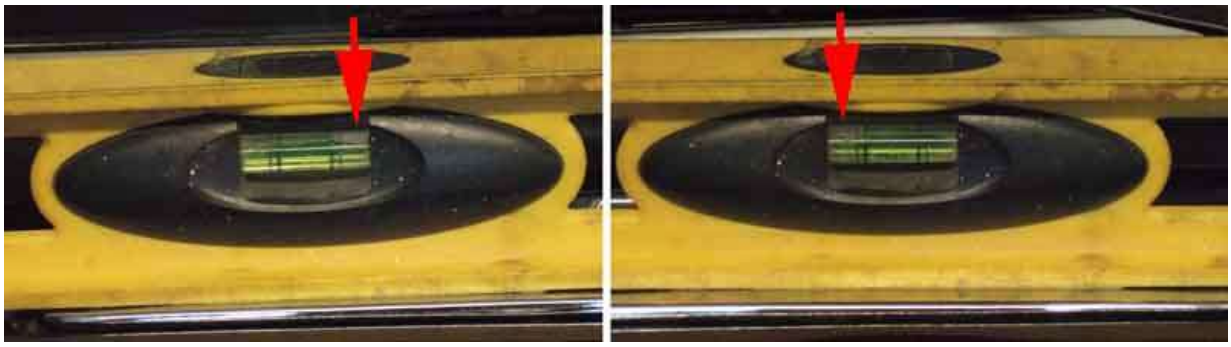
Only one version listed in the Parts Catalogue for all years and all models - AHH6102, but a replacement bought for Vee in 2017 has a significantly different curvature to the original and doesn't fit the panel very well. Bee's was replaced in 1990 and was a good fit being the same as the original, and both old (kept, of course) and new are the same as Vee's original.

My first attempt to compare the curvatures was to lay a straight-edge with its centre of balance over the last square hole in the grill at one end, then measure the distance between the other end of the grille and the straight-edge. Several milli-metres less, difficult to photograph with a rule, but you can see the difference between Vee's problem grille at the top, Bee's good grille in the middle, and Vee's original grille at the bottom.

Then as I was using a spirit-level I hit on the idea of comparing the bubble positions when positioned over the end square hole on each grille. Vee's replacement here with the bubbles barely off-centre:



And Bee's replacement here with the bubbles right at the ends of the glass tube. Ideally both cars need to be on flat and level ground of course, which as can be seen in both of the above is the case as the bubble offset is the same on both sides for both cars:



Then I had the idea of going back to method 1 but using drill shanks to gauge the gap rather than measure directly. With the straight-edge pressed down over the last square hole one end, I inserted drills between the straight-edge and the last bar at the other end. With Bee a 15/16" drill shank was fractionally too big and a 7/16" too small so about 11.4mm, whereas on Vee I could only get a 5.5mm drill shank in, so Vee's new grille has half the curvature of the other three. It wouldn't stay in with plastic sockets, so I've had to reuse the original spire clips.

# Dash Controls

The wonderful illogicality of the chrome bumper controls - the heat control has to be turned clockwise to turn it on whereas the direction control is turned anti-clockwise, which is the more natural direction for turning a rotary control on, I suggest. This is because both dash controls pull the cable when turned anti-clockwise, and push it when turned clockwise. However the air flap at the heater unit shuts off air flow when the cable is pushed, but at the tap on the cylinder head pushing the lever opens it for heat, and that is where the illogicality comes from. The operation of the dash control for heat was reversed on rubber bumper cars and V8s so that turning it anti-clockwise pushes the cable instead of pulling it, so then each controls is turned anti-clockwise to get heat or air, and turned clockwise to shut them off:


Chrome bumper air-direction

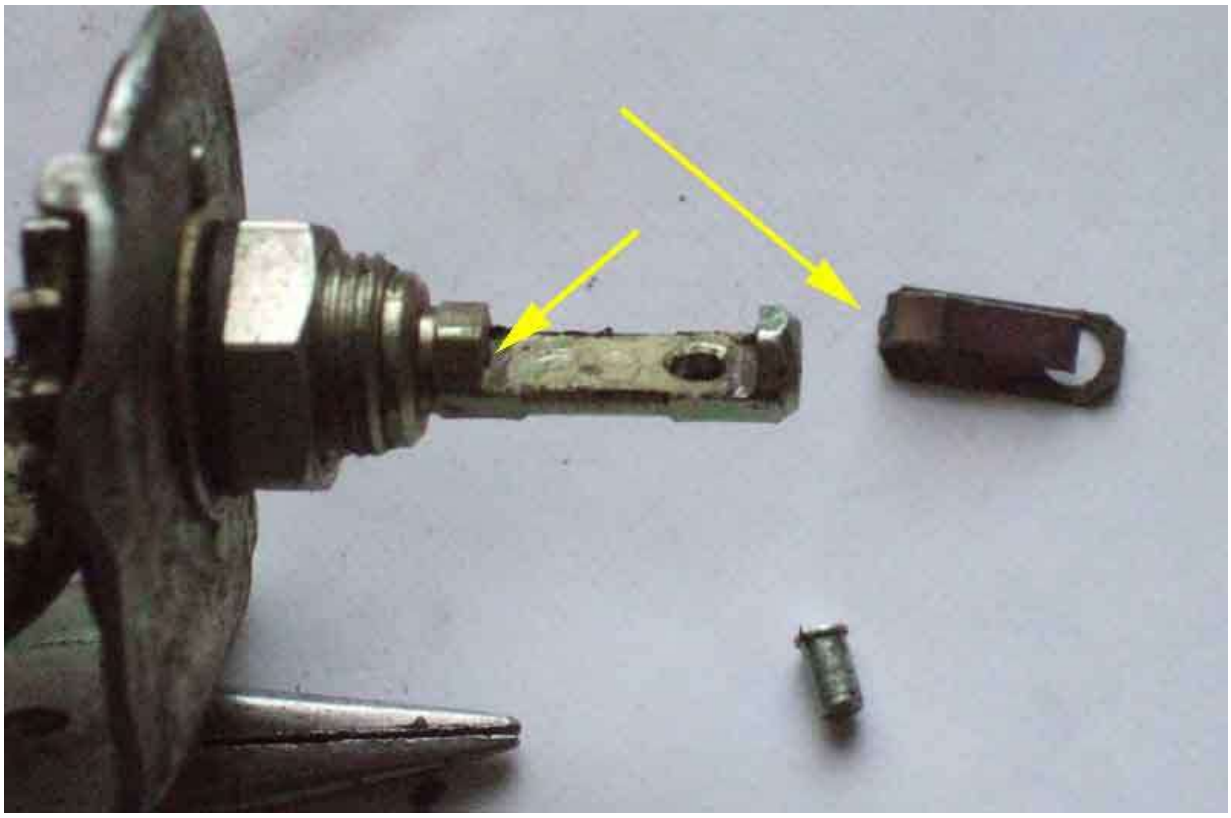

Chrome bumper heat


Rubber bumper heat

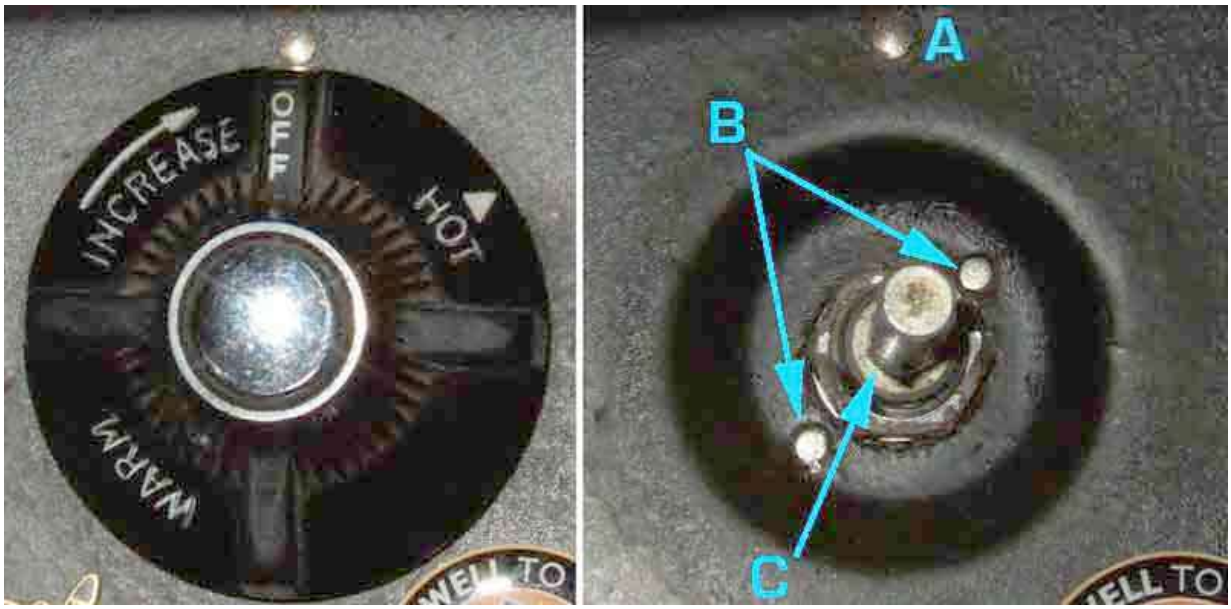
Showing the holes in the metal dash-mounted heat-control knobs, direction control knobs are similar. Press down the sprung pin at the bottom of this hole to release the knob. If the control shaft has rusted badly the corrosion could have expanded to jam the knob onto the shaft:


Showing the pin that retains the knob, with the spring that presses it outwards. In this example the spring has lost some if its tension, normally it would be pressing on the back of the pin. The pin has a flange to retain it in the shaft with the knob removed:

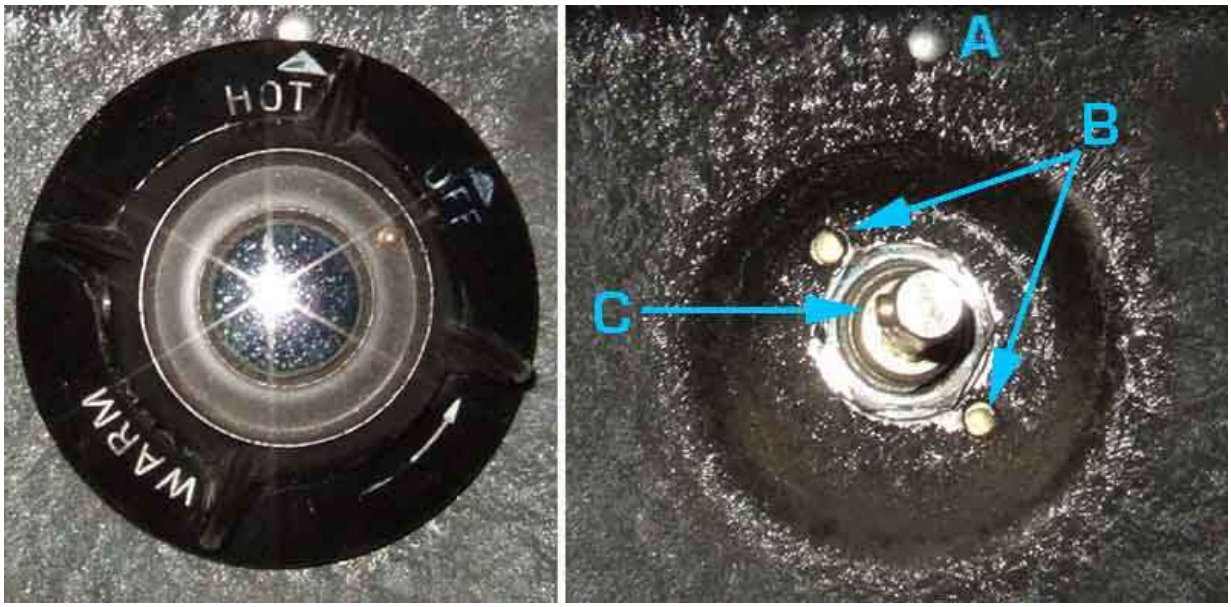
The end of the spring is turned up at the pin end (arrowed in the above), so a spike can be inserted and that end of the spring levered up to remove. There is a small projection on the curved end of the spring, that locates in a hole in the shaft (both arrowed), when refitting the spring. The hole in the spring is larger than the flange on the pin, so the pin can be refitted before the spring:



With the knob removed you can get at the nut which when undone allows the control to be withdrawn from the rear of the dash. You can also see the pegs and location holes to correctly orientate the control in the dash so the control knob legends are correctly aligned with the datum pin (A). Chrome bumper heat control location pips (B) are at 2 o'clock and 8 o'clock, and when set fully anti-clockwise (off) the knob location pin (C) is at 7 o'clock:

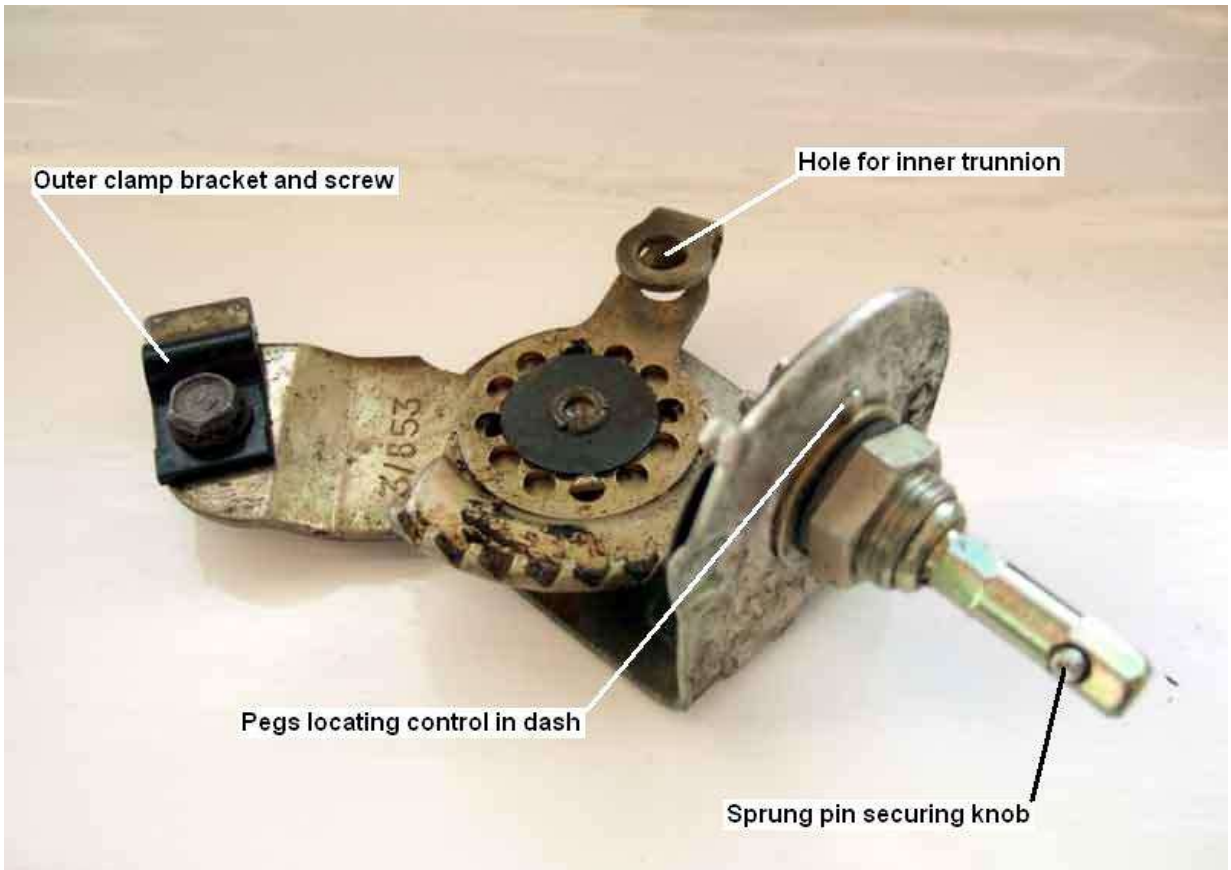



Rubber bumper dashboard heat control location pips are at 10 o'clock and 4 o'clock, and set fully anti-clockwise (hot) the knob location pin is at 9 o'clock:

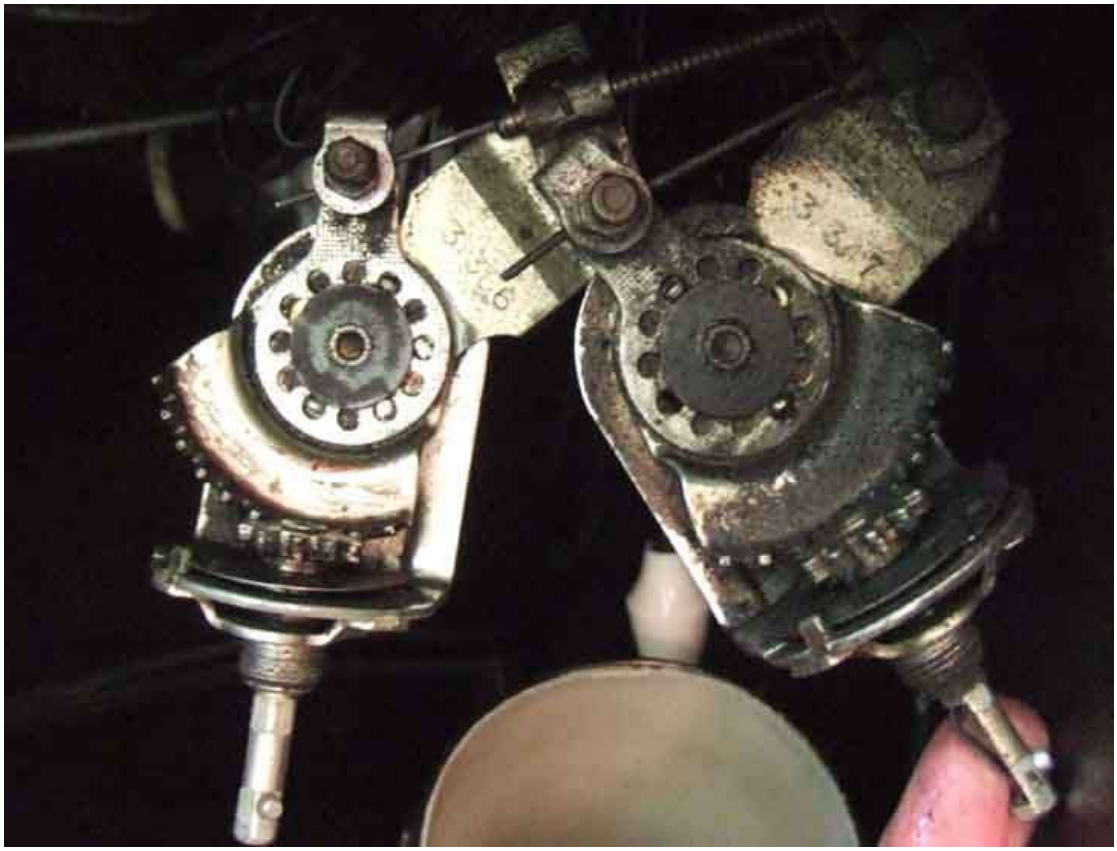



The dashboard air direction control location pips are the same for both chrome and rubber bumper at 12 o'clock and 6 o'clock.

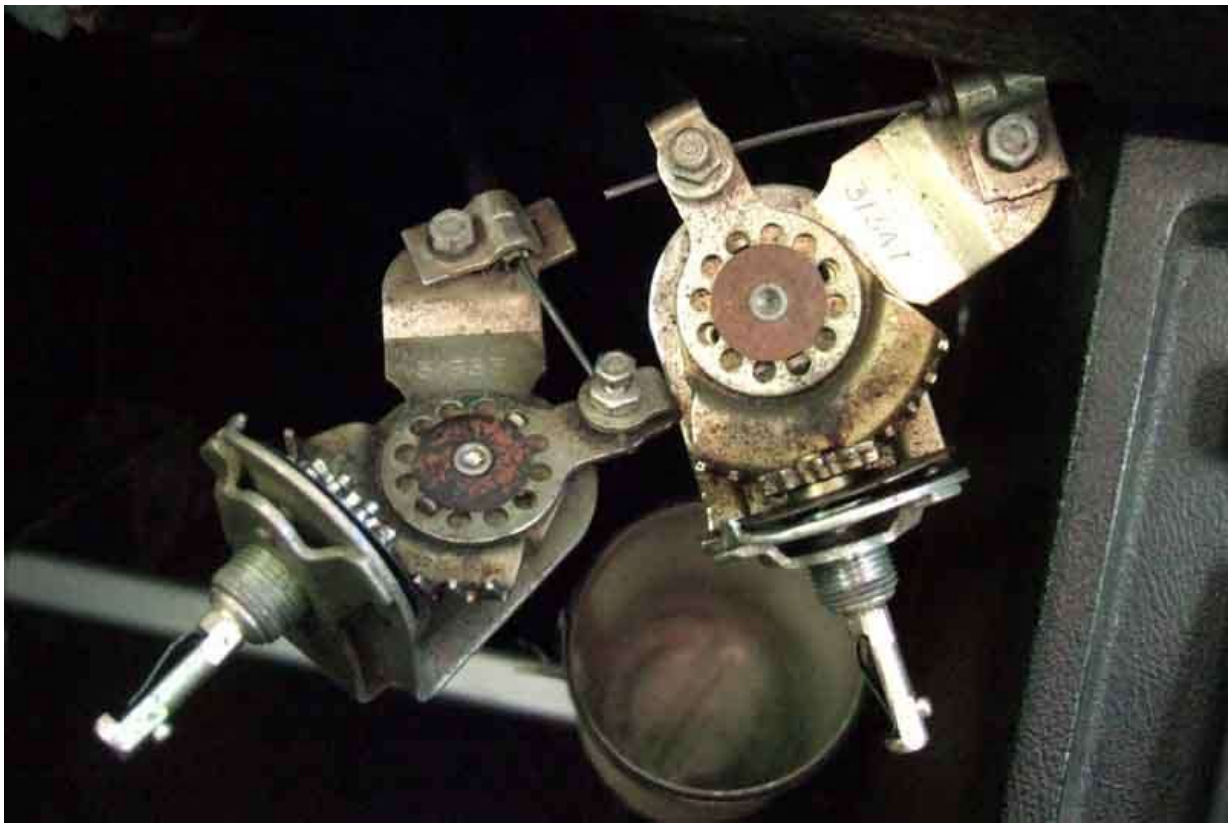
On UK cars there should be enough cable to bring the control below the dash to access the cable clamps or for lubrication. Out of interest the multiple holes shown in the moving lever (and there are more in the fixed bracket underneath) allow a set of components to be assembled in various ways to suit many orientation and operation direction requirements. This is a 1980 heat (I think!) control:




The controls of my 73 roadster, 3/366 for heat (left) and 3/347 for air (right) ...

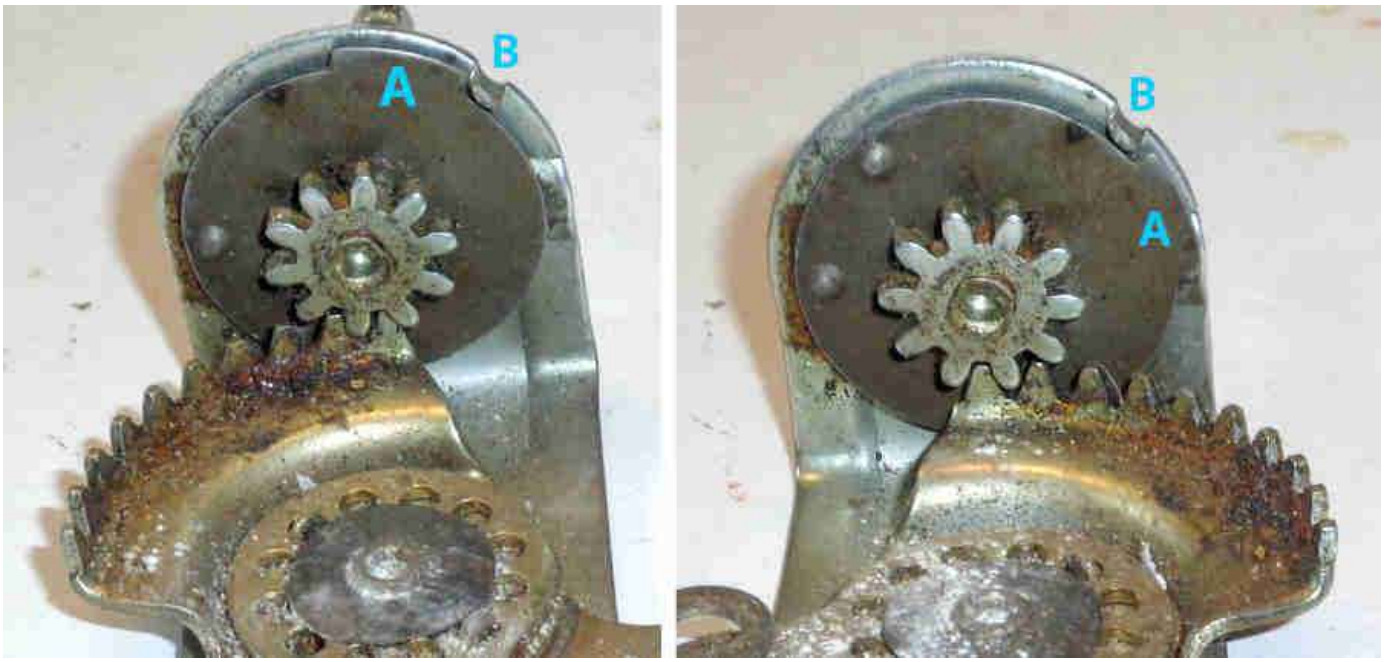


... and 75 V8, 3/533 for heat (left) and again 3/347 for air. Compare the two heat controls and note how the moving parts are positioned on opposite sides of the sheath clamp so the control operates in the reverse direction:

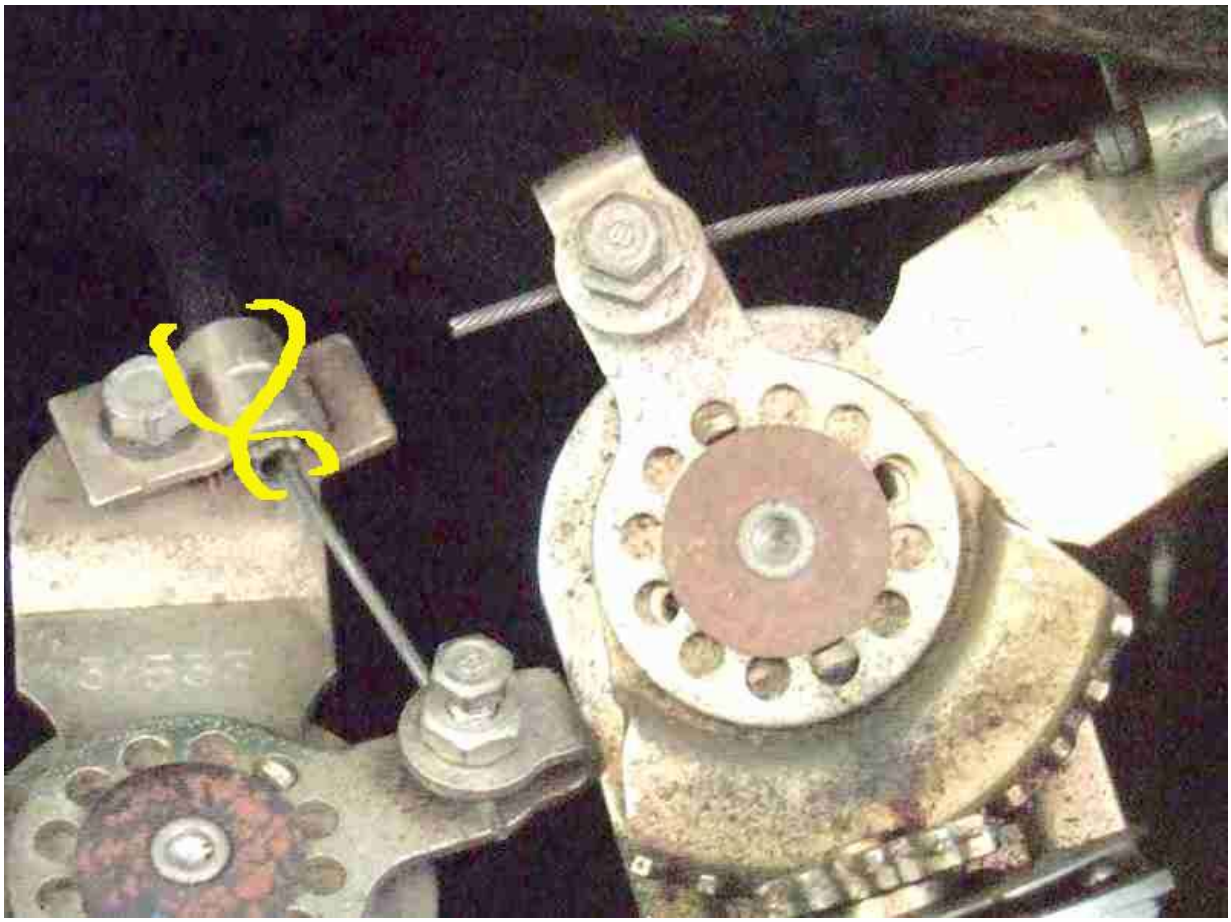


As you can see tin-dash controls are quite easy to get to where you can work on them.

The range of movement of the control is determined by a moving tab 'A' on a disc that rotates with the spindle and small gear, and a fixed tab 'B' on the body of the control, here shown in each of the two extremities of movement. The protrusions round the edge of 'A' are trapping a ball-bearing against the back-plate and there is a similar indentation in that to give click-stops at fully on and fully off:



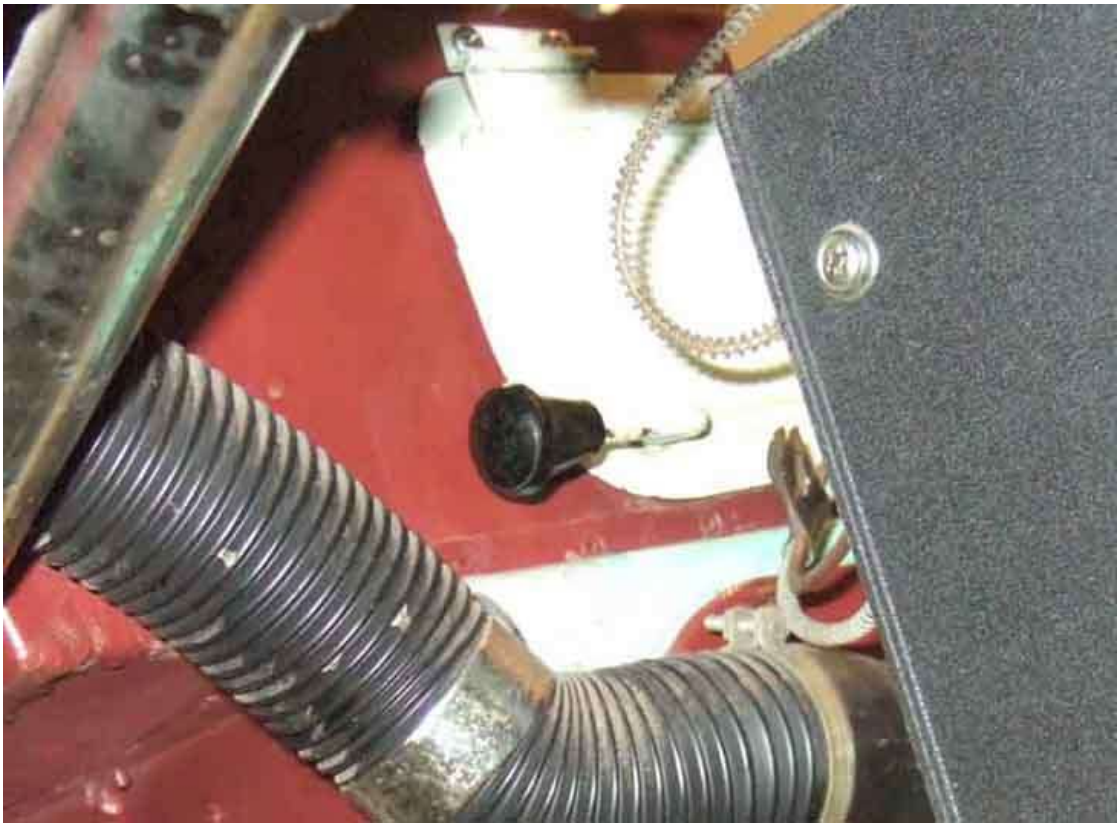

Not easy to see here but the V8 has a different sheath on the heat control (left). This has a nylon core with four steel wires running length-wise in slots, inside a plastic sheath, as opposed to the wound steel outer of the roadster. This overcomes the problem of the wound steel outer expanding like a spring when pushing the inner to open the heat control, but can have the opposite problem of pushing the outer through the clamp when pulling on the inner to close it, because the clamp can't grip the plastic and nylon outer as well as it can the wound steel. I don't have a photo but at one time I had to use some stiff wire twisted to make a loop around the inner then over the clamp and under the inner. The loop around the inner allowed that to go back and fore but restrained the outer when pulling on the inner:



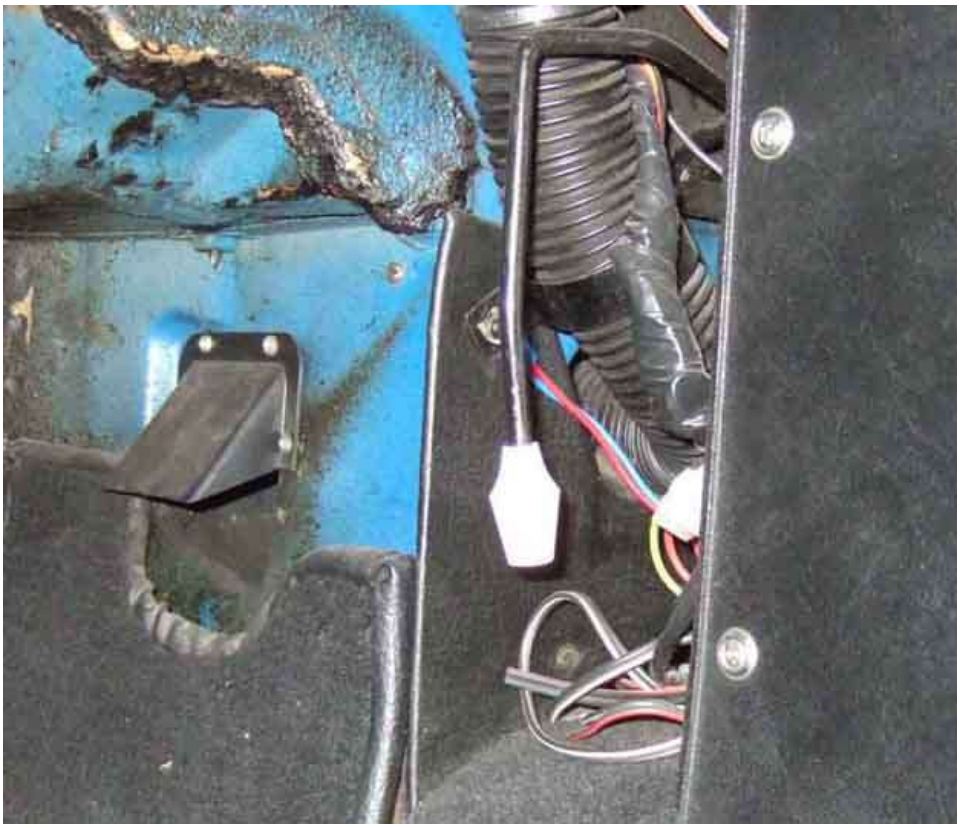
Both cars have wound steel outers with stranded inners on the air direction control. This seems strange given that the inner has to push the air direction flap closed as well as pull it open, rather than pulling against a spring to open and the spring pushing it shut, but it works well enough.

The heater controls on the LHD cut-away at Gaydon. This shows both controls having the same orientation i.e. turning anti-clockwise pushes the cable. It also nicely shows why the controls have different part numbers and are orientated differently on the dash - the upper control has to come down past where a radio would go, whereas the lower control has to go across to fit above the turned-under part of the dash. Similarly the angle the sheath makes to the spindle varies - the upper control sheath has to pass over the cross-brace, whereas the lower one has to pass in front of it. It's pretty clever, really, that the designer came up with a method of achieving so many different orientations and angles using the same basic parts just assembled differently:

The early lever just pointed sideways making it much harder to move as well as being more hidden under the dash. They also had black knobs (this is the Gaydon cut-away hence the flap itself being white instead of the usual black):

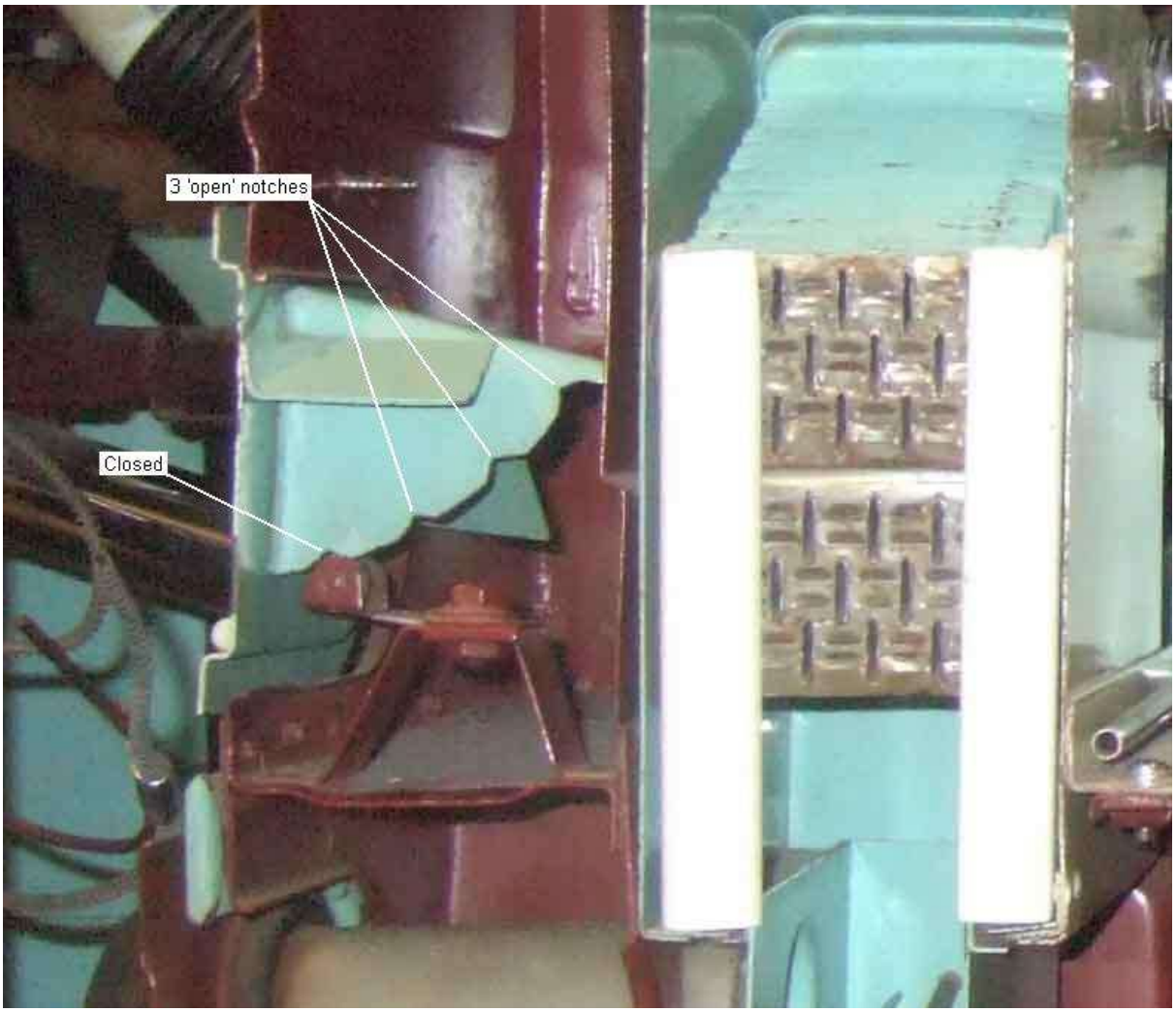


Open to the first notch ...



... and to the 2nd, you can see the flap open directly above the handle, between the rear edge of the centre console and the demister ducting:

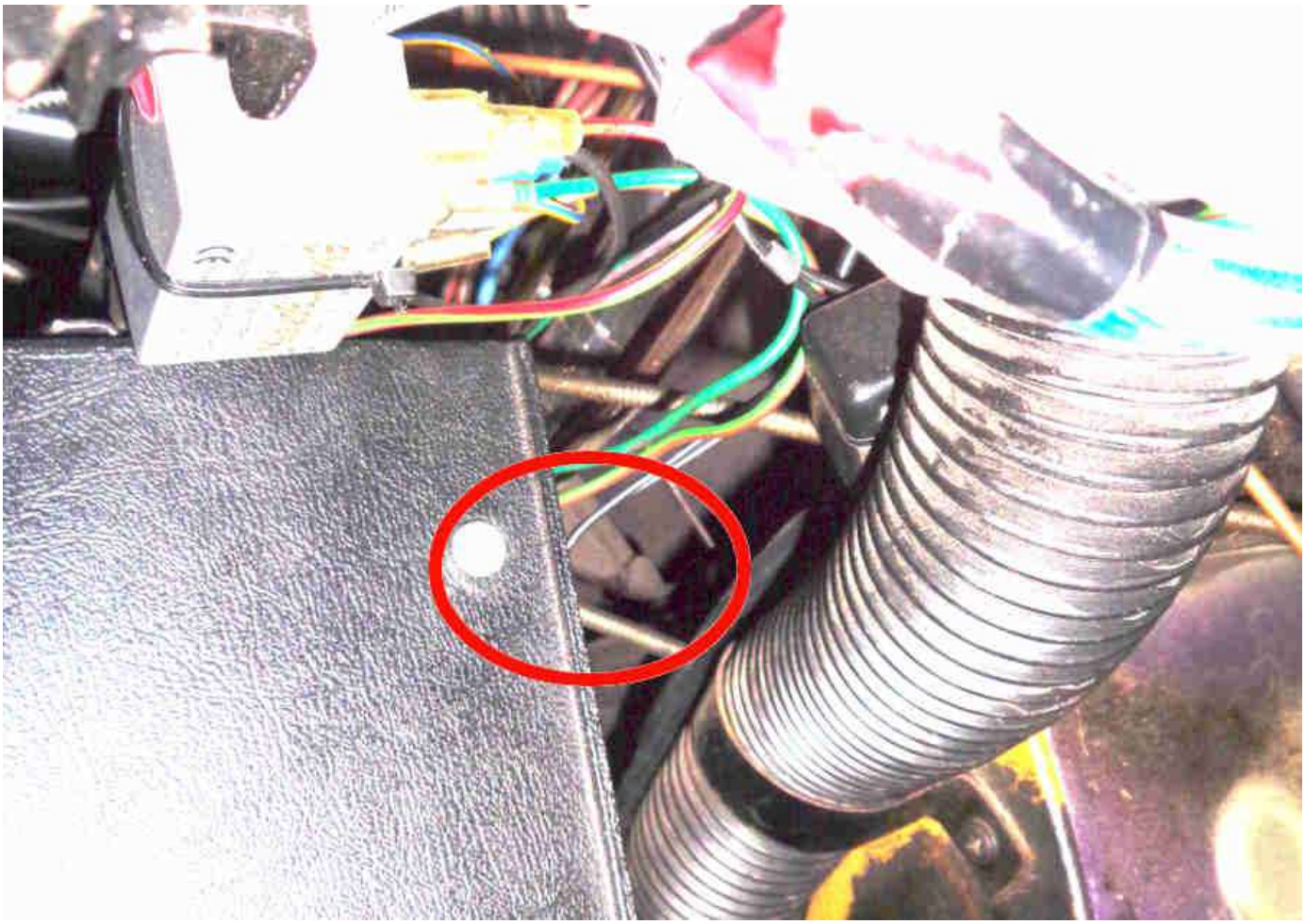
The British Motor Museum Gaydon 'cut-away' MGB clearly showing the **four** notches in the control quadrant, giving one closed and **three** open positions. The third notch seems to be deeper than the others, which will mean it takes more of a pull to get it from that to the fourth, which is maybe why many (well, everyone else as far as I have found) thinks there are only three notches and hence only two open positions



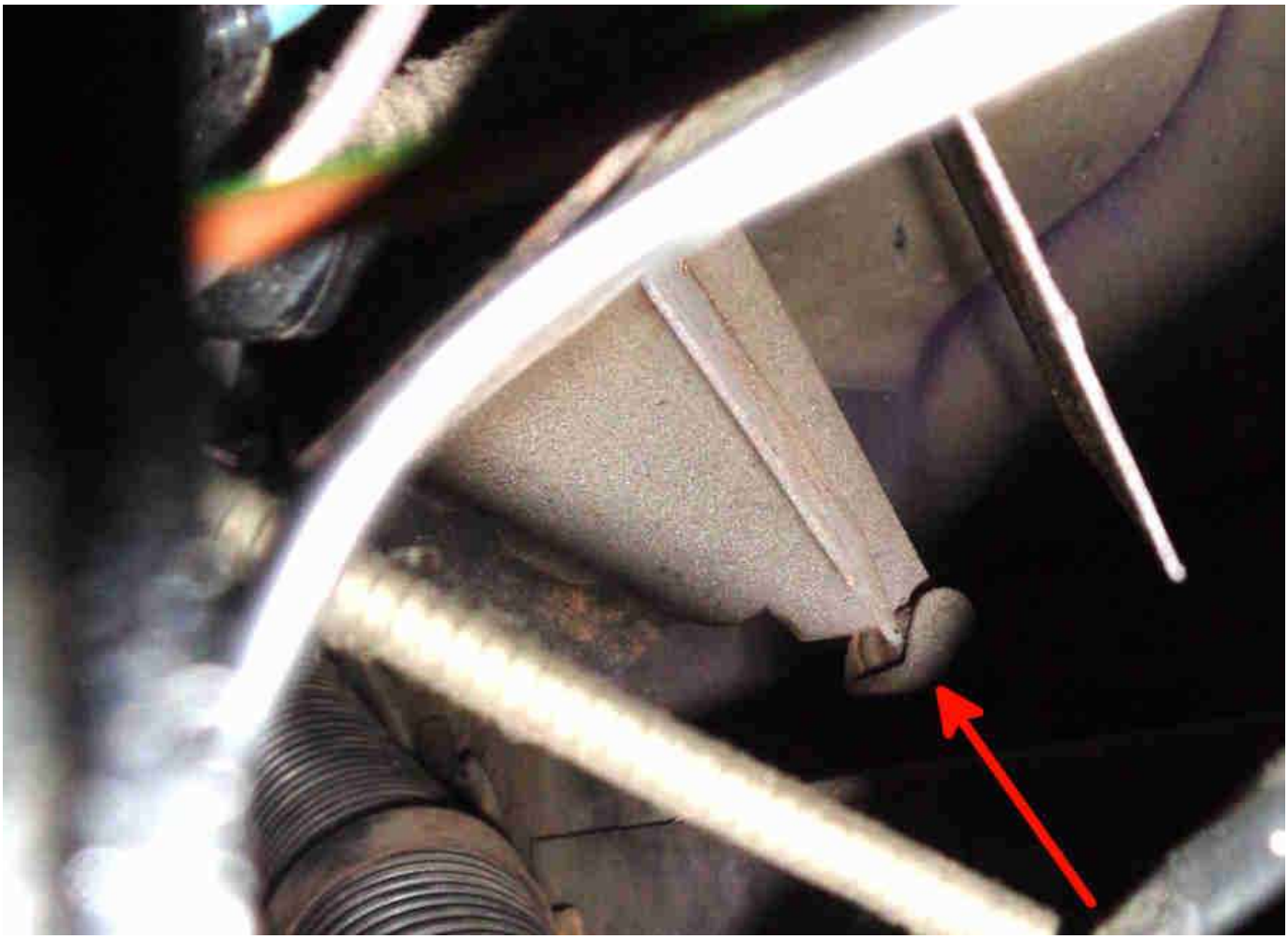

Herb Adler's mod with a coil spring (arrowed) between the head of the bolt and the detent. This allows the arm with the roller to move downwards slightly when moving the cold air flap, rather than having to spring the arm itself, making the flap easier to open and close. A longer bolt may be required, secured with threadlock or possibly a lock-nut. This also shows one of the vanes that are attached to the back of the flap (nearest the camera, concealing the roller) which direct air sideways into the footwells when the flap is open.

The back of the cold air flap showing the vanes that direct air into the footwells and the notched quadrant:

You can just about see the quadrant and roller detent with the flap open from low down in the driver's footwell of a UK car, looking upwards. This gives the general direction:



Zooming in, shown in the third open position:



If the roller detent goes past this it will come off the quadrant and you won't be able to close the flap. The quadrant and detent are closer to the left-hand side, it's possible that with one person wielding a suitable lever from that side another person on this side may be able to 'talk them in', as it were, and lever the roller detent down and start closing the flap. The other pictures on this page should give enough info to help see what you are aiming to do.

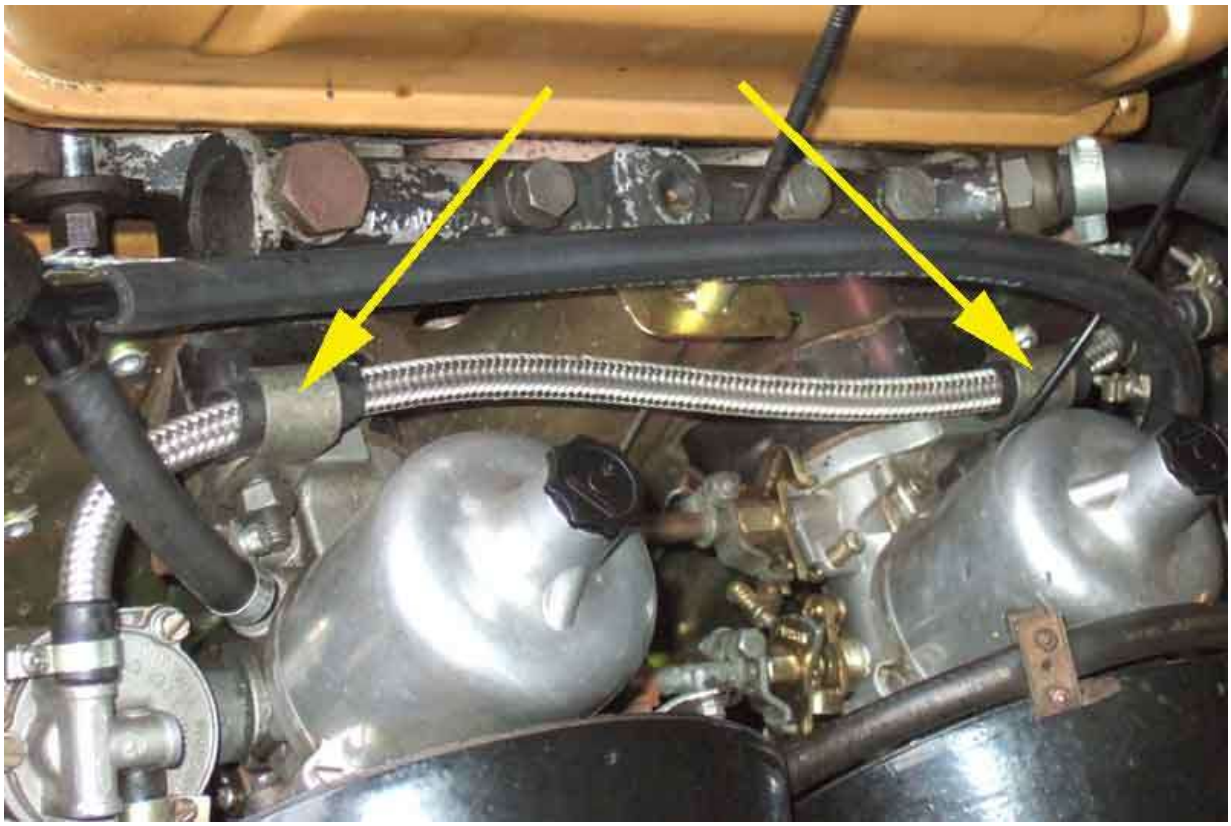
# What's that kink in the heater return pipe for?

To give clearance for the kick-down cable on automatics:

Kick-down cable and starter inhibitor/reversing light switch on a BW35 auto:

# HS Carb Hose Support

Someone was asking where to get these HS carb hose clips and sleeves, not listed in the Leyland Parts Catalogue or on any of the usual suppliers MGB web pages. I eventually found the clips listed on an eBay ad for hoses and stainless clips complete as 12H1001SS. Several of the usual suppliers list those, but not on their MGB pages i.e. 'in context', only for other models such as Midget and Sprite, or under general hardware. Then I found PCR811 yellow passivated versions which are a lot cheaper, and again shown for other models but not MGB. Oddly the BL Catalogue lists quite a few components with a PCR prefix but not that one:



Support clip PCR811. Incidentally some suppliers show the same clip used for the early heater return pipe, the later pipe has them already attached: (*Motaclan/Leacy*)

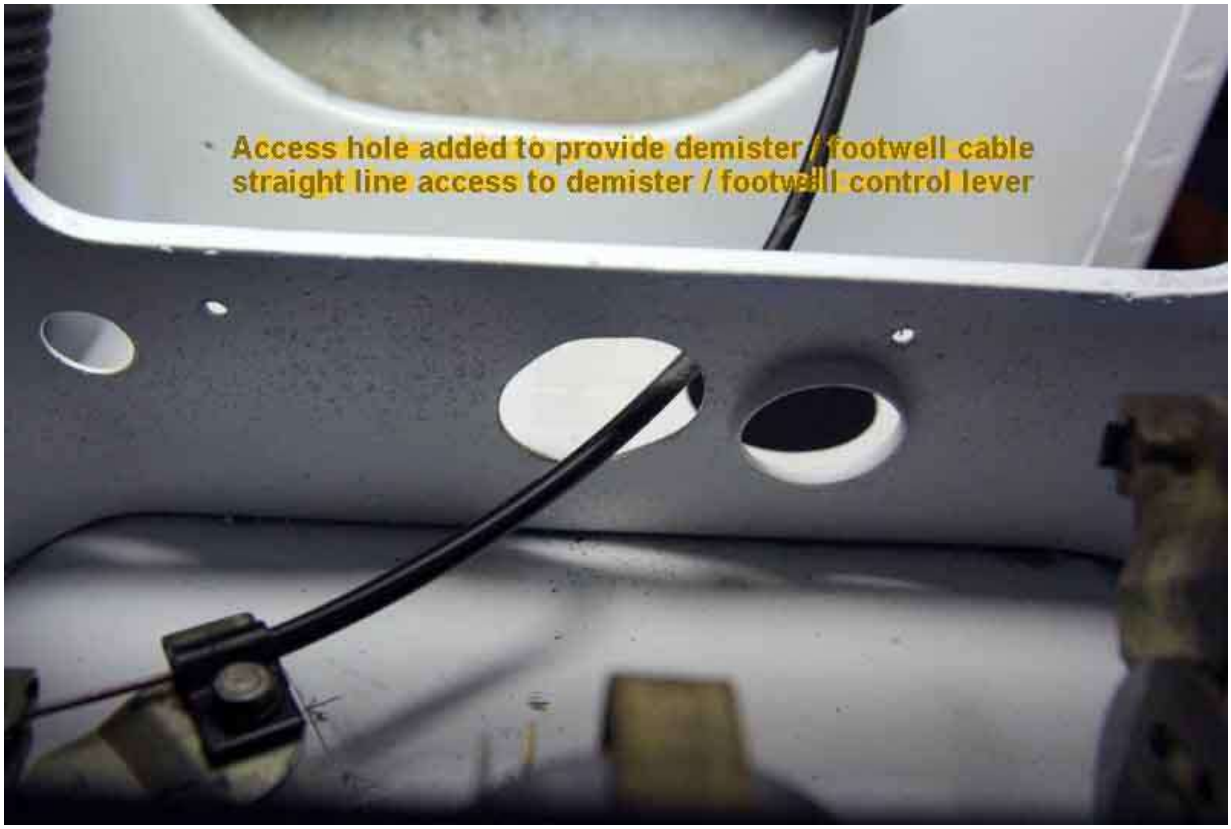
Again the sleeves or 'ferrules' only appear against Sprite/Midget and even then only a couple of suppliers (Moss Europe (item 84) and MS&C (item 9)) as HMP215007. My front one tends to slip out as they are a loose fit in the clips. Glue would probably hold it:

# Console Heater Controls

John Maguire in Australia found the original positioning and routing of the console-mounted heater controls and cables led to them being stiff, and has re-positioned the controls and rerouted the cables by cutting additional holes as follows:

Slot the firewall cable hole, and increase the size of the large hole in the inner firewall, until straight line access to the demister/interior direction lever on the heater box is achieved.


Add a cable clearance hole to the panel between the console and bulkhead.



Swap the heater/demister controls left to right and rotate through 90 degrees such that the Off positions are horizontal. Demister assembly should now be horizontal. Heater assembly vertical. Both cables now make a smooth transition from the firewall to the controls.


Attach the heat cable to its console switch on the bench while swapping the controls left to right to permit access to the cable clamp and trunion tightening bolts.

Demister/interior cable can be attached to console switch assembly with access through either the radio aperture (or from above before the I/P is fitted) to secure the cable clamp and trunion.

Fit the console to the car while passing the heater cable forward into the engine bay for connection to the heater tap later on.

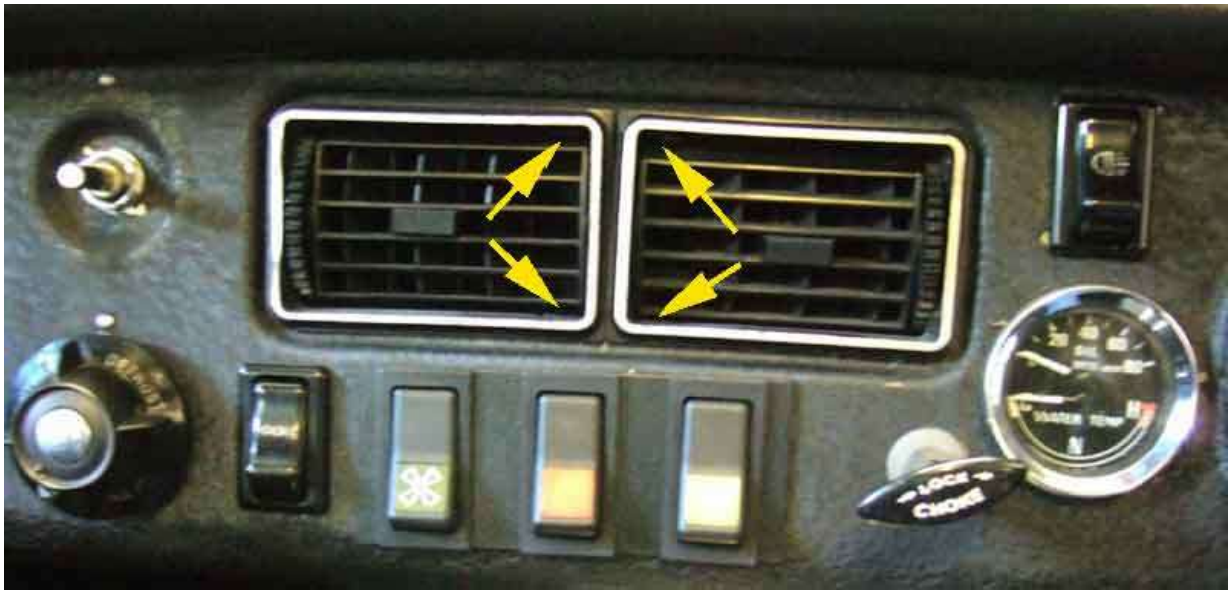
Finished result.


Note 1: It needs to be understood that the heater/demister cable length must be finalized early on. Fit and refit cable as required to align and establish inner and outer lengths. Initially attach a longer heater / demister cable to the heater box flap lever. The outer cable can then be removed and re-fitted as often as is required to establish cable length by guiding it in and back out along the inner cable.

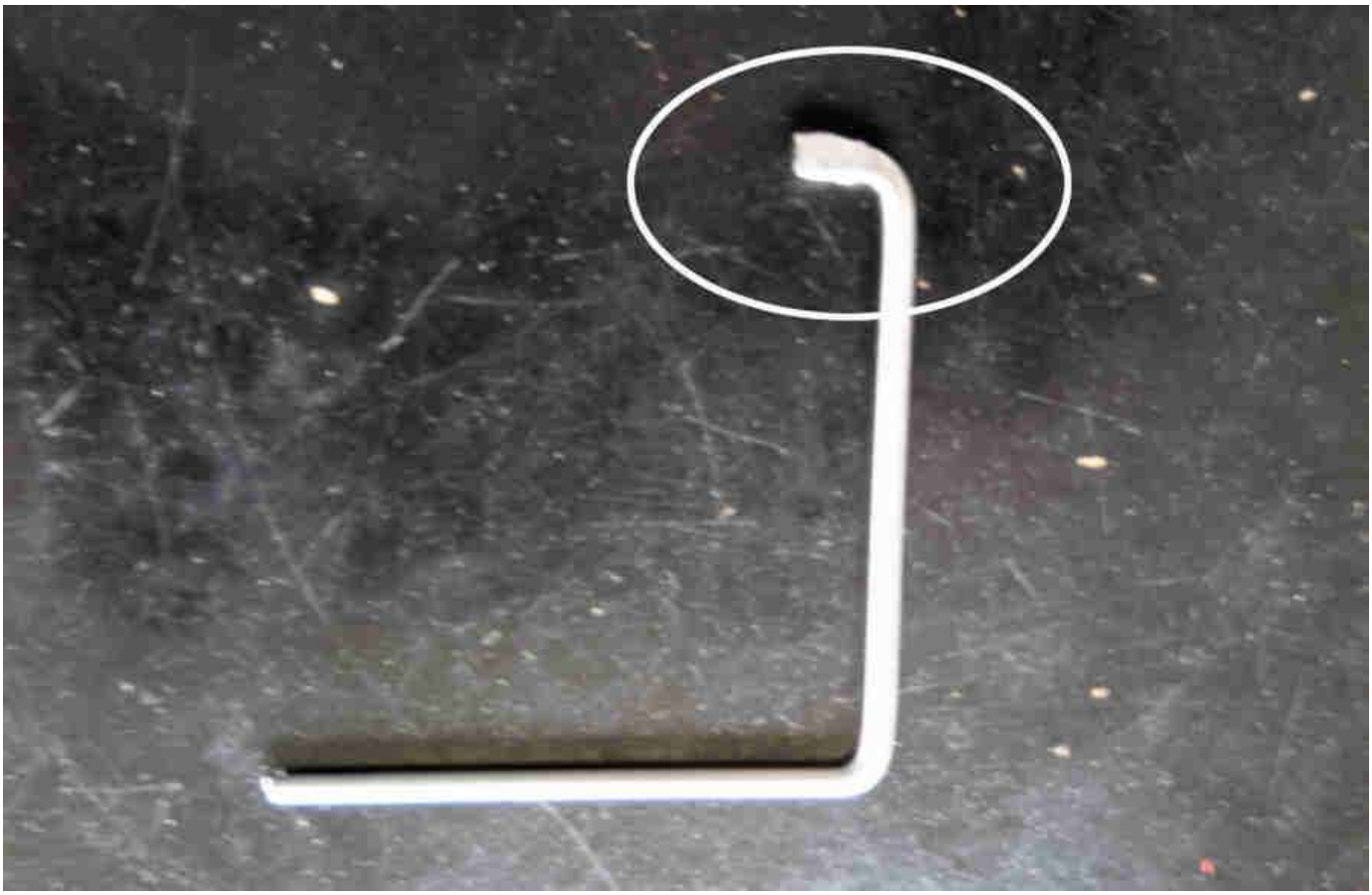
Note 2: The demister tubes are my own improvisation, originally from an old vacuum cleaner!

# Fresh-air Vents

The fresh-air vents in the 73 and later UK dash. To remove them (one at a time, they are individual) carefully lift up the tabs (arrowed) at the inner corners with something like the point of a knife blade - one at a time whilst easing the bottom (if you are lifting the lower tab) of the vent forwards, then lift and ease forwards the other tab and upper edge:



It's probably easiest on RHD cars to remove the left-hand vent first as you can reach up behind the dash on the passenger side to grasp the body of the vent to do the easing forward bit while you are lifting the tabs. Malcolm Whitehouse sent me this info on a tool he made to make it easier - and ally rod with the tip flattened into a chisel-shape:



Shown inserted with the vent removed for clarity:


The WSM says to remove the tube with the vent, but the tube seems to be clipped into the bulkhead whereas the vent is just slotted into the tube, so it's much easier to leave the tube behind. Once that one is out you can reach the right-hand vent through the resultant gap.

To replace, do the right-hand one first as you will need to position the rectangular end of the heater outlet tube inside the open end of the dash vent, and this is easiest done with the other one out of the way. To refit the left-hand vent reach up behind the dash as before, but this time to position the heater output tube in the vent: In case you are wondering about the three 'foreign' switches, a PO had rather butchered the dash to fit a couple of switches that were neither the same as the originals or each other. I was fortunate to get three illuminated switches of the same type but different colours/logos to tidy it up a bit. The left-hand one with the fan logo is connected to the cooling fan relay, so not only can I override the thermostatic switch if I want to but it also shows when the thermostatic switch has closed to operate the relay and fans. The middle switch has red illumination and is used to operate the rear fog lights. The right-hand switch has green illumination and is used to operate the front fog lights.

*November 2016:* The section from the manual, with the parts about the packing boxed in red by Ray:

**Section R.35**

**FACE-LEVEL VENTS**

**Removing**

1. Disconnect the air duct hoses from the back of the face level vents.
2. Ease up the bottom locating tag of one vent and slightly withdraw the vent until the locating tag rests on the lip of the fascia aperture.
3. Ease down the top locating tag and remove the vent and the anti-rattle packing.
4. Repeat 2 and 3 for the remaining face-level vent.

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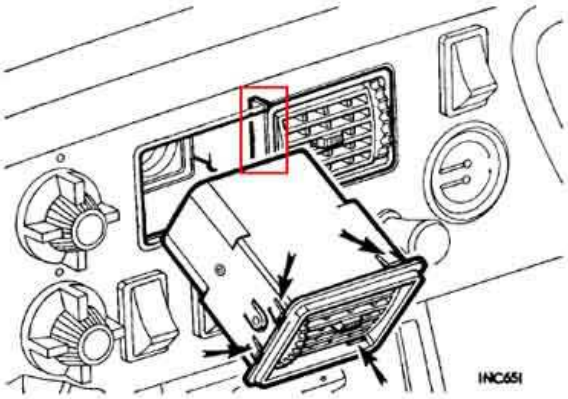
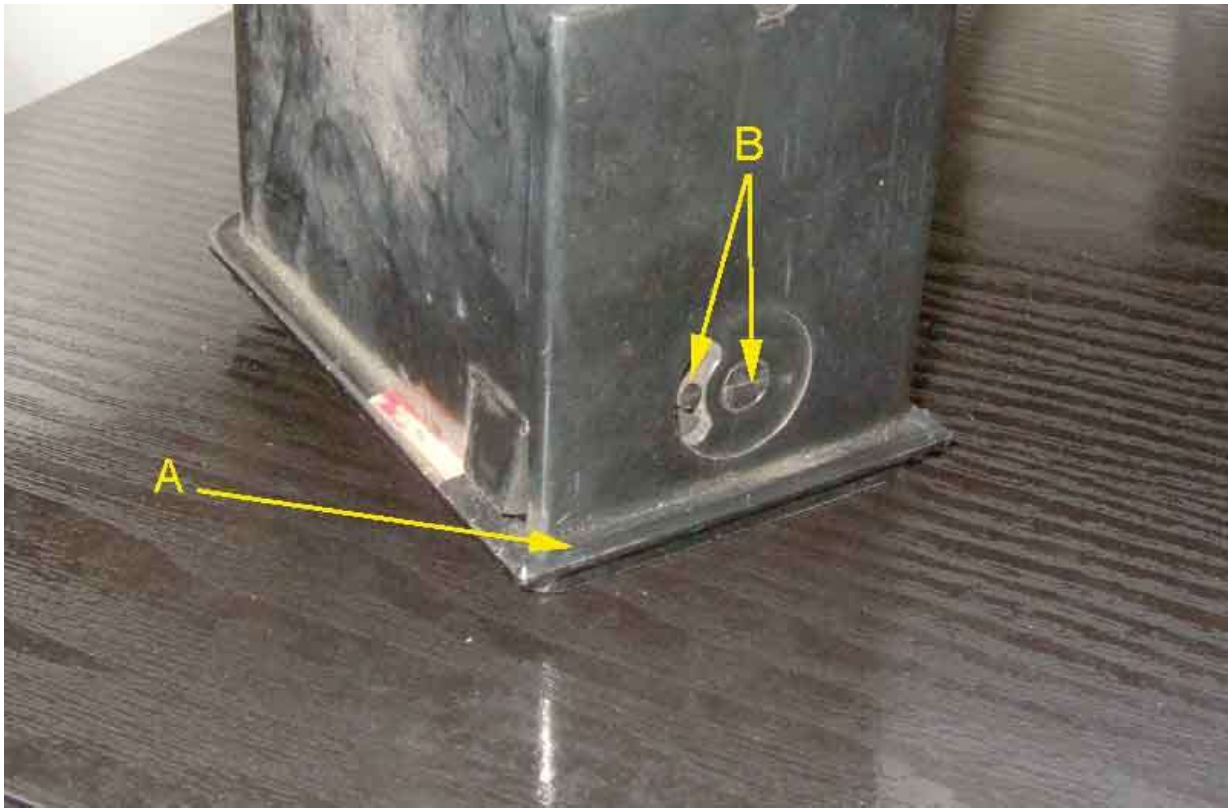



Fig. R.13
Removing the face level vents showing the locating tags arrowed

R.27

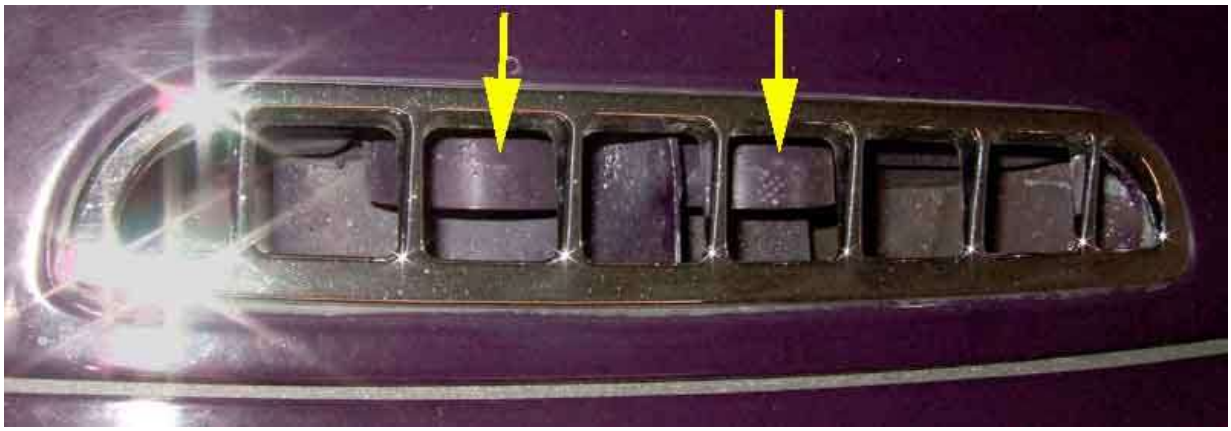
One of Vee's vents with thin strips of card glued to the back of the flanges - arrowed. There is a third one on the other long side:

The factory packing would have to be thick enough cater for both flanges (A), but if wide enough and too thick it will press on the pivot and limit stop (B) and could prevent the adjustment that directs air up or down:



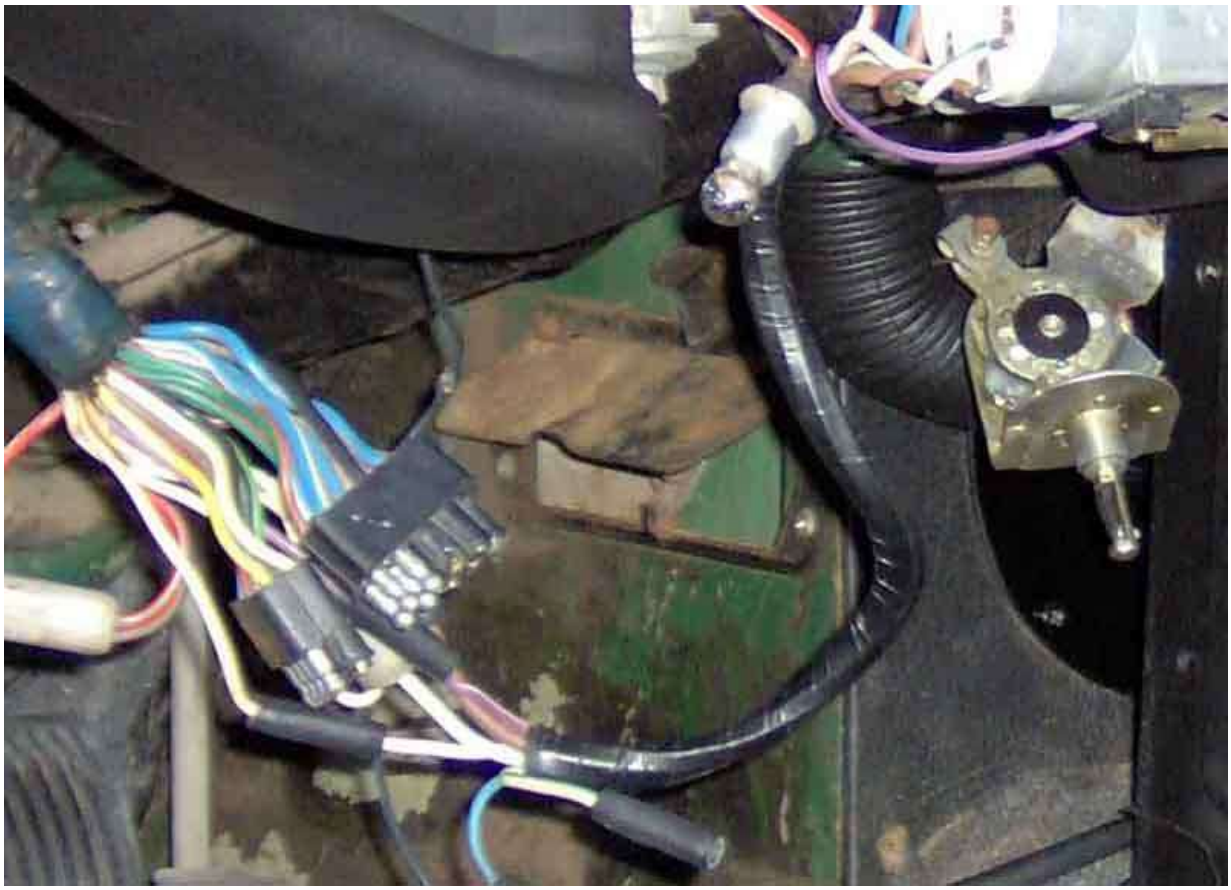

The tubes BHH609 that connect the air vents to the bulkhead. NLA from the usual suspects at the time of writing, some showing up on eBay. The round end is a push-fit into the bulkhead hole, each with four protrusions (arrowed) to click them into position. The vents themselves are just a sliding fit onto the square end:

The cowled inlets in the heater intake:

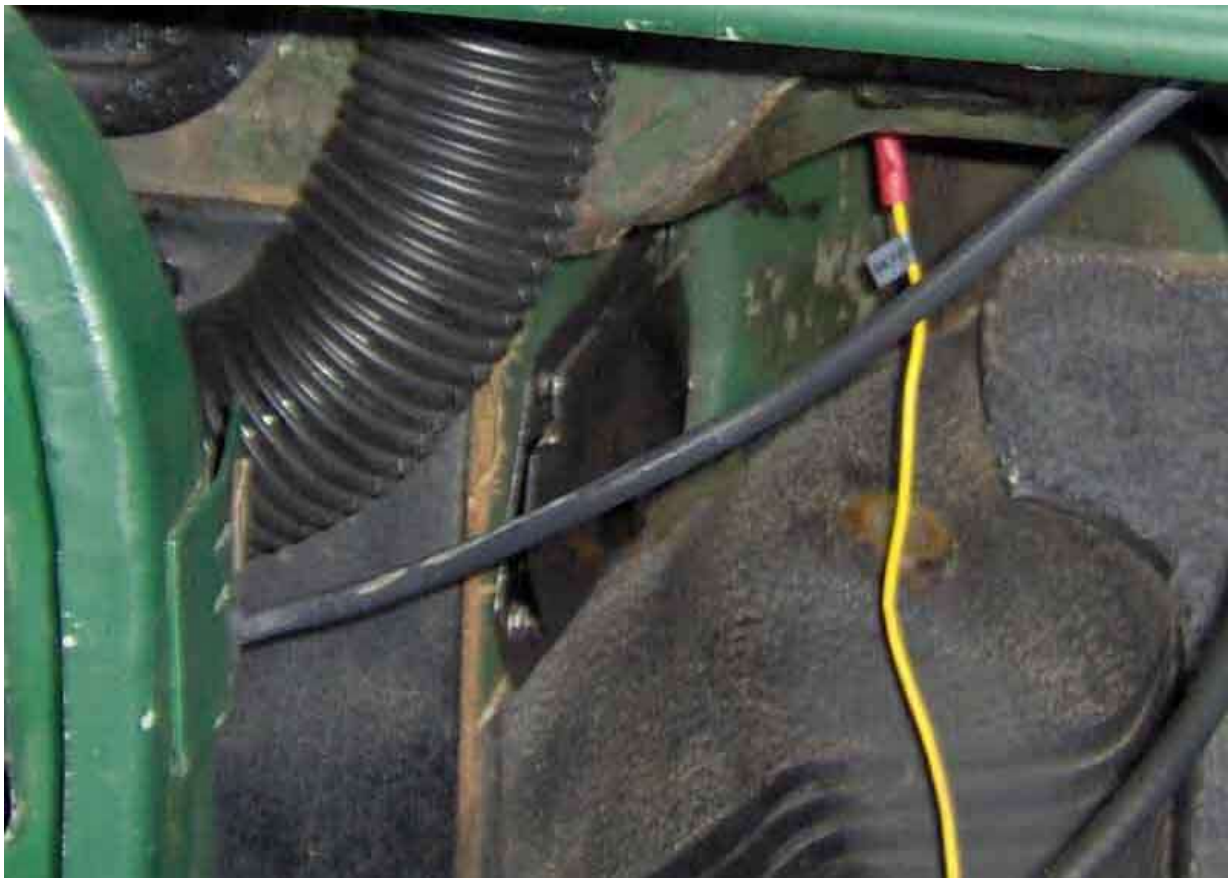


# Footwell Vents

Early (up to August 1970) left-hand footwell vent shown in the open position. This picture and the next courtesy of Rick Lindsay.

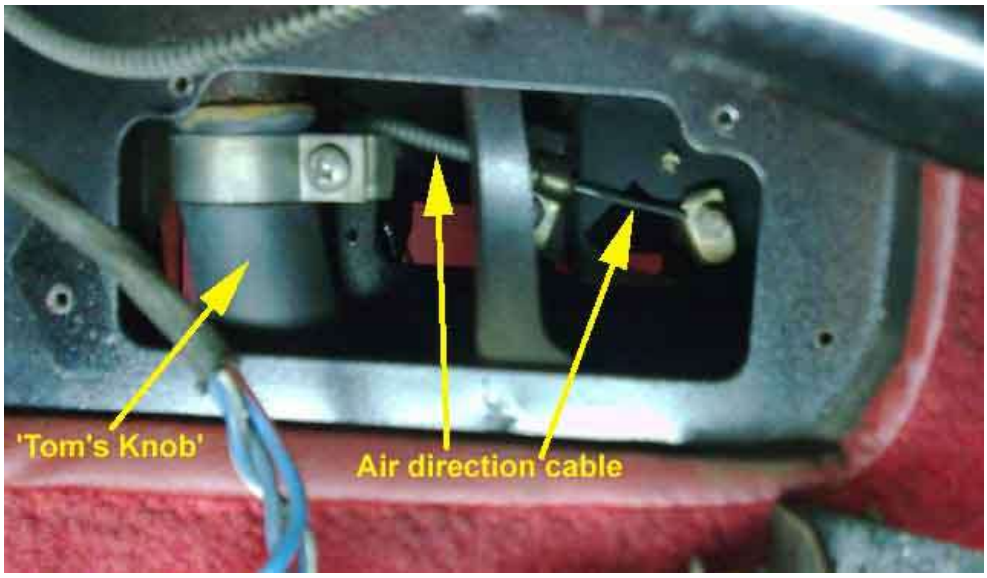


Early right-hand vent shown in the closed position.

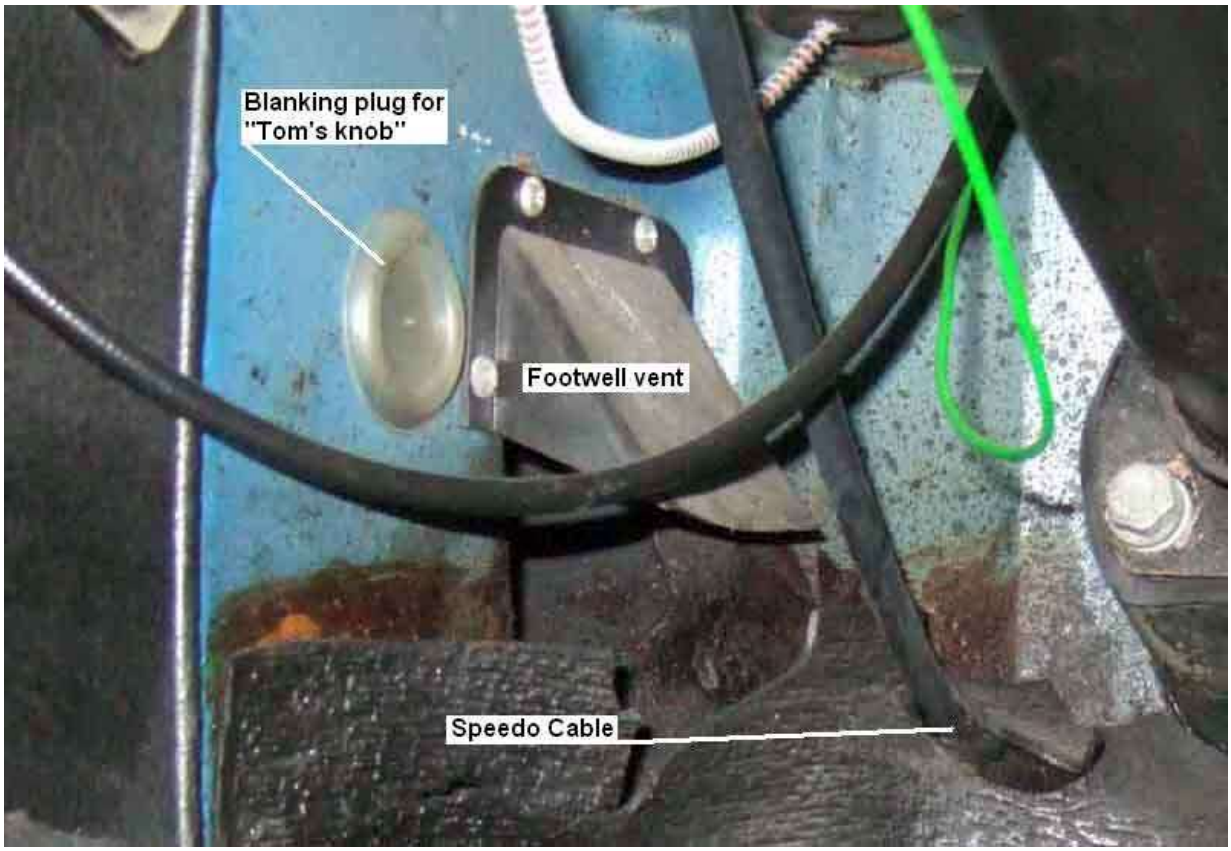


The right-had vent when removed gives better access to the air-direction cable (slightly) and Tom's Knob hose clamp than does the later fixed hood and bung. (DK McNeill)

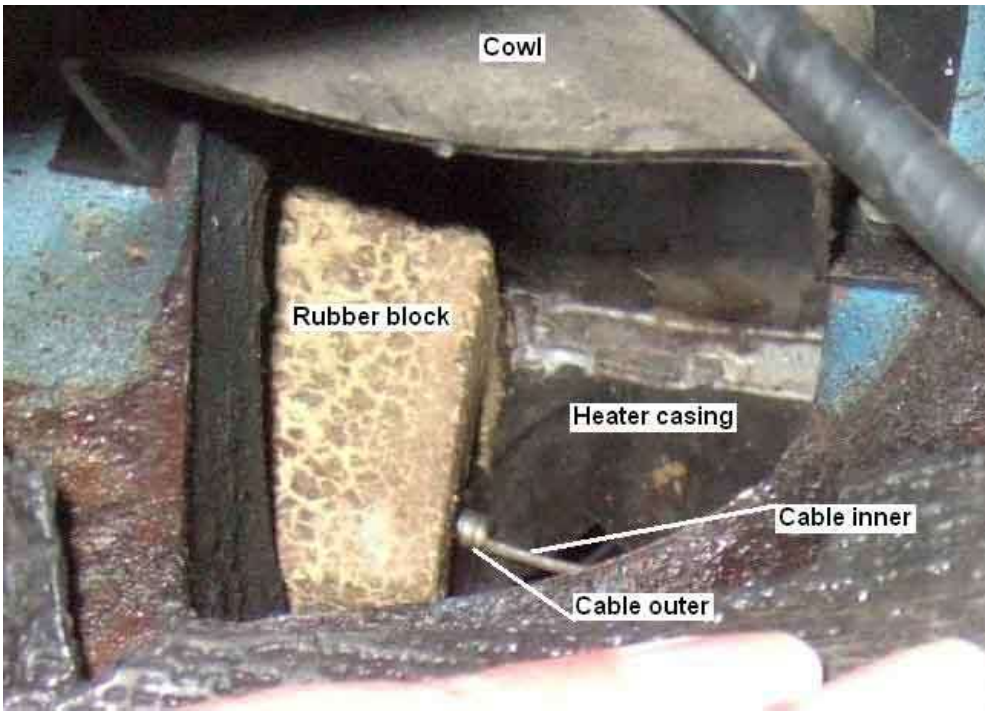
Another view from Dave O'Neil:



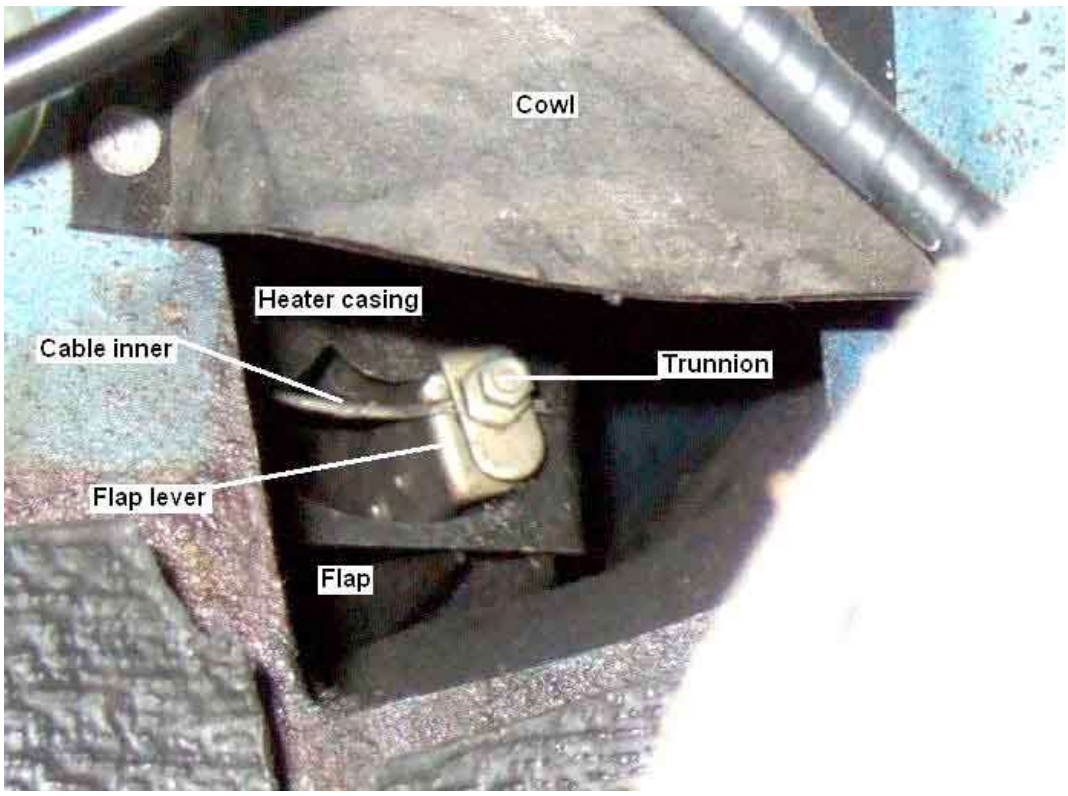

Later (August 1970 on) fixed vent hood in the right-hand footwell of my 75 V8 (this also nicely shows the access plug for the heater drain tube clamp).




The air-flap cable attachments can only be shown in two separate pictures on an RHD as the pedals get in the way. Note the rubber block, the clamp for outer is covered by it, making undoing or fastening without cutting into the block impossible.



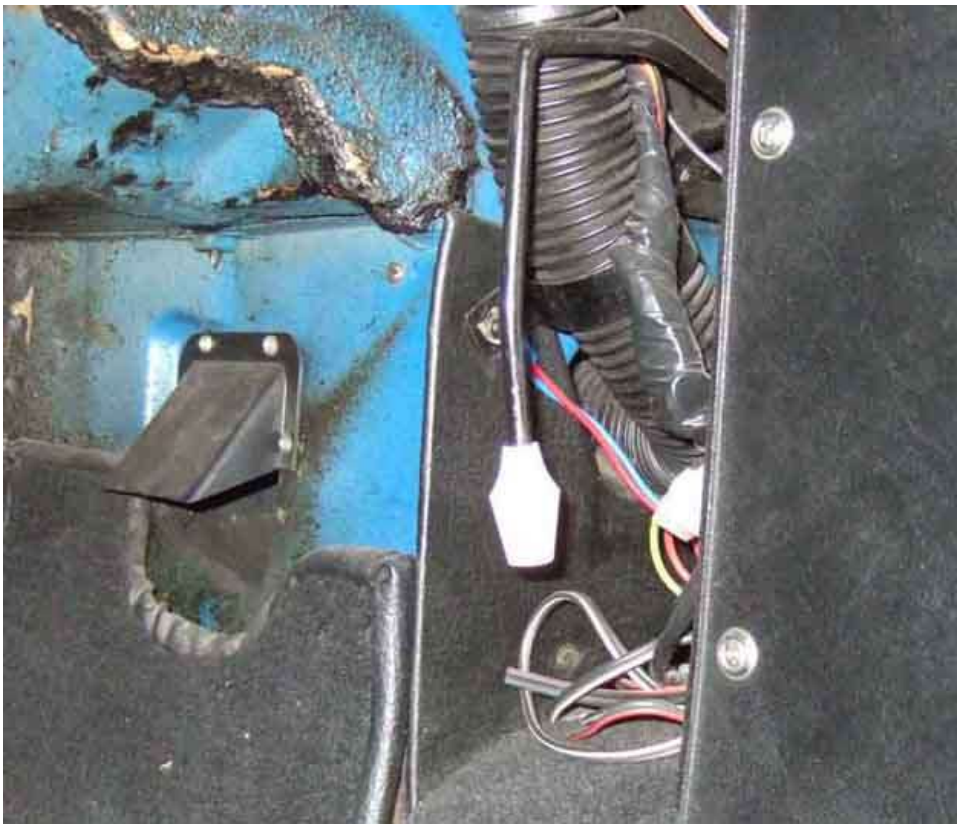

The inner fastening to the flap lever, shown in the Off position. This looks to be more accessible but I can only just get a finger-tip to it, although access would be better with the cowl removed. You would still need to manipulate the end of the cable with a pair of very long nosed pliers, and the trunnion with a nut driver on an extension, you wouldn't be able to see the hole in the trunnion, and the pedals on an RHD prevent you looking straight into the space! All in all a difficult proposition even if you were only replacing the inner. This seems to be a stranded inner, but logic dictates that it should be solid as it has to push the flap closed as well as pull it open, and there is no spring to aid closing. I must be fortunate in that this flap is very easy to move. Interestingly my mate Terry with a 73/74 reports that his also seems to be stranded as is my 73 roadster, whereas his replacement from the MGOC (original chopped off both ends when the heater was removed by a PO) is solid. I've come to the conclusion that a stranded cable is fitted as these are much more flexible, as the cable has to cross from one side to the other behind the dash to get from the heater unit to the dash control.




Control for the cold-air flap in the left-hand footwell, in the closed position. This is the later lever, longer and angled downwards giving more leverage.

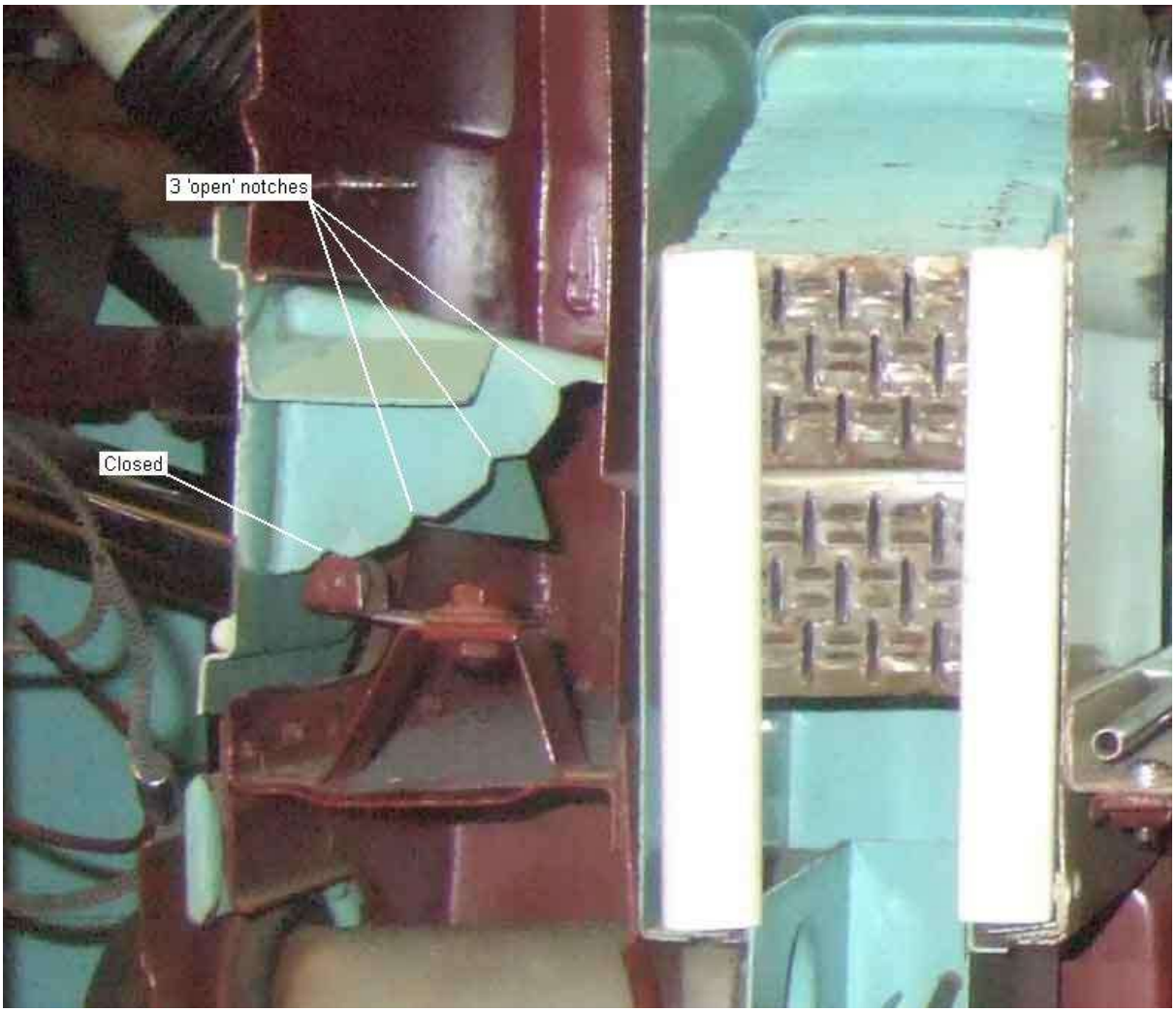
The early lever just pointed sideways making it much harder to move as well as being more hidden under the dash. They also had black knobs (this is the Gaydon cut-away hence the flap itself being white instead of the usual black).

Open to the first notch ...



... and to the 2nd, you can see the flap open directly above the handle, between the rear edge of the centre console and the demister ducting.

The British Motor Museum Gaydon 'cut-away' MGB clearly showing the **four** notches in the control quadrant, giving one closed and **three** open positions. The third notch seems to be deeper than the others, which will mean it takes more of a pull to get it from that to the fourth, which is maybe why many (well, everyone else as far as I have found) thinks there are only three notches and hence only two open positions.




Herb Adler's mod with a coil spring (arrowed) between the head of the bolt and the detent. This allows the arm with the roller to move downwards slightly when moving the cold air flap, rather than having to spring the arm itself, making the flap easier to open and close. A longer bolt may be required, secured with threadlock or possibly a lock-nut. This also shows one of the vanes that are attached to the back of the flap (nearest the camera, concealing the roller) which direct air sideways into the footwells when the flap is open.

The back of the cold air flap showing the vanes that direct air into the footwells.

# Screen Vents

## Pre-1972:

Showing the rigid tubes (white) between the heater unit and the elbows, and the flat bulkhead:


The demister outlets viewed through the cut-out in the cabin-side bulkhead. (*Dave O'Neil*)

The elbows in the mounting plate that covers the above cut-out. (*Chris Wilson*)

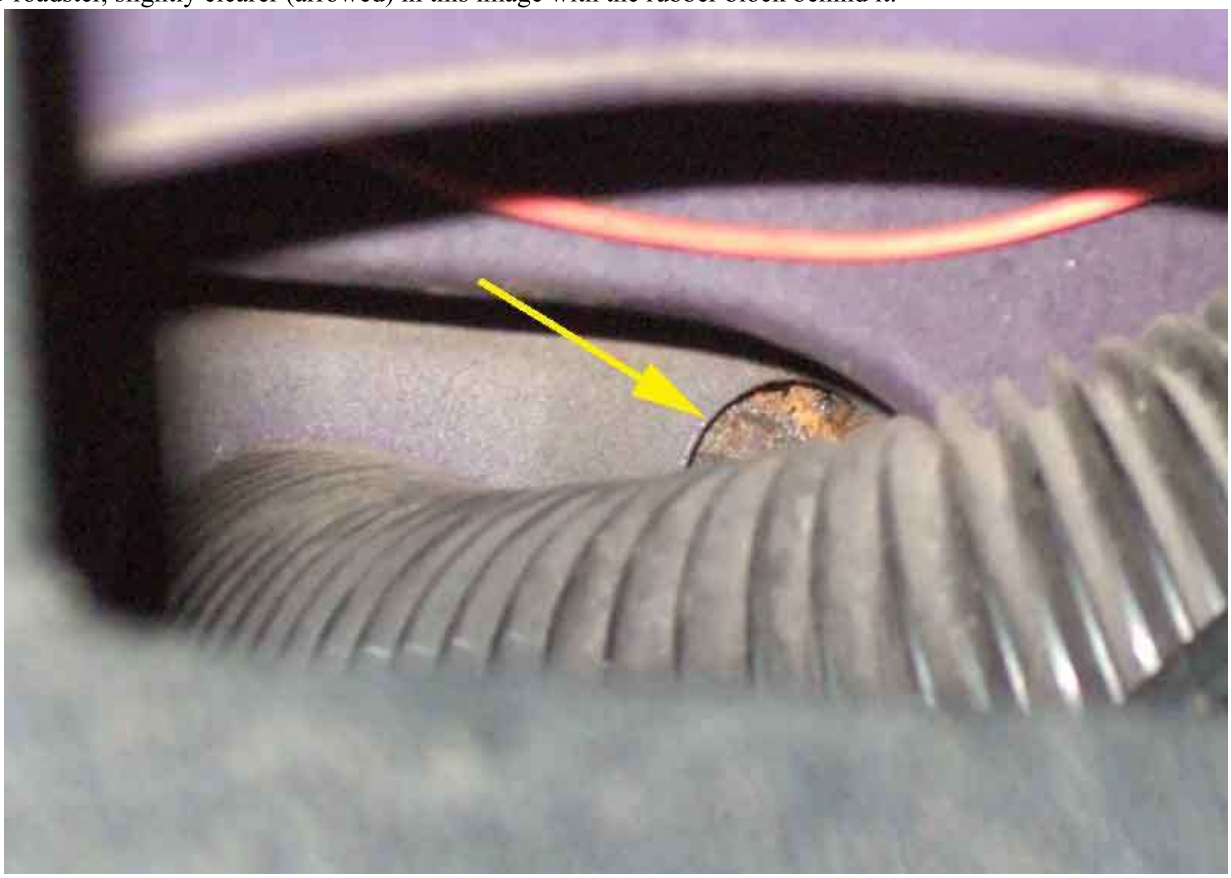
## 1972-on:

Flexible tubes turning to face the heater i.e. no elbows. Black trim panel goes under the tubes, with this removed you have better access to push the tubes into the rubber block.

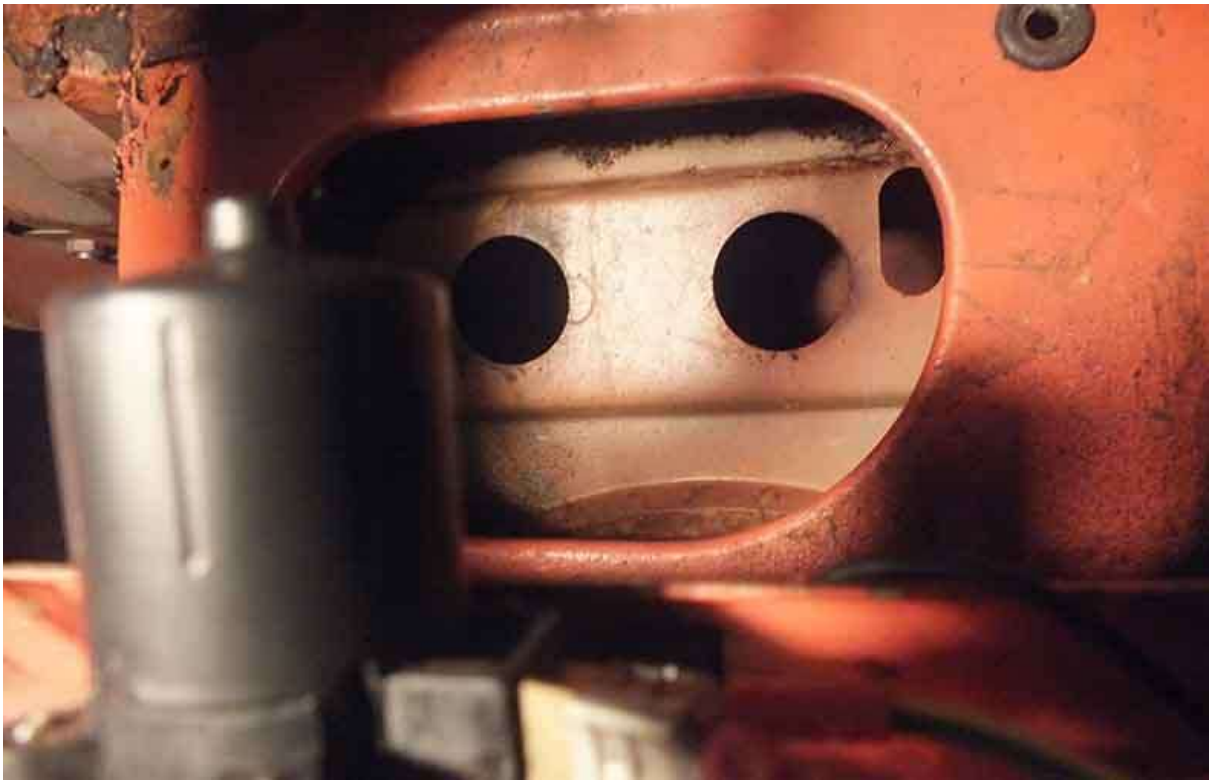
The tubes pass through the large aperture in the cabin-side bulkhead, and the smaller holes in the engine compartment-side bulkhead, direct to the rubber block seal.

Note that at some point the air-direction cable got a dedicated slot for the cable (compare with the earlier arrangement), which made it much easier to fit the cable to the heater unit before fitting the heater to the car. Before that the cable had to be fitted afterwards - bad enough with the large pre-1970 footwell vent, difficult with the later fixed vent and especially with the rubber block arrangement. The cable had to be attached in-situ originally as before the dedicated slot it was impossible to get the heater into the body with the cable already attached without severely kinking the cable. Haynes indicates and Chicagoland MG Club claims it wasn't until 1977 that this dedicated slot for the cable was provided, but you can just see it in the image above of

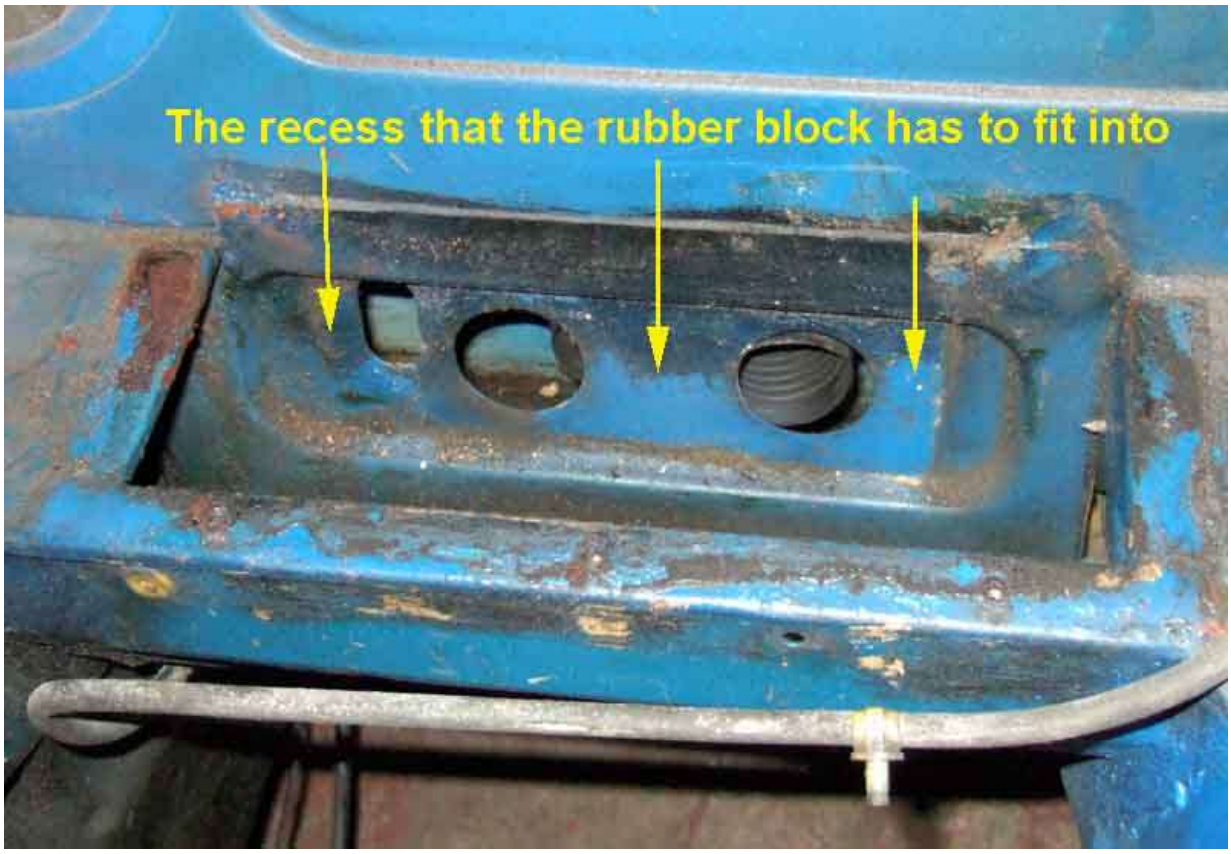
my 1973 roadster, slightly clearer (arrowed) in this image with the rubber block behind it.



Even clearer is this image on a chrome bumper shell that could be as early as 1971. (*Graham Barker*)

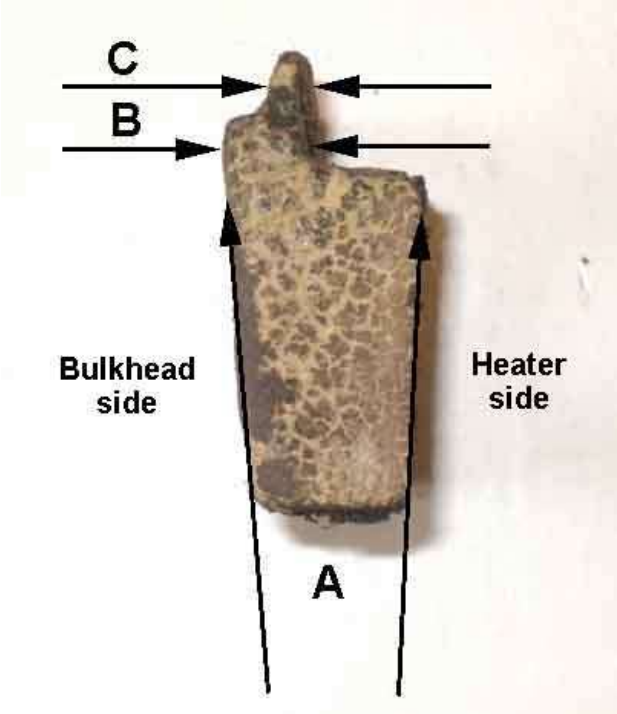


Engine compartment side, on Vee (1975), corrugated tubing visible behind the panel. These just push into the rubber block which fits into a recess in the bulkhead.




The only vent tube that seems to be available now is this AHH5428 'paper and foil' type which I doubt handles the bends as well as the original corrugated plastic type, and is a horrendous ⧫18! Each!!: (*Moss Europe*)

The block gets thicker towards the top, so has to be compressed more and more to fit into the recess. At point 'B' it is being compressed by half to the thickness at 'C'.




'A' is the thinner part of the block that is above the recess. There may be some scope for thinning the block at the shaded areas, so there is less to compress.

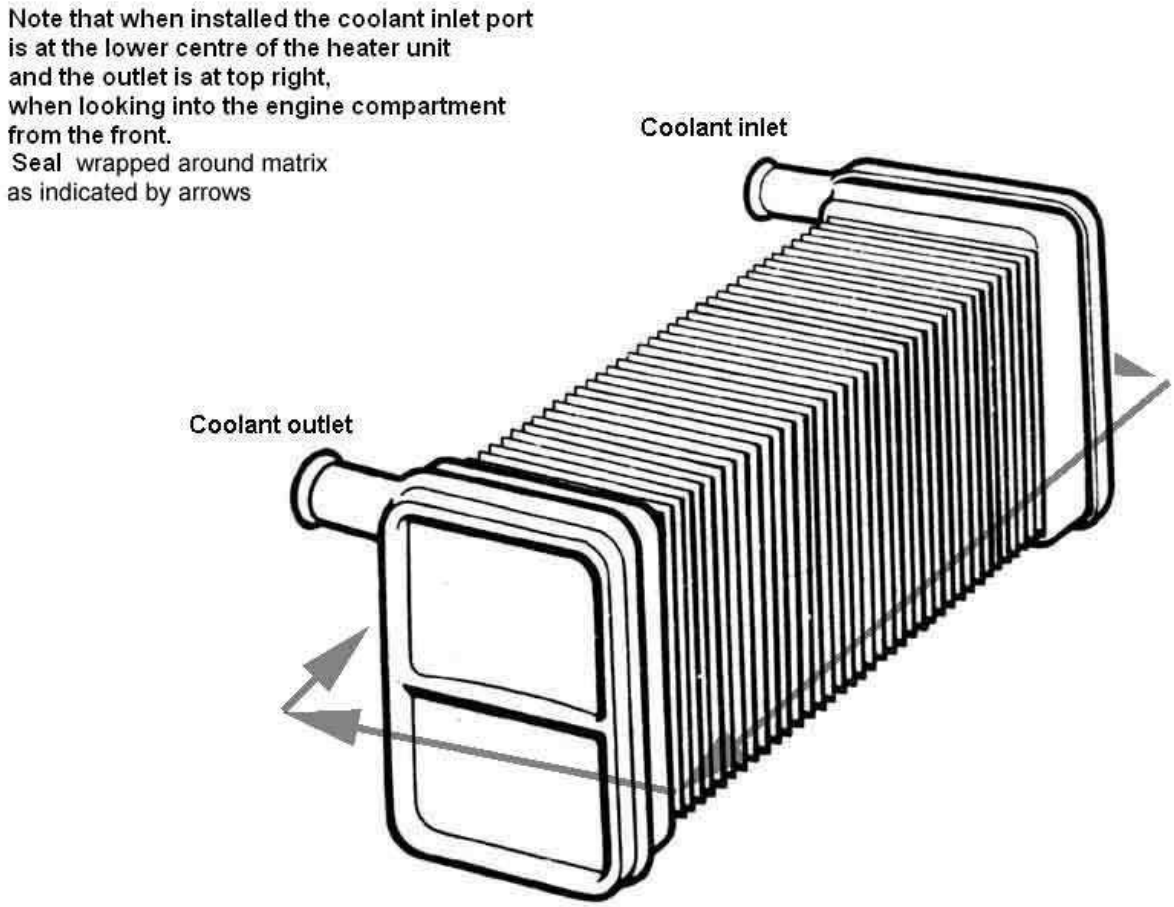

New block (BHH389) trimmed with a craft knife, leaving the full thickness of the material around the vent holes. As suspected the bottom of the heater was 1/4" forwards of where it needed to be to be pushed down into the cavity. But daubing both the face of the block and the back of the cavity with Swarfega as a lubricant, as well as reducing the thickness over most of the upper edge, allowed me to wedge the left-hand corner in.

After that pressing down and wiggling got the rest of the bottom of the heater into the cavity, then pushing straight down was relatively easy - especially with no engine!

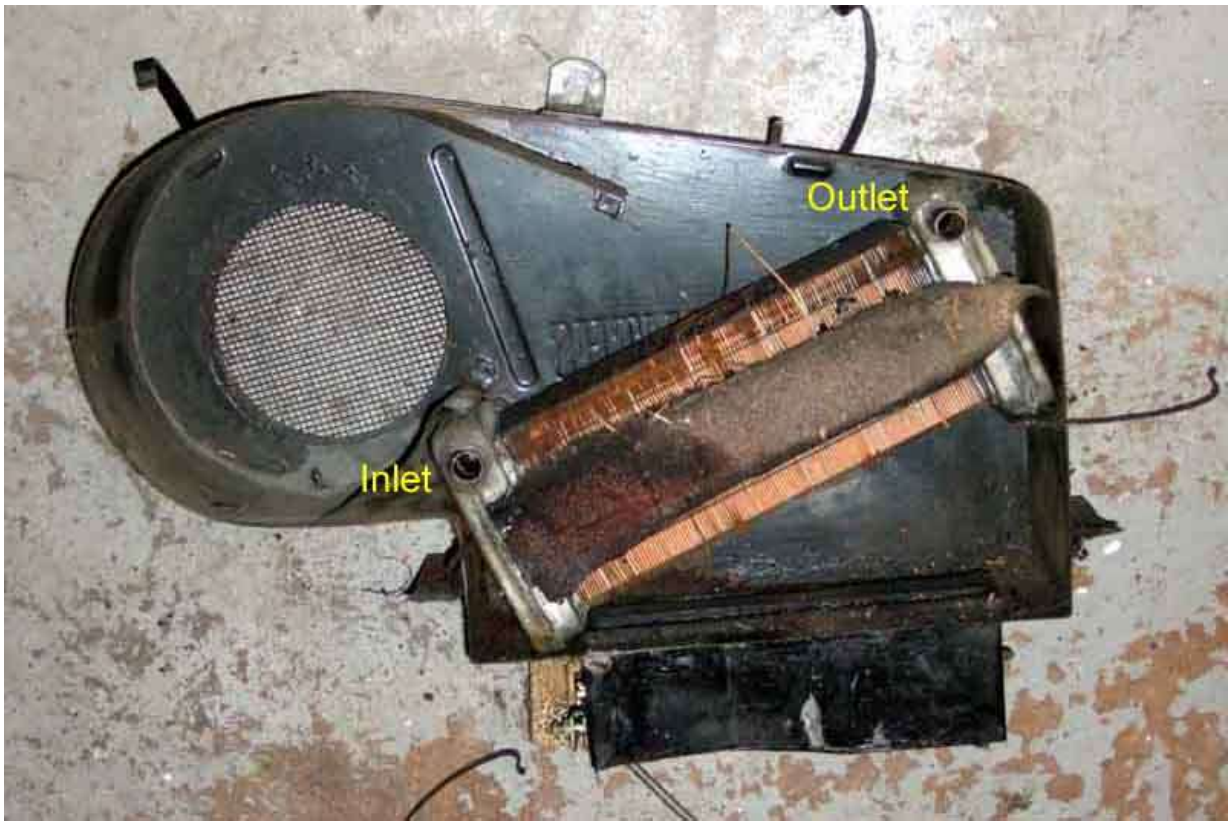
However Brian Wall of Exeter MG Owners Club opted to stick it to the bulkhead rather than the heater, and once lubricated the heater went in (and came back out) easily. It also struck me that without the heater it would be easier to fully seat the demister tubes in the block, doing it purely from the cabin was quite a fiddle. But then again, there are protrusions around the demister outlets on the heater that would have to be pushed down the face of the rubber block, but more importantly the clamp for the cable outer is inside the large slot in the rubber block. Given that I can't see how - with the heater I have - it could be installed with the rubber block glued to the bulkhead.

# Heater Matrix

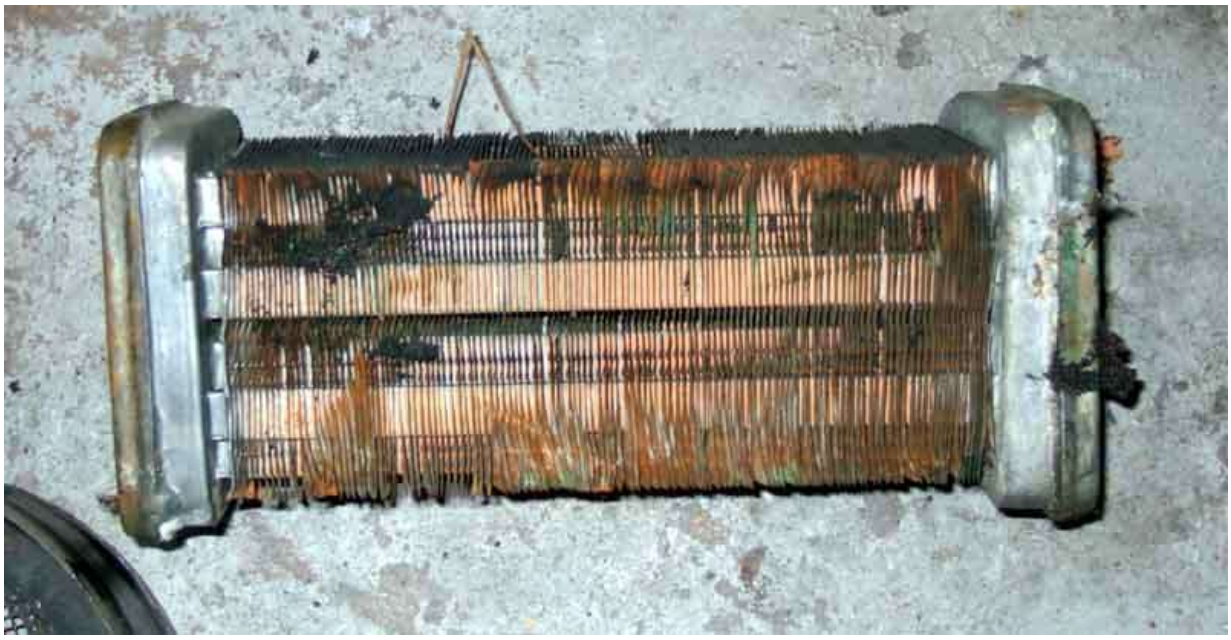
Most cars:




Vee's heater (removed as part of a restoration) cover removed, manky foam on this side of the matrix ...

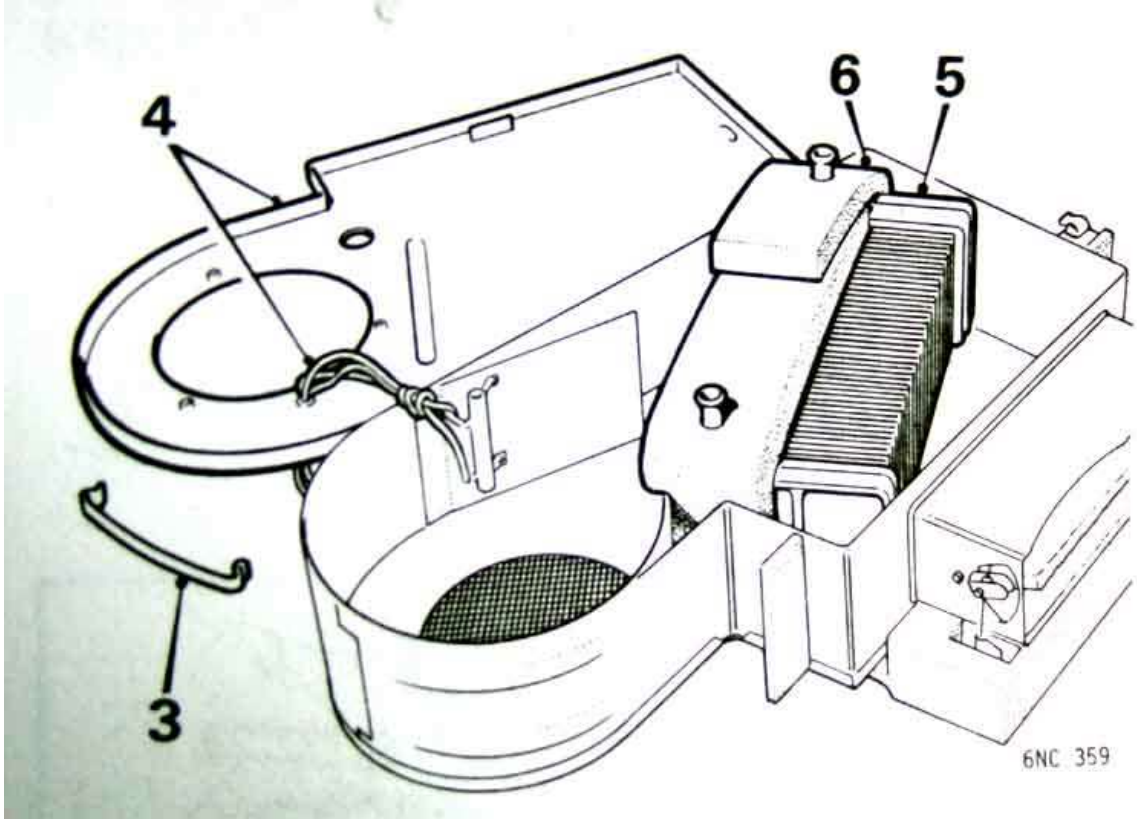


... and no foam at all on the other side, allowing a significant amount of cold air to bypass the matrix:



New seal fitted, seals the ends as well as the sides, so air can only pass through the heater unit by flowing through the matrix itself. Note the direction of fan rotation, on motors with differently coloured wires reversed connection will greatly limit fan effectiveness. Even when you connect green/yellow from the motor to green/yellow in the harness and black to black the motor may still turn the wrong way, more info here:

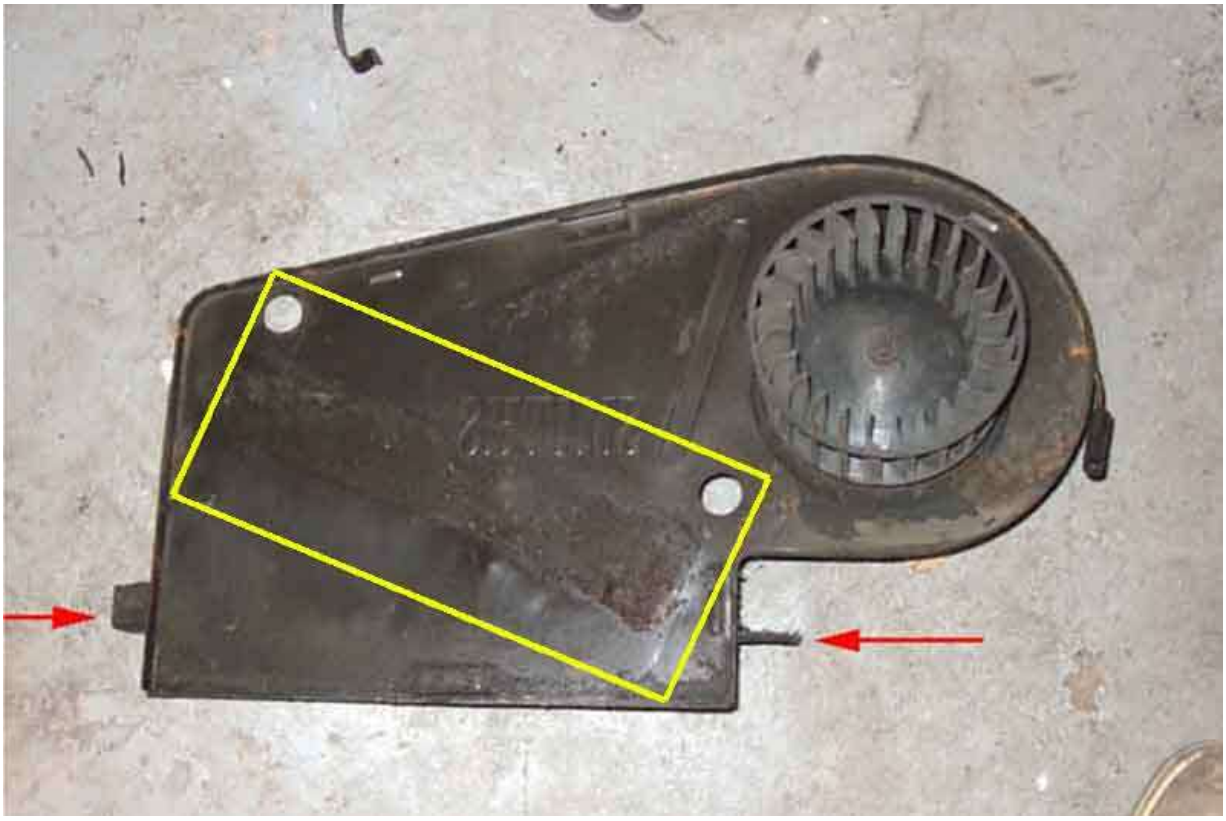

However I note that the late Leyland Workshop Manuals show the foam seal wrapped round the upper half of the matrix, with the ports poking through:




Maybe saved them from fitting the port grommets below! Seal for the matrix ports where they pass through the cover. A grommet, so fitted to the cover before it is fitted over the ports:

By cutting across the cover immediately below the bigger flange that screws the heater down onto the bulkhead shelf (red arrows), the cover can be removed with the heater unit in-situ. One corner of the matrix is still tucked down into the bulkhead shelf slot, and there are parts of the main case that look as if the matrix can only be withdrawn straight forwards. Presumably it **can** be fiddled out otherwise people wouldn't do the mod, although I don't think I've ever read of someone subsequently needing to remove the matrix to prove it! The cut-off piece should be pop-riveted to the main case, and ideally a small strip across the bottom of the main cover that will go down into the bulkhead shelf slot in lieu of that part of the original cover, to maintain the sealing so that all the heated air passes into the cabin and doesn't leak out into the engine bay. If you are desperate and need to change the matrix without removing the heater it's said that you can fold the cover down, presumably far enough to clear the matrix tubes, but that would seem to allow even less space for the matrix to be wiggled out past the location pieces in

the main case. The other thing cutting the cover allows is to fit an uprated impeller to the motor, which is said to be bigger than the hole in the cover unlike the standard impeller, as well as to be able remove the motor with the larger impeller:



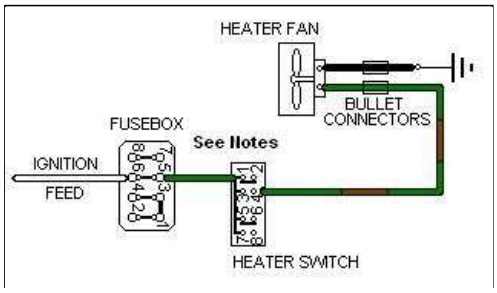
The Clayton Classics heater, very tight in a V8: (*Terry Brown*)

Available from Moss Europe at the humongous price of £460, although to be fair B&G are showing the standard 77 and later heater unit at £475. Moss matrix uprated from 1kW to 3kW, three speed fan, motor completely contained in the case. But note that unless you have full coolant flow through the system and coolant at the right temperature i.e. everything else in the cooling/heating system working correctly you won't see that level of improvement and with more air flow it could be cooler:

Single-speed before 77 Two-speed 1977-on

# Single-speed heater fan (before 1977)

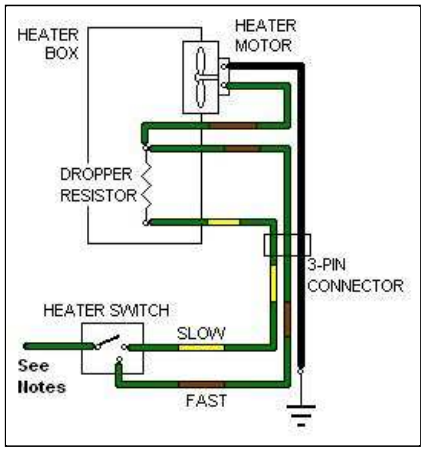
Hover over a wire to confirm the colour




Note 1: Up to 1970 the heater fan was powered from the green circuit in the fusebox. From 1971 for the remainder of chrome bumper production and all V8s the heater fan (and wipers and electric washers) were powered from the accessories position of the ignition switch via a white/green to an in-line fuse under the fusebox, and then via a green/pink to the fan switch. 4-cylinder rubber bumper cars up to the 1977 model year were powered from the green circuit in the fusebox again.
Note 2: Before 1970 the wire from the switch to the motor was Green with a Brown tracer. From 1970 it was Green with a Yellow tracer.
Note 3: Up to October 64 the wires going into the fan motor may both have been black. Because of the 2-way bullet connectors these can be connected either way round and should make no difference. The later fan motor with the differently coloured wires gives a vastly superior performance one way round compared to the other, try both ways.
Note 4: The single-speed fans on my 73 and 75 take about 3 amps.

# Two-speed heater fan (1977 on)

Hover over a wire to confirm the colour




Note 1: On 1977 models the heater fan is powered from the green circuit in the fusebox off the ignition relay, but when the ignition relay circuit on RHD cars was modified sometime in 1978 a second in-line fuse between brown/white and green wires was added under the fusebox. The heater fan (together with indicators and GT HRW) was powered from one of these - the one with the thinner wires, the other with thick wires being for the cooling fan.
Note 2: If installing an uprated or aftermarket dual-speed motor that has three terminals to give the two speeds, care must be taken with the switching that power is not applied to both live motor terminals at the same time, or the motor will be damaged. This does not occur with the original two-speed system that used a single-speed motor and additional dropper resistor as shown above.

I didn't know the actual resistance and wattage values of the dropper resistor, but did some tests to see what sort of values they might be. I put a standard 3 ohm coil in series with the motor and it seemed to drop the speed by about half which would be about right. I then measured the voltage across it with the motor running at this speed and got about 5v, which at a system voltage of 12v (engine not running) is about half voltage which tends to confirm what I'd heard. This represents about 1.7 amps (voltage across the resistor divided by its resistance). Subsequently the manufacturer of the heater systems for the MGB and many other makes and models, Ashley Hinton, told me that they were 2.5 ohms so not a bad guess. Based on my test the motor has an equivalent 'resistance' of about 4 ohms, so with a 2.5 ohm resistor you would get about 2.2 amps, so about 5.5v across the resistor. Wattage is calculated by squaring the voltage and dividing by the resistance i.e. 5.5x5.5/2.53 which gives 12 watts. If you want to convert a single-speed system to a 2-speed the resistor would need to be greater than 12w to avoid burning it out, and probably screwed to a metal mass to aid cooling, making this type the best bet.

If you have a 2-speed you can measure the resistance by putting an ohmmeter between the green/yellow and green/brown wires with the fan switched off, and measure the voltage across the resistor by putting a voltmeter between those two wires with the ignition on and the fan switched to slow.

You can only calculate watts by measuring the actual resistance of and voltage across the resistor in this way as motor current varies with rotational speed, a stalled motor taking a lot more current than a freely running one. You can't measure the resistance of a stationary motor and use that in any calculations, except to see what the stalled current would be.

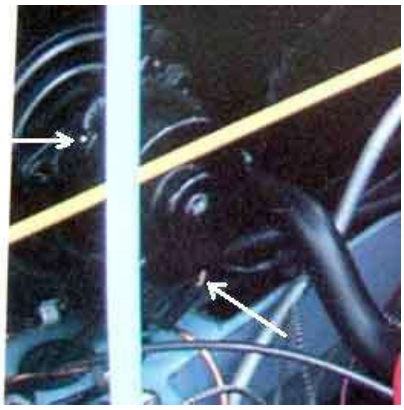
# Heater Motor and Fan

All photos from Clausager except where stated.

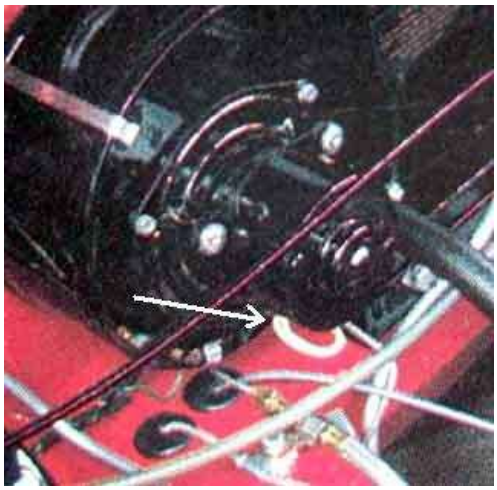
Types 2-speed systems Polarity and fan direction

**Types:**

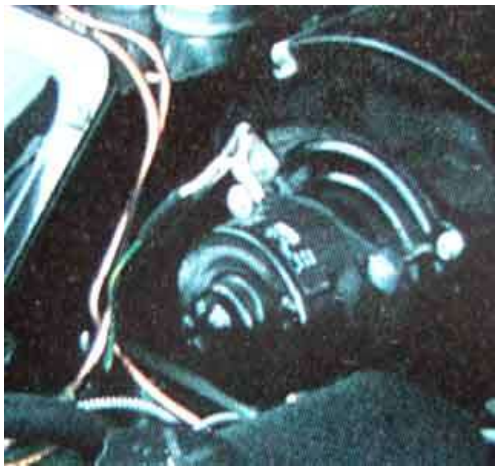
1962. On the face of it no white wires, but close inspection indicates the wires are wrapped in black tape, and there are traces of white at each end (arrowed), entering the motor near the top:



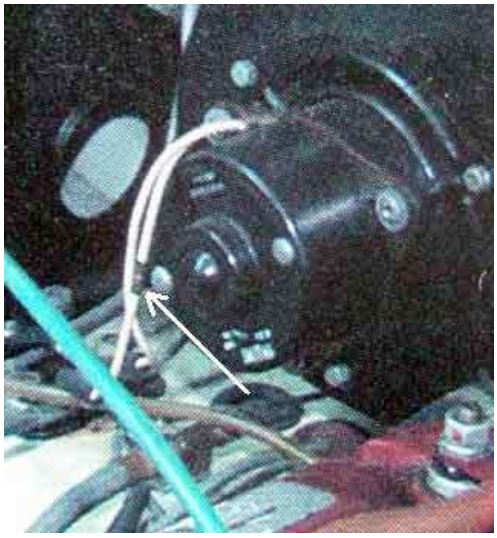
1964. Definitely two white wires entering the motor at one point, near the bottom:

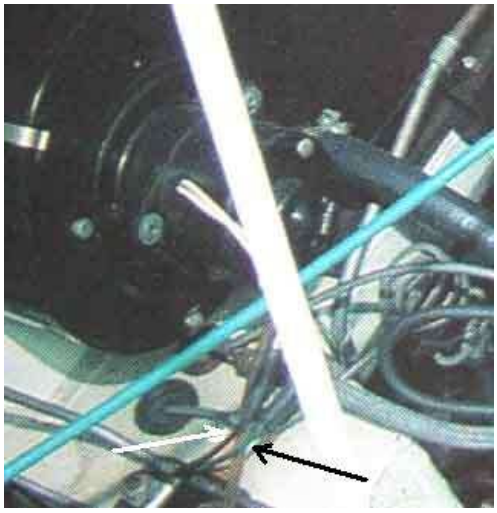


1968 MGC. This seems to have the early longer motor and the two white wires:



1969, still two white wires, although one has sleeve on it, possibly indicating polarity! This wire does seem to be going to the coloured harness wire, with the other one going to the black:

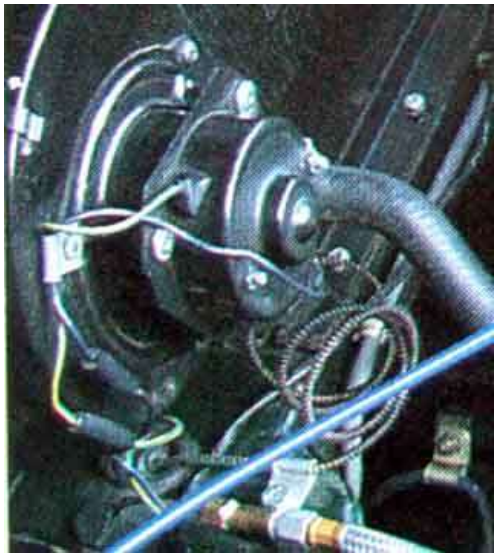


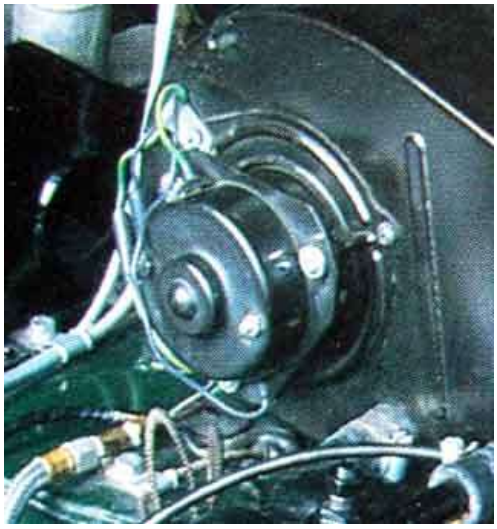


This 1969 MGC seems to have the later coloured wires and the shorter motor with the polarity indication, even though it is still three years before the introduction of the V8. Compare the depth of the motor bodies in the following pictures with those above. However this, and any of the photos, could be sporting a replacement heater unit or motor:

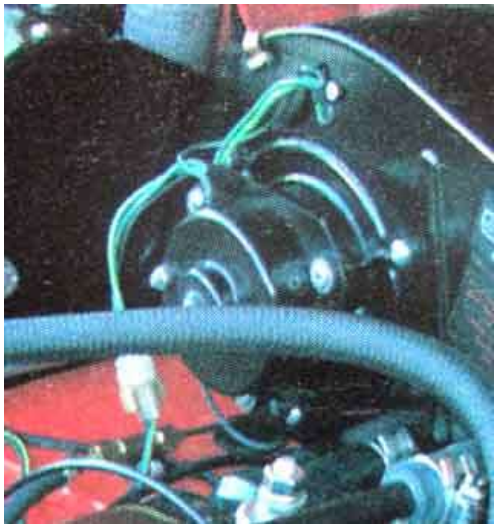
1972. One coloured and one black wire, entering the motor together, and polarity indication as above:

1975, definitely one coloured and one black wire going to opposite sides of the motor. A clear difference in the shape and size of the flange on the motor body compared to the earlier one:



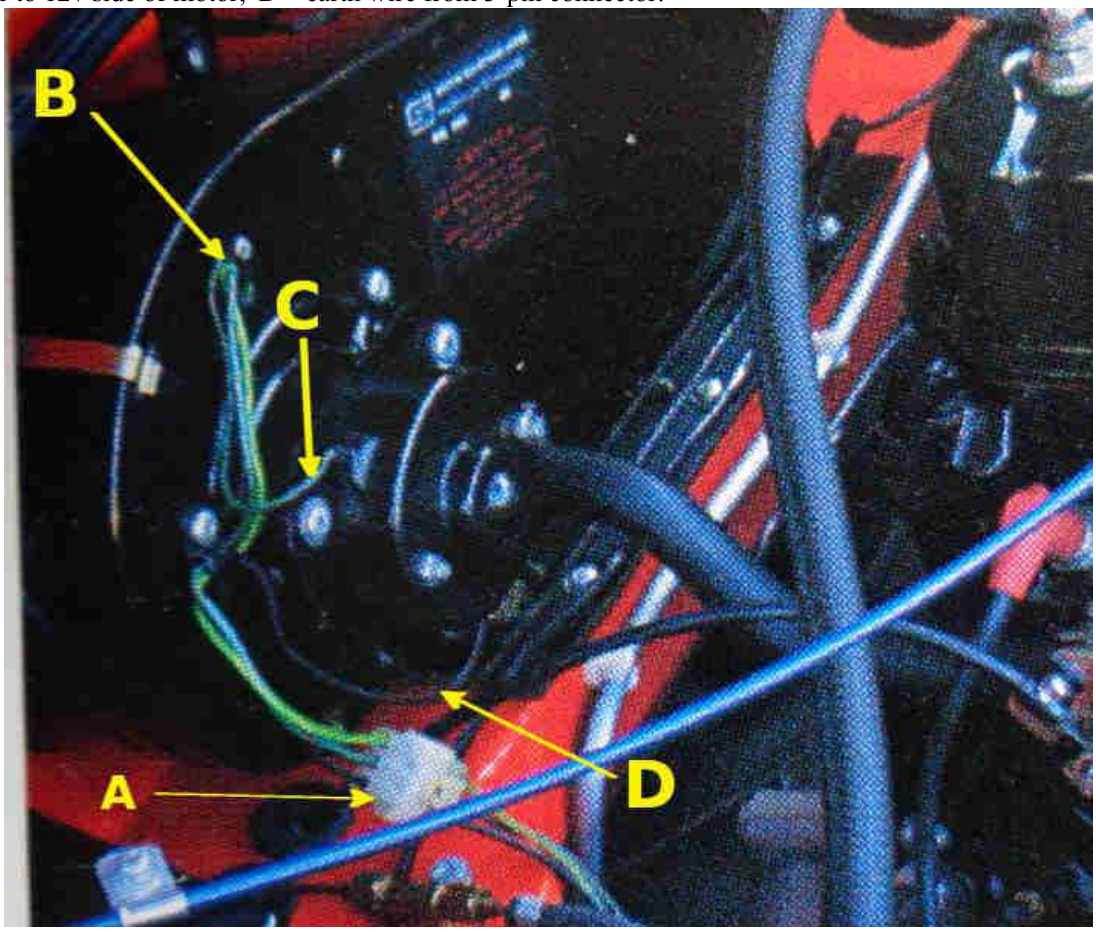


1980. Probably the same size motor (externally at any rate). Three wires coming from a 3-pin plug, two of them going into the heater casing plus the black earth wire going direct to the motor, and a third coloured wire coming out of the casing and going to the other side of the motor:



**2-speed systems:**

**Factory:** 'A' - 3-pin connector; 'B' - three wires going through heater cover, two from the 3-pin connector; 'C' - wire from heater cover to 12v side of motor; 'D' - earth wire from 3-pin connector:




Dropper resistor for 77 and later 2-speed heater fan (circled) inside case: (*Photo by Andy Charman*)

I didn't know the actual resistance and wattage values of the dropper resistor, but did some tests to see what sort of values they might be. I put a standard 3 ohm coil in series with the motor and it seemed to drop the speed by about half which would be about right. I then measured the voltage across it with the motor running at this speed and got about 5v, which at a system voltage of 12v (engine not running) is about half voltage which tends to confirm what I'd heard. This represents about 1.7 amps (voltage across the resistor divided by its resistance). Subsequently the manufacturer of the heater systems for the MGB and many other makes and models, Ashley Hinton, told me that they were 2.5 ohms so not a bad guess. Based on my test the motor has an equivalent 'resistance' of about 4 ohms, so with a 2.5 ohm resistor you would get about 2.2 amps, so about 5.5v across the resistor. Wattage is calculated by squaring the voltage and dividing by the resistance i.e. 5.5x5.5/2.53 which gives 12 watts. If you want to convert a single-speed system to a 2-speed the resistor would need to be greater than 12w to avoid burning it out, and probably screwed to a metal mass to aid cooling, making this type the best bet.

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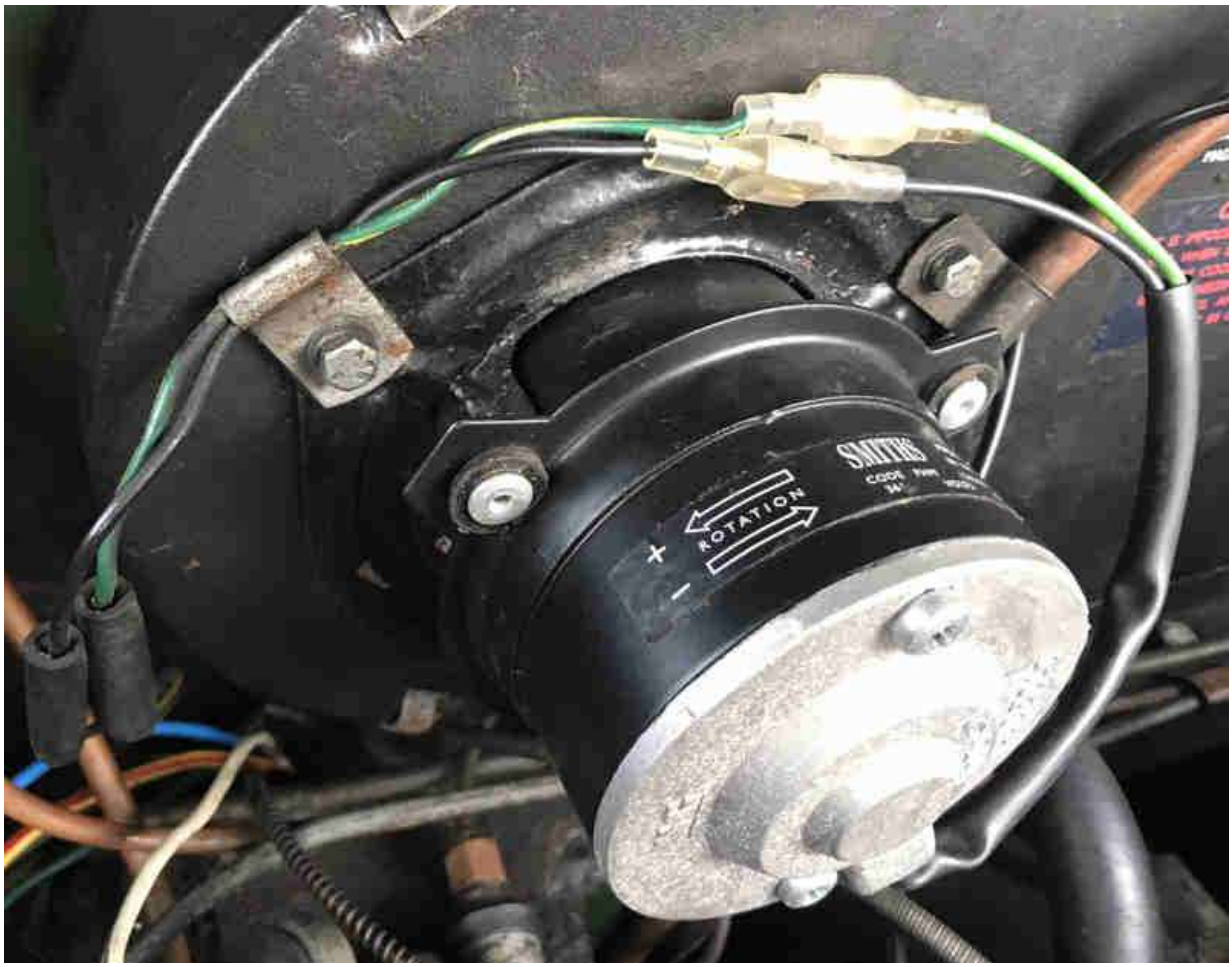
**After-market:** An after-market 3-wire (you can just make out the tinned end of the black wire just overlapping the grey wire, and a red wire), 2-speed motor and fan from MG Parts Benelux which may be the same as the 2-speed offered by MGOC. The correct rotation is shown on the label:


**Polarity and fan direction:**

Clive Wells' 1969. The label on the motor clearly indicates it is polarity-sensitive - but what does '+ve' and '-ve' mean? After some pondering I have come to the conclusion that it refers to the polarity of the car's electrics in that a negative earth car - these labels only appeared after that change - connecting colour to colour and black to black would result in the motor and fan rotating correctly. As all motors now seem to have differently coloured wires a +ve earth car would need colour connected to black and black to colour to rotate correctly. Ideally the green/yellow would be red so with that and a black wire it would be more obvious which way round to connect them, but there we are. On Clive's the black wire comes out of the top and the coloured (green/yellow) below as per post-72 seem to be so it looks like a replacement motor. And being brightly coloured the lower wire looks like that has been changed as the black is a bit manky. Clive said that reversing the colours where it connected to the car's harness did blow noticeably better, so as it is a negative earth car the wires must be connected incorrectly internally:


Ben Columb's replacement motor, the same direction label (although he fitted that himself), both wires coming out from the bottom and an alloy base to the motor. This replacement came with spade connections, so needed an adapter harness to connect to the bullets of the main harness:



Clive said his now rotates 'clockwise', Ben said his rotates 'anti-clockwise', but what does that rotation mean? Looking at the case with the cover, motor and fan removed there is a guide plate directing air from the fan down onto the top of the matrix. Logically looking at the heater from the motor side that would indicate that the fan rotates clockwise to be the most effective, and checking Bee's that is indeed the case. But if you take the motor and fan out and look at the fan end on, it will be rotating anti-clockwise when most effective:


*February 2022:* Motors listed by Brown & Gammons (left, with spade connections) and Moss Europe (right, bare ends, wires truncated to reduce wasted space) are pictured below. It's not a very clear original but the B&G item has an arrow that would put the fan rotating with the top rotating away from the matrix when in the case (anti-clockwise), and Moss clearly has an arrow showing it would be rotating in the other direction (both circled in green). Both B&G and Moss only show one part number for both +ve and -ve earth cars, but to blow correctly in both it would have to be shunt-wound, i.e. non-polarity sensitive. In about 1970 the MGB motor changed to one with permanent magnets which reverses direction according to polarity, as indicated by the rotation labels above. However the B&G part number 37H7913 has an 'N' suffix which could be taken to be for negative earth, but there is no option listed for positive earth MGA and Mk1 MGBs. Moss again only has one for both +ve and -ve cars, with no suffix letter. Only Rimmer states this part number is for Mk2 cars i.e. negative earth cars, with the Mk1 positive earth version (17H2288) being NLA. None of the other suppliers I have looked at differentiate between +ve and -ve earth, some with a label showing anti-clockwise rotation, others showing clockwise. One other shows spade connections, the others (where visible) have bare ends. Where visible all have both wires exiting the motor body together, and sleeved:


The effect of reverse connection (first clip) and correct connection (second clip) on heater fan performance:

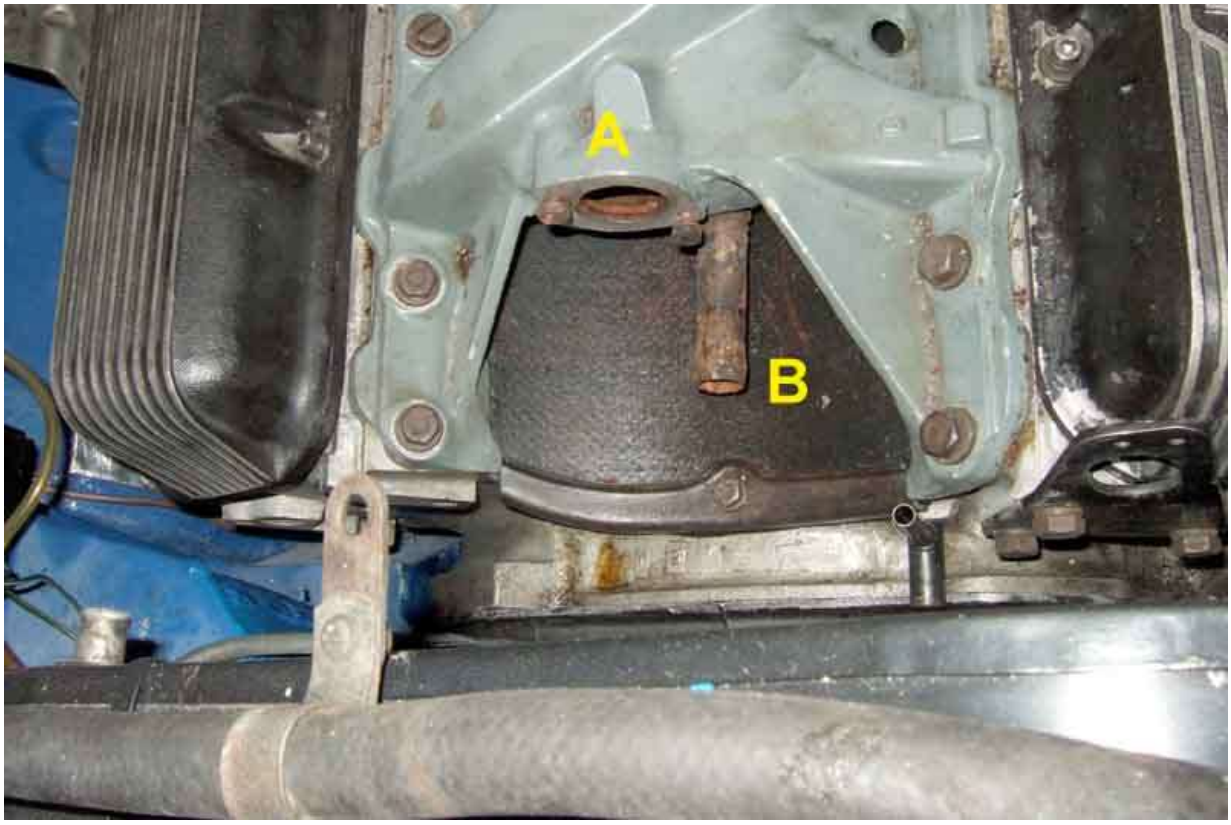
MGB heater fan

And how about the fan? The blades are curved having a concave face and a convex face, they draw air from the centre and blow it outwards centrifugally, but which way would be most effective? Thinking about a spoon one wouldn't use its convex side to lift food from a bowl up to one's mouth, so does that mean air is moved best by the concave face? In which case the fan would be rotating anti-clockwise when looking straight at it as here, or clockwise when looking at the back of the motor when it is in the case:

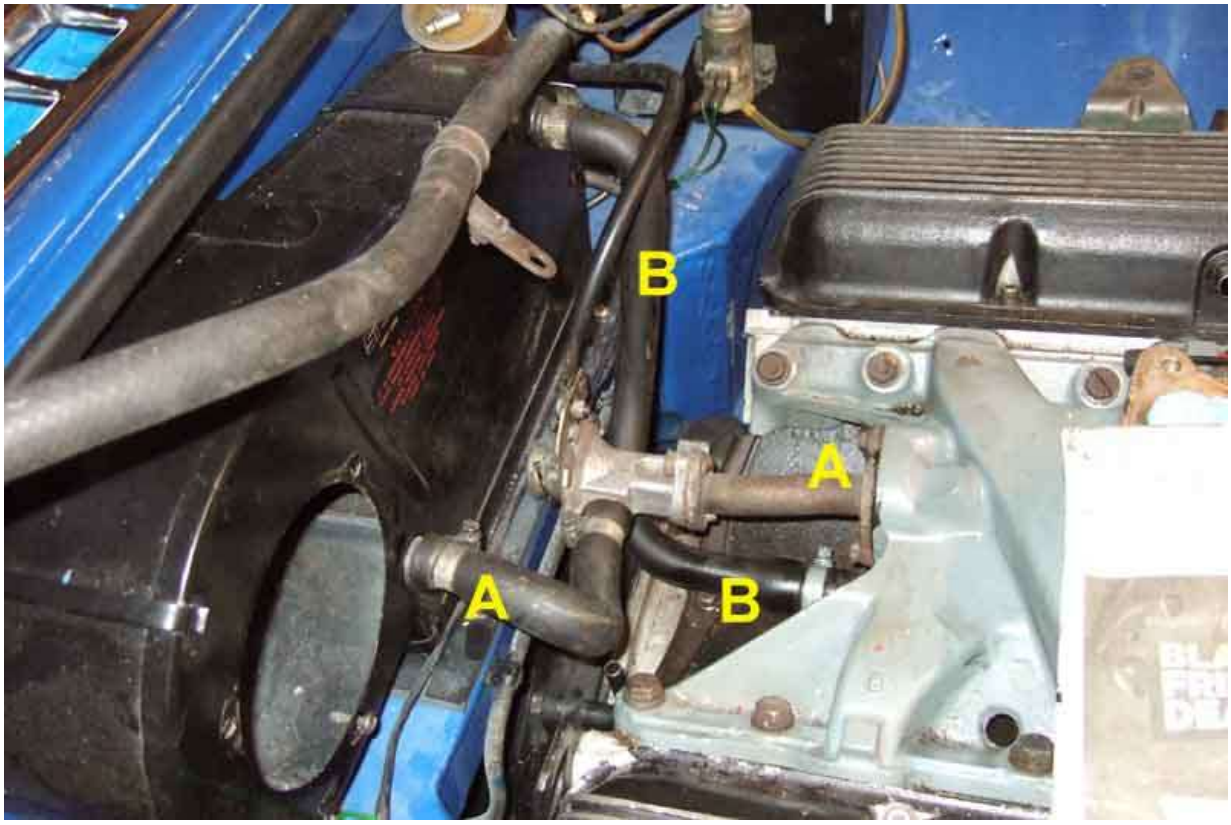
Mine rotates clockwise, and Ben Colomb shows (with a very noisy motor ...) that even out of the casing rotating clockwise shifts more air than anti-clockwise.

# V8 Hoses

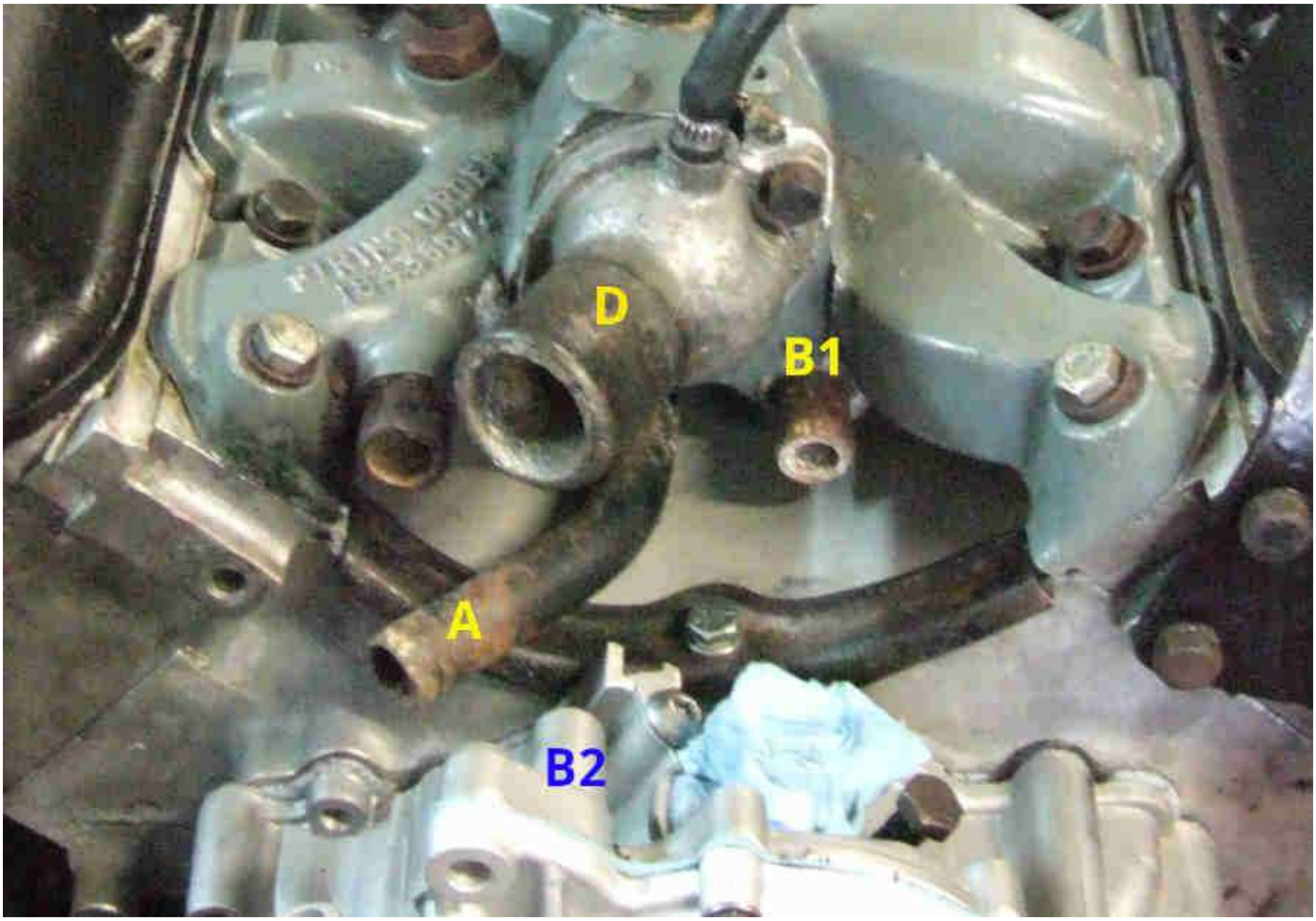
The heat valve on its adapter pipe fits to the outlet 'A' at the back of the inlet manifold, with a hose to the lower port on the heater matrix. The upper port on the matrix is connected to pipe 'B' that is clipped to the underside of the inlet manifold and runs to the front:



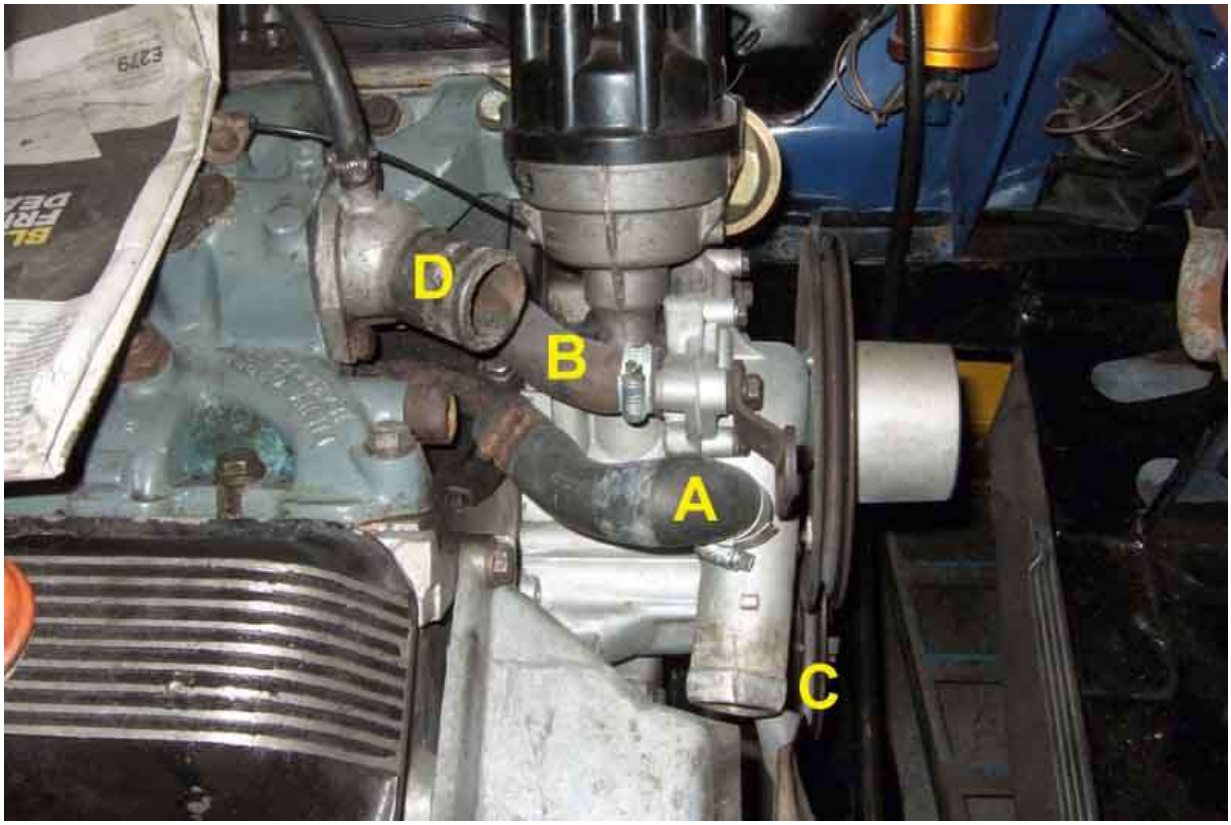

'A' is the hot coolant outlet from the inlet manifold to the lower port on the heater matrix. 'B' is the return from the upper port on the matrix to the pipe running under the inlet manifold:



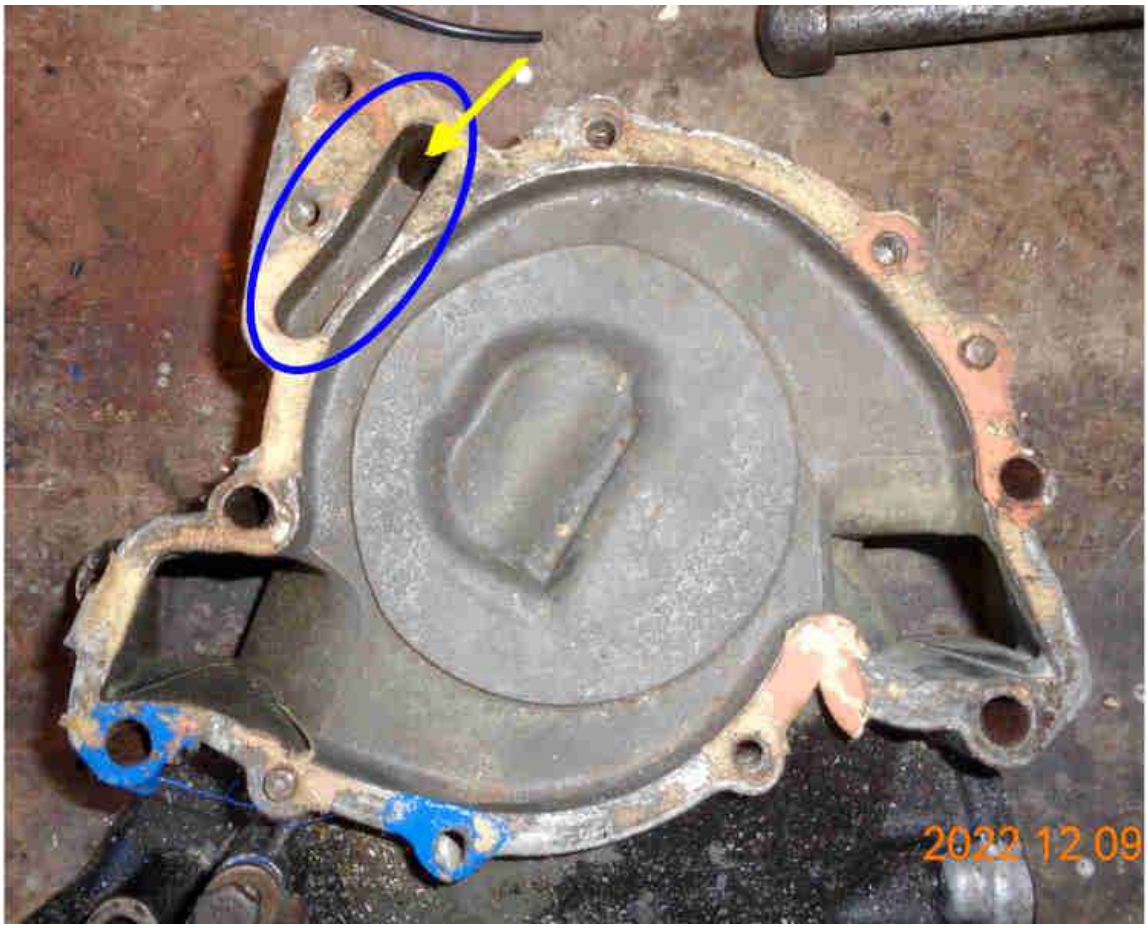
At the front of the engine the heater return pipe under the inlet manifold comes out at 'A'. 'B1' is the port on the front of the inlet manifold that is a pipe travelling through the inlet manifold to near the back where it is open, which goes to 'B2' on the back of the front cover. 'D' is the top hose to the radiator:



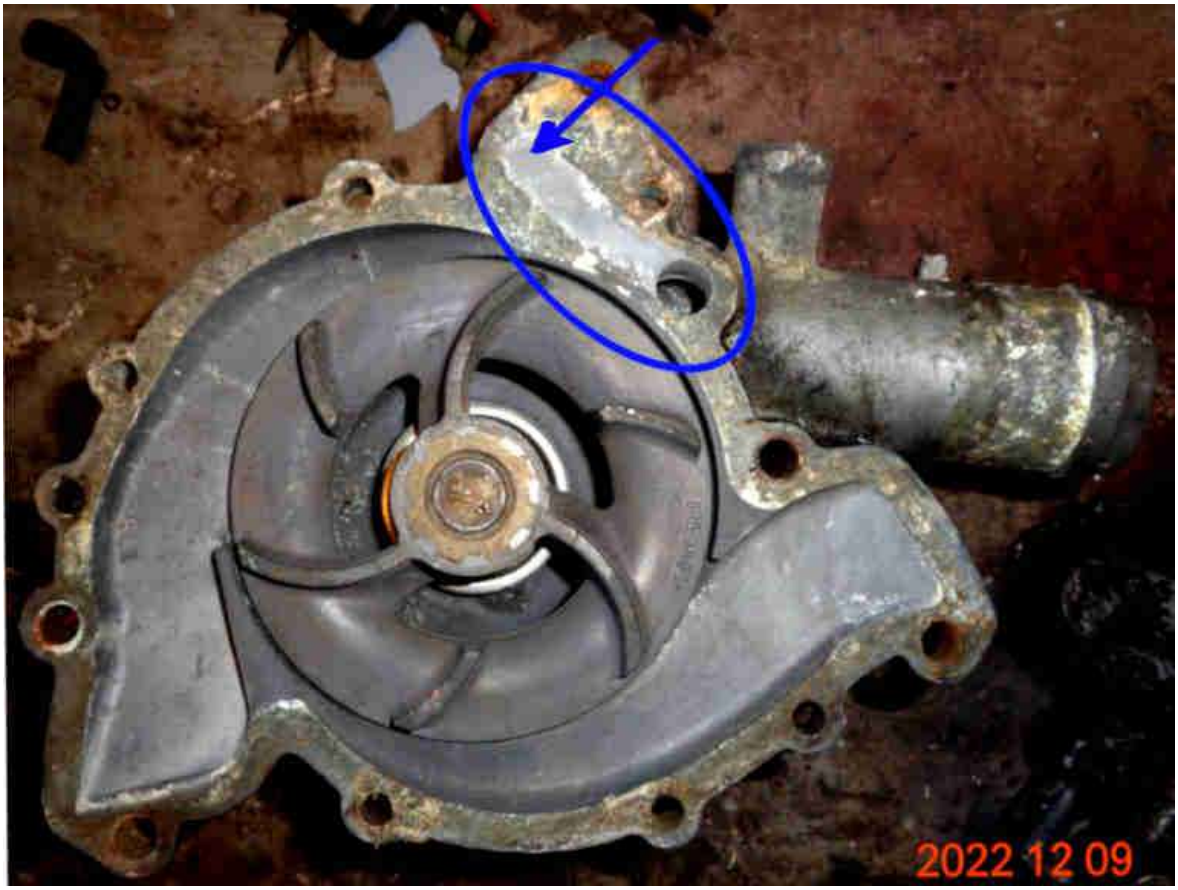

'A' is a short hose from the heater return pipe under the inlet manifold which tees into the large bottom hose port on the pump. 'B' is another short hose from the front of the manifold to a port on the back of the front cover. 'C' is the pump inlet from the bottom hose, and 'D' is the top hose from the thermostat housing to the radiator:



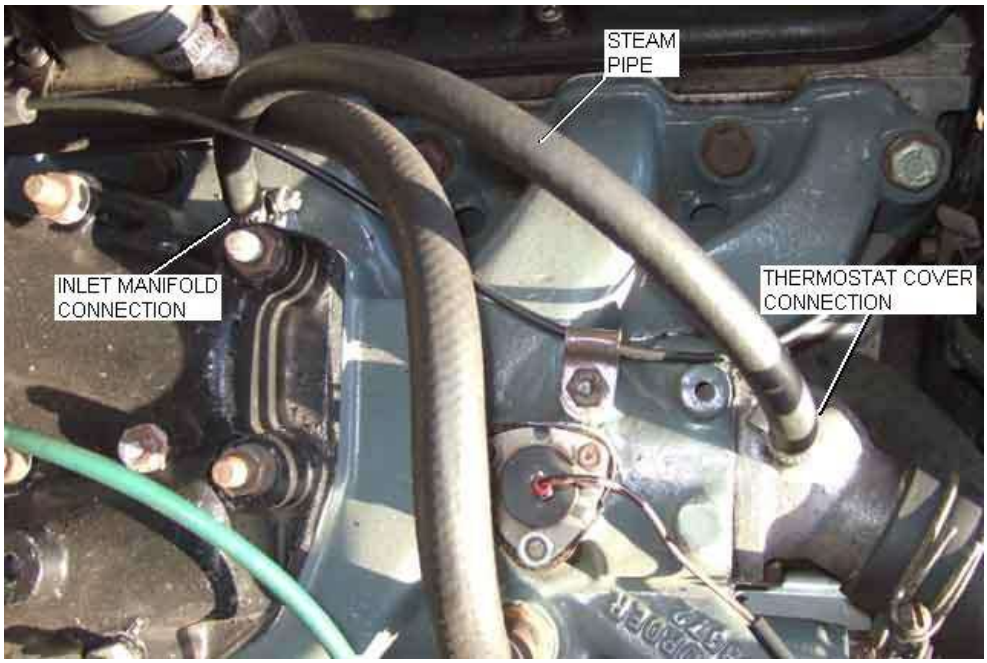
The port on the back of the front cover comes through towards the pump at the arrow, and the slot bounded by the ellipse:




The pump body is flat where the port comes through the front cover at the arrow, so coolant flows along the slot in the front cover (the ellipse) to a hole which goes through into the large port for the bottom hose:




The steam-pipe between the inlet manifold and thermostat cover:

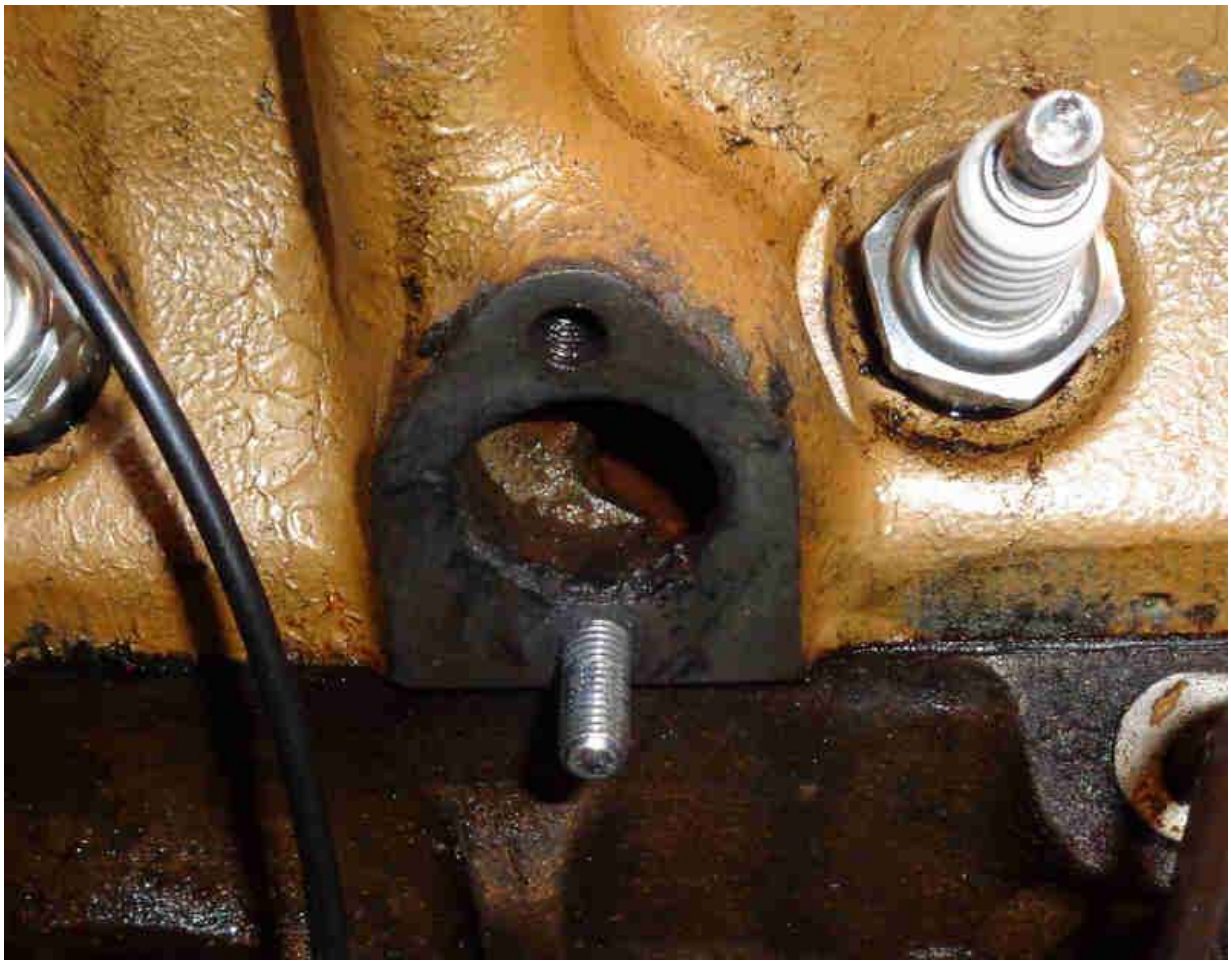

STEAM
PIPE
INLET MANIFOLD
CONNECTION
THERMOSTAT COVER
CONNECTION

# Heater Valve Leak

Crystalline deposits on the valve, temp gauge capillary and distributor plus more coolant in a tray under the engine show the leak from not being able to fully tighten the lower screw has got worse recently, so must be dealt with:

Previously I had researched helicoiling the block, but wasn't sure how cast-iron would stand up to that compared to steel or aluminium. Googling again I found several reference to J-B Welding a stud into the cast-iron, and using a nut, and that should work with the heater valve.

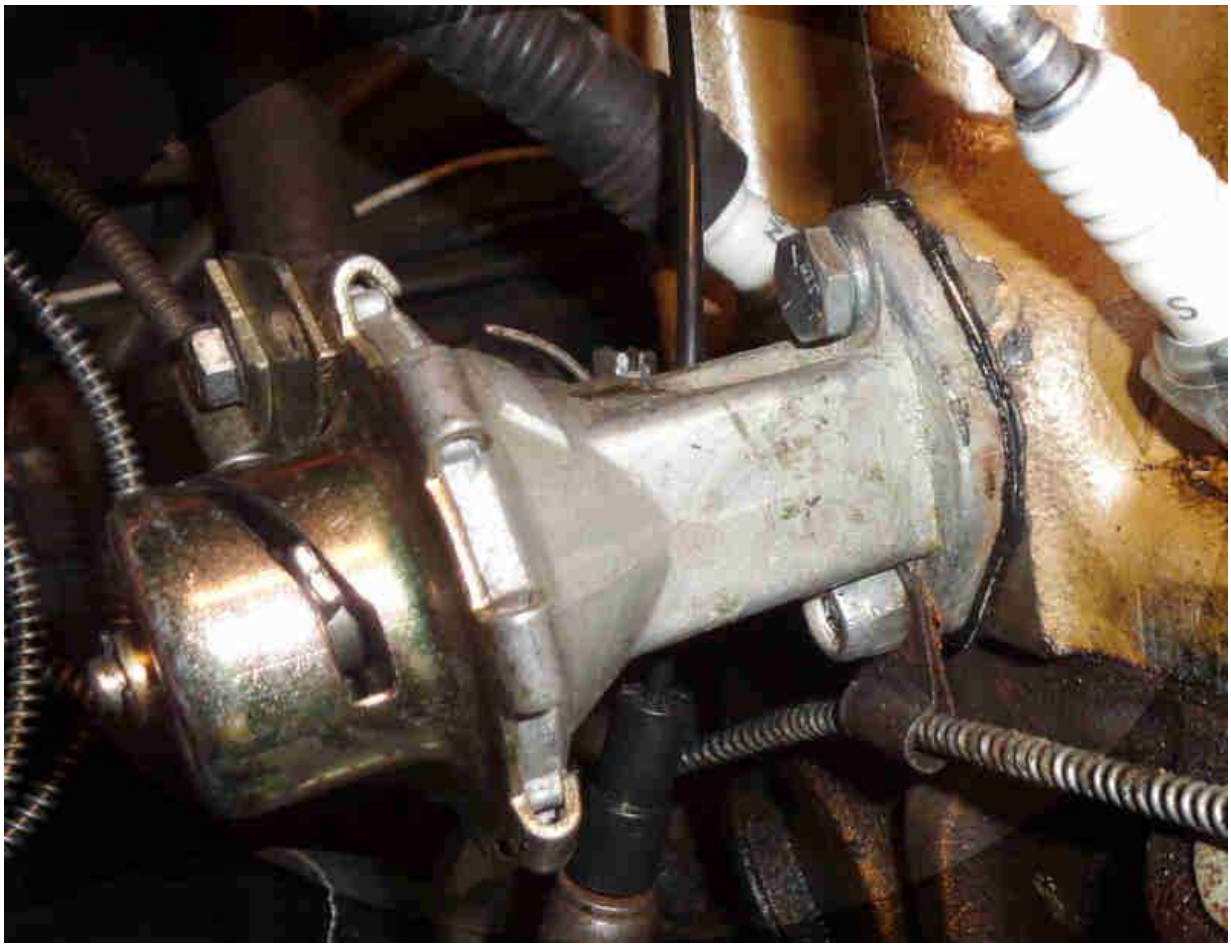
J-B Original is similar to Araldite but takes 15 hours to fully cure and then resists temperatures up to 500F constant, which is way more than enough. KwikWeld is 300F and sets quicker (4-6 hours) but softens at lower heat. With the valve off the tapped holes are 'blind', so no concerns about stuff getting into the cooling circuit. First run a tap down the hole to clean it out (not much danger of taking metal out in this case), and temporarily fit the stud to make sure it will go in far enough. I have to avoid putting too much JBWeld in the head threads and packing the bottom of the hole with it, so opt to coat just the first three threads of both stud and hole, screw it in with double-nuts, and wipe off the external excess. I leave it overnight to cure:



Next morning (a good 20 hours later) the remains of the mix were still malleable in that I could make an impression with a finger-nail, which wasn't good news, but then outside temps are barely above freezing overnight. Played a heat gun on it for a few minutes and it firmed up a bit, so used that on the stud as well although not ideal with the other things around it. A couple of hours later I checked the test piece and could make no impression which was good news, but in the meantime I remembered the cooks blow-torch which gives a much more focussed heat and played that on the stud for a couple of minutes, which started warming up the head round it, so should be fine. Only 4C in the garage so it didn't take much effort to decide to leave it until next day when it's due to be 7C. Didn't get above 4C for several days, so leave it some more.

I had wondered if the base of the valve would be corroded as in the original and even the 'nine year' valve below but it polished up in no time on abrasive paper on a flat surface leaving just faint patches despite being 11 years old. Condition of the rubber was another concern as the previous replacement only lasted 9 years. Internally looked very clean as well, so I've opted to refit it, we shall see!

In the event it was left for well over a week as temps around zero gave me no encouragement to go into the garage and I couldn't use the cars anyway because of salt on the roads. When I did I had decided to use a new 3/4" UNF screw and lock washer for the top. I had some 3/4" (the correct size for the 4-cylinder, 7/8" for the V8) and 1" left over from Vee's repaint so started screwing a 3/4" in, but it was sloppy in the threads and wouldn't tighten. A nut on the threads was also sloppy, but snug on a 1", which was also a good fit in the head - most odd. So a 1" it will have to be but it needs cutting down as the blind threads won't take 1". When fitting a screw you haven't used before do a trial fit without a lock washer and make sure it at least nips up the valve to the head. If it does then you know it will fully tighten with a lock-washer fitted.



At least the nut on the new stud fully tightened, although it could have done with being about 1/4" longer. I was planning to use a plain nut and lock washer but couldn't find any new nuts, so used a Nyloc on its own as I had some of those. The support for the temp gauge capillary adds quite a bit of thickness and the end of the threads only just reaches into the nylon insert, really the stud should have been at least 1" allowing 3/8" into the head and some spare threads. As it is I'll keep an eye on it and may substitute a plain nut and lock-washer.

# THE NEVER ENDING SAGA OF BB and WW

by Herb Adler

**As bought**

The other week I was at the local Sunday market, and I came across this heater tap, from??? As the BB had had the heater tap leak all over my distributor, and I had replaced it with a generic one, that doesn't want to turn off the heat, I purchased it. Cheap enough. It is vacuum actuated, as it comes, however, this was easy to remedy, by unscrewing the actuator.

**Without actuator**

**Fittings**

Using some copper plumbing capillary fittings and a base, made from ⅛" steel, I soft soldered up a fitting to go on the motor. Now, the tap was for ½" hose, so the I used a ½" to ⅜" elbow, with short lengths of ⅜" and ¼" tube, for a hose to attach to.

I reused the cable clamp, from the original heater tap. Never throw anything away, eventually it becomes useful.

**Mock up**

After soldering the base to the pipe work, I painted it to match the engine, and made a mock up of how it will be installed, next month, when I have the engine out, to check the clutch.