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Heating System

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 NEW NEW NEW [The sectioned MGB at the Heritage Motor Centre Museum, Gaydon](#) NEW NEW NEW

There are frequent complaints about the effectiveness of the MGB heater, both in terms of heat output and air output. Whilst the MGB heating system won't be as effective as systems in new cars or even cars 10 years old I have found it perfectly adequate both for heat and air flow and I was using my V8 as a daily driver in all weathers for about 6 years, including one spell of about 2 months when the temperature was well below freezing in the mornings and evenings. During this period the motorway hard-shoulders were littered with modern cars where the owners were scrubbing away at the salt-encrusted windscreens because the washers had frozen up, something the MGB, particularly the V8, will never suffer from! Towards the beginning and end of the run 'season' it can be pretty cool sometimes (we've had snow on the Kimber run before now) so the heater comes into play with the top down, and it is not uncommon for the Navigator's feet to get too warm on full heat.

And in a GT don't forget that opening a 1/4-light or window a smidgen really helps the screen clearing, at least. I know that the MGB can't be compared to the Volkswagen Beetle for airtight-ness but with all the windows closed it is like asking the fan to blow up a balloon.

But first a description of the heater unit itself, see the accompanying photos and drawings. *Added January 2009*



It can be quite confusing to work out just what is going on without dismantling as although the heater is clearly visible in the engine compartment all its workings are hidden away in the depths of the dashboard and the cars structure. What you can see, when looking into the engine compartment from the front, is the back of the

motor on the left, a hose connected to the tap on the cylinder head low down near the middle, and another hose at top right connected via a metal pipe to a spur from the bottom hose. Logically, and for the most efficient coolant flow, the inlet should be higher than the outlet so natural convection (the temperature of the coolant reduces as the heater transfers heat to the air) aids pumped flow, but in fact it is the reverse i.e. heated coolant comes out of the tap on the cylinder head, into the lower port of the heater, flows **upwards** through the matrix, and out of the top port to the bottom hose to be circulated through the engine again by the pump. As it would have been quite possible to put the motor on the other side and angle the matrix the other way i.e. a mirror image, so convection aided pumped flow instead of opposing it, I can only assume that they already had the heater unit available in the 'parts bin', quite possibly where the original application had the heat source and return on opposite sides of the engine to the B-series, and had to use that to keep costs down.



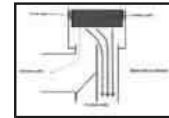
The back of the heater casing butts up against the front of the air-

box at the base of the screen, there is a large circular hole connecting the two with the motor impeller sitting in the hole behind a mesh screen (except earlier cars) in the motor casing. Thus when travelling along air pressure at the base of the screen rams air into the heater unit, and when the motor is running the impeller pulls air in from the box.



Air is blown downwards through the matrix picking up heat, towards the flap at the base of the unit that controls air distribution. A foam strip is wrapped round the ends and sides of the matrix preventing cold air bypassing the matrix, which is one of the several causes of poor heater performance (good air flow but cool), as is anything partially blocking the matrix (poor air flow).

Air to the footwells comes out of a large opening at the bottom of the heater unit, on top of the tunnel, and then travels sideways to exit into the footwells, via plain moveable flaps on early cars and fixed hoods or cowls on later cars, both mounted on the sides of the tunnel. The later fixed cowls are better at directing heat down onto the feet, with the earlier moveable flaps a lot of air will escape sideways and not be directed downwards. Although with the individual closeable flaps you could close the passenger one to get more air to the drivers footwell if you wanted. Air for the demisters comes out of two holes on the lower back of the heater unit, pointing towards the back of the car, various tubes and hoses taking this up to the demister vents on the dash. These are all push-on, so can easily be dislodged in two or three places each, which is why you may have demisting from one vent but not the other. There should be a large rubber block glued to the lower back face of the heater unit, which is what the demister tubes are pushed into. If this rubber block is crumbling away demister air will leak into the footwells instead of being directed onto the screen, and in severe cases the tubes may keep falling out.



The direction flap is situated in the large opening at the bottom of the heater unit, running across the car, pivoting horizontally. The ends of this can just about be seen and felt through the footwell vents. In the Off position the top half is tilted towards the back of the car so it covers the angled plates that direct air into the demister ports, so blocking those off, and the bottom half is tilted towards the front of the car, so blocking the footwell vents off as well. In the middle Interior position the flap is straight up and down. Both the interior and demister outlets are uncovered, but as there is more resistance to flow up to the screen the bulk of the air comes out of the footwell vents, although some comes out of the demister vents as well. On Demist the flap is tilted so that it completely blocks off the footwell exit, so all air is directed through the demister ports.



Effectiveness of both the Off and Demist positions is aided by felt strips glued to the edges of the flap to give a good obstruction to airflow without rattling. These felt strips can come unglued which not only prevents complete closure from a missing strip, but the dislodged strip can block normal movement of the flap, and block airflow to both demister ports and footwell.



The cable that controls the flap attaches to the right-hand end of the flap, and uses the same kind of trunnion for the inner and curved clamp on the outer as for the heater tap and dash controls, see below. Whilst it might just be possible to get to the trunnion on the flap lever through the right-hand footwell, the clamp for the outer seems to be concealed under the rubber block, and in any case access is extremely limited, especially by the pedals on RHD cars. There is really no alternative to pulling the cable out with the heater unit, and on reinstallation attaching it to the heater unit first and threading the control end down through the space in the heater shelf and out the back through the firewall into the space behind the centre console.

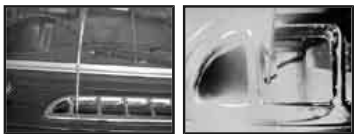
There are several areas which should be looked at if you have poor heater performance:

- Correct operation of the [thermostat](#)
- Adjustment of the [heat control valve](#)
- Coolant flow through the [heat control valve](#)
- Coolant flow through the [matrix](#) (and the rest of the heater coolant circuit)
- Air flow through the [matrix](#)
- Air flow bypassing the [matrix](#)
- [Directional control](#) of heated air
- [Fan](#) power supply and rotation
- The [fresh air vents](#)
- The [cold air flap](#)

Then you can start looking at [enhancements](#).

Air Box

This is the box under the external vent at the bottom of the screen. There is a drain hole at the bottom of the box which has a curiously shaped length of hose connected to it known as "Tom's Knob". It is visible from under the car near the front of the gearbox tunnel at the right hand side, and is a length of about 1" bore hose with a ball-shape at the bottom and a slit below that, secured to a short pipe on the bottom of the air box by a worm clip. The purpose of the ball and slit is to allow water to drain out but stop any engine fumes from being drawn up into the airbox and from there into the cabin. However over many years debris can build up in the bottom of the airbox, particularly if the car is parked under trees, and the vent can get blocked. Usually the first you know about this is that the carpets get wet from the airbox filling up with water and reaching the level of the vents into the cabin.



Click on the thumbnails on the left for a larger image of where this drain can be found and cleared (Mike Howlett advises that this method can only be done on the 72 and later cars as on the earlier models the water deflector covers the drain). A length of 1/4" dowel (the drain hole is only about 1/2") is ideal for gently probing around the bottom until you find the hole then carefully working through

the gunge in the pipe until it comes out of the bottom. That should release any trapped water which will probably be black and gungy, which is why it is always preferable to work from above and avoid getting a face-full or even an arm-full. Then slowly run clean water in from the top from a hose while you work the rod up and down to wash out the accumulated debris until the water runs clear. Some recommend cutting the ball off the end of the hose but since this is probably a once in 30 years or so operation there doesn't seem much point, and it does stop fumes getting into the cabin.



If you do need to get at the drain hose for any reason it is fixed to the bottom of the heater box with a worm-clip, which when looking up from underneath seems impossible to get at. However there is a blanking plug on the side of the tunnel

in the right-hand footwell, immediately behind (relative to the front of the car) the heater outlet, giving access to this clip. Be aware that this area has probably never been touched since the car was first assembled, the clip may be rusted, and I have heard of at least one case where leaning on the clip to undo it caused the end of the spigot the hose attaches to, to break off. Incidentally, Pete Thompson has pointed out (January 2011) that the drain should never be left without some kind of hose being attached to it, as the spigot is inside a a box section above the tunnel, and the drain hose comes through a hole in the tunnel. This can be seen from the two photos - the access hole for the clip securing the drain hose is level with the heater footwell outlet in one photo, which is clearly above the top of the tunnel in the other. Leaving the spigot without a drain hose will allow water and debris from the air-box to get into the cabin at best, or be trapped and rot out the tunnel at worst.

If you do regularly park where leaves can fall into this vent it might be worth fitting a piece of mesh under the external grille. Early cars had the grill secured with half-a-dozen spring clips pushed on from below - i.e. balancing a clip on the tip of your finger while you manouvere it through one of the grill holes i.e. a right fiddle. You may well get the grill off by levering it up carefully but you will probably lose the spring clips. Later cars used a set of plastic 'sockets' which push into the holes from above, and the grill pushes into the sockets, a much easier proposition, albeit easier for some scrote to pull off again. However at first fitting you may have to enlarge the holes slightly to get the sockets in. Bear this in mind when sending the car away for painting, making sure the holes are big enough to begin with. When fitting a mesh put it on the grill first over the pins trimming to size if necessary, then put the grill complete with mesh back on the car.

Air Direction

This is controlled by one of the two knobs on the dashboard - the one that says 'Screen', 'Interior' and 'Off'. This moves a cable which controls an airflap at the bottom of the heater box inside the car to direct the air to either the screen vents, the footwell vents, or block it off altogether. Note that early cars had a door on the footwell vents and if this is closed it will block off the air no matter how the heat and direction controls are set. By removing the footwell vents and standing on your

head in the footwell you should be able to see the air flap moving as the control is turned. If not maybe the cable has become detached from one end or the other. Removing and replacing the heater is reckoned to be the worst ever job on the MGB (but comprehensively described on this [Chicagoland MG Club page](#)) and refitting the direction control cable has to be done at a particular time. If yours doesn't work then maybe a PO got the heater box back in forgetting to refit the cable and couldn't face getting it out again. Another problem is that there should be felt strips glued to the flap and these can become detached blocking the airways. If the flap moves and the strips are in place but the air direction does not line up with the knob markings it could just be the relatively (!) simple job of adjusting the cable in the clamps on the dashboard control. But there were several sets of knobs and controls over the years if yours works backwards a PO may have fitted the wrong one.



Getting at the control can be a fiddle. First you have to remove the knob. Somewhere on the shaft of the knob you should see a hole or depression that looks like it might contain a grub-screw. It doesn't, it is a spring-loaded pin on the control shaft. Depressing it while pulling on the knob

should get it off but some knobs have been known to seize on the control shaft. With the knob off remove the nut and withdraw (that all encompassing term) the control from the rear of the dashboard or console. The UK dash-mounted ones are much easier to remove than the console mounted in my experience, can't speak for the American padded dash.



With the control in your hand you should see the outer of the cable is clamped to a fixed arm by a curved bracket secured with a screw, and the inner attaches to the moving part with a 'trunnion' that fits in a hole on the end of the lever. This 'trunnion' is also used at the other end of both cables i.e. at the air flap and the heat valve. I have

seen two types of cable - a spiral-wound outer with a solid wire inner, and a later type with plastic outer sheath with embedded longitudinal wires, again with a solid wire inner. It works on a push-pull principle i.e. it has to be pushed one way and pulled the other it is not like the accelerator cable which the pedal pulls but returns under the action of springs on the carb. I believe the later type of outer came about because with the earlier spiral-wound outer if the other end is stiff then pushing on the wire just causes the spirals to open up like a spring instead of moving the valve or air flap, which was what was happening with the water valve on the roadster when fully shut. The later sheath does not do this and so you can get greater force on the inner when pushing. But although My V8 has the later sheath and was not expanding when the control was pushing on the wire, the valve was so stiff that when it **pulled** on the wire it was pulling the sheath through the clamp.

Note that there are different control mechanisms installed to the dash for heat and air direction, so if you remove both remember to label them or check the 'logic' of them before going to the bother of reconnecting the cables and installing them. As well as different mechanisms for air and heat there are also different ones for RHD and LHD, 4-cylinder and V8, and for various export markets - no less than 11 different types, plus 10 different knobs, and whilst later models had common knobs

there were 4 different dials that went behind them! The controls have two locating pegs that fit into holes on the dash, each control can fit in one of two positions 180 degrees apart, so check that the legends on the control knobs align correctly with the datum pip in the dash above each knob also. Convention seems to be that the heat control goes above (dash-mounted) or to the left (console-mounted) of the direction control, on UK dashes at least, but I don't suppose it matters much.



Whilst airflow to the footwells comes direct from the heater box that to the screen vents goes via flexible tubes coming off the back (i.e. the cabin side) of the air box high up behind the centre of the dash and going to the slotted vents under the screen. If footwell air is OK but little or nothing is getting to the screen, particularly one

side only, check these tubes are in place and not split. Note that in November 1970 the screen vents were changed to include baffles that improved the distribution of air across the screen and hence demisting.

Cold Air Flap



There should be a lever in the left-hand footwell by the right knee of any occupant for both RHD and LHD cars. It opens a large flap behind the console which opens the bottom of the airbox and lets cold air in directly from the air box. It is only effective when the car

is moving, not when the fan is on, and even if the heater is going full-blast makes the cabin jolly cold if it is either open or the seal is defective! The lever is said to click the flap into three positions, one of them being closed, but both my 73 roadster and 75 V8 have an extra 'notch' on the lever quadrant giving a third, even wider open position, albeit needing a bigger tug and a longer movement of the lever to get to it. If this flap is open or leaking it will easily defeat the attempts of the heater to warm the cabin on a cold day.

Updated December 2008: Just spotted this on page 62 of Clausager, which clearly shows the control quadrant having four notches. The flap is closed so the spring catch is in the first notch, there are three more notches giving three **open** positions. It also seems to show the 2nd open position having a bigger notch than the others, which means it would take more of a pull on the handle to move it from that one to the final one, which is exactly how mine is.



Updated December 2009: Herb Adler has sent me this photo of a mod he has made to the detent to make it easier to move the flap. It consists of a coil spring on the bolt, which is easier to compress and allows the whole detent to move downwards, rather than having to spring the actual detent itself between notches.



Coolant Return Pipe *Added July 2009.*

Ever wondered what that kink in the coolant return pipe was for? Oil filler cap? Nope. To allow a smoother route for MkII accelerator cables? Nope. To clear the

PCV valve on Mk1s? Nope. Reused a part for another model? Nope. Drawing office hiccup? Nope. Give up? [Chris Betson wins the prize.](#)

Fan *Updated October 2006.*

Schematics:

Single-speed (to 1977)

Two-speed: (1977 on)

Until 1977 or so (possibly earlier for North American spec cars) a single-speed fan was fitted, after that a dual-speed. The diagrams seem to show a different motor being fitted with 'fast' and 'slow' windings but in fact it is a similar single-speed motor with a dropper resistor to achieve the slower speed.



The dropper is inside the heater box to benefit from the cooling flow of the fan. From the 3-pin connector the two coloured wires go into the heater box and a single wire comes back out to one side of the motor, the black wire going directly from the 3-way connector to the other side of the motor. See Clausager pages 66 and 67 for both types.

Updated January 2011:



Early cars (Parts Catalogue indicates Mk1, but Clausager indicates it could have been later) may have had motors with wound stator and rotor the same as the MGA but after that they had a motor with a permanent magnet stator. The effect of this is that whereas the early motor will always turn in the same direction regardless of polarity (like the starter motor) the later motor is polarity sensitive. If the later motor is connected backwards (or the polarity of positive ground cars is changed and the heater fan isn't reversed as well) the motor will run backwards which will result in a greatly reduced output but an increase in noise. This isn't immediately obvious as air continues to flow in the normal direction, and it was only because I already had the roadster that I noticed how poor the air flow on the V8 was. Reversing the connections resulted in the same air flow as the roadster, and much less noise. The early motor seems to have two white (they were black on the MGA) wires exiting from the same point on the motor connecting to a black and green/brown from the harness via bullet connectors. The later single-speed has different coloured wires exiting from opposite sides of the motor going to green/brown (before 1970) or green/yellow (70-on) and black harness wires via bullets. The two-speed has green/brown, green/yellow and black wires with a 3-pin plug and socket so cannot be reversed. The two coloured wires go into the heater casing, and a third comes out going to one side of the motor, with the black wire going direct to the other side of the motor. The motor changed again in about November 1972 with the introduction of the V8, which needed a 'shorter' motor to clear the carb air box, but was fitted to all models. At the moment I don't know if the motor itself was shorter, or just that the mounting flange was fitted further back, putting more of the motor inside the casing and less outside. The motor changed again in Sep 76, possibly being a more powerful motor to make the most of having the two-speed switching (half the speed

of the original motor for the first speed being pretty useless, much like the dimmer rheostat for gauge lighting ...), for the remainder of production.

Note that 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.

Bad connections in the solenoid - brown - ignition switch - white - fusebox - green - fan switch - green/brown or green/yellow - fan - black - ground circuit can contribute to slow running. Some say fitting a relay will improve fan speed but in my experience if it does so to the level claimed then you have bad connections in the circuit and you will do more good fixing those than fitting a relay, the motor is hardly a 'high current' item. To see how much you are losing connect a voltmeter between the live motor wire and the brown at the fusebox, and again between the ground wire of the fan and a known good ground e.g. the engine. To see the effect of fitting a relay, with the fan on (fast if two-speed) connect a heavy gauge wire between the brown at the fusebox and the live (not the ground!) wire at the fan, making sure it is the fast wire for two speed motors and not the slow. If you **do** decide to fit a relay then I hope I don't have to explain why you only need one even for a two-speed system!

I generally find I hardly have to use the fan, the ram-effect being more than enough for cabin heating. I do need it for screen clearing, and when first driving off on a cold morning the mist that forms from my breath is rapidly cleared by just a few seconds of directing the air onto the screen and using the fan, even though there is not yet any heat in it. If I get sufficient condensation on the glass to form droplets, like on a very wet, cold day, the fan takes ages to clear it. However cracking the 1/4-light open just a touch will clear it quite quickly when underway and keep it clear, I only have to resort to using a duster if stuck in traffic, and only under those very wet, cold conditions.

Fresh Air Vents



For the 1972 model year two fresh-air vents were fitted to the centre of the dash controllable for both air volume and direction. Rather pointless in the roadster except perhaps in a tropical rainstorm, but they do make the GT more comfortable. The air for these comes straight from the external air box bypassing the matrix so the air is not heated. Like the cold air flap if you have these fresh-air vents open at the same time as the heater is on you will find the cold air from the vents wins easily.

Footwell Vents



All models have a 'warm air' vent in each footwell on the side of where the heater box is located, above the tunnel and behind the dash or console. Originally the

vent had an adjustable flap, possibly to direct more air to the drivers footwell if the passengers seat were unoccupied (or you didn't like them). I don't think it was anything to do with directing air to the screen demisters as these cars had the air direction control knob anyway.



In August 1970 (Car No. 219001) these adjustable doors were replaced by a fixed hood. Said by Clausager to be 'improved', it possibly did so by having sides and so directing more air downwards onto the feet instead of 'leaking' away from the sides of the flap, but I'm sure there was an element of cost-reduction as

well!

Heat Control



The heater controls have been described as 'wonderfully illogical' in the past, and this is because with the chrome bumper controls you had to turn the air direction control anti-clockwise to turn it on

which is fine, but the heat control has to be turned clockwise. Not only is that illogical from a tap point of view, which normally has to be turned anti-clockwise to turn it on, but doubly so as it is also the reverse to the air direction control. Rubber bumper cars had knobs of a different style, and on these the heat control direction has been reversed to make it the same as the air direction control i.e. anti-clockwise to turn then both on. From the 77 year on the knobs changed again to a coloured and illuminated style positioned on the centre console.

Two aspects to the heat control valve - adjustment of the cable operating it and coolant flow through it. I'll cover the cable first, or you can [skip straight to coolant flow](#).

The heat control, like the air flow control, uses a cable with a solid inner to operate a lever on the valve. Even if the valve operates smoothly and easily there is lost motion in the control, cable and valve, but the control and valve both seem to have the same amount of movement on the levers. Therefore you can adjust the cable so that at one extremity the valve is fully shut, or adjust it so that at the other extremity the valve is fully open. You cannot adjust things so that the control will move the valve from fully open to fully shut, so which one do you opt for? I suggest that unless you have an additional on/off tap to shut things off completely in the summer you go for the 'fully off' option. In any case in the UK at least you are quite likely to sometimes want the heat on in summer, and sometimes want it off in winter! Even not being able to fully open the valve on either of my cars I still get air temps of around 140F/60C coming out the heater and that is with an ambient of about 50F/10C which I find quite adequate and usually have to turn down after a while.



Getting at the control can be a fiddle. First you have to remove the knob. Somewhere on the shaft of the knob you

should see a hole or depression that looks like it might contain a grub-screw. It doesn't, it is a spring-loaded pin on the control shaft. Depressing it while pulling on the knob should get it off but some knobs have been known to seize on the control shaft. With the knob off remove the nut and withdraw (that all encompassing term) the control from the rear of the dashboard or console. The UK dash-mounted ones are much easier to remove than the console mounted in my experience, can't speak for the American padded dash.



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seen two types of cable - a spiral-wound outer with a solid wire inner, and a later type with plastic outer sheath with embedded longitudinal wires, again with a solid wire inner. It works on a push-pull principle i.e. it has to be pushed one way and pulled the other it is not like the accelerator cable which the pedal pulls but returns under the action of springs on the carb. I believe the later type of outer came about because with the earlier spiral-wound outer if the other end is stiff then pushing on the wire just causes the spirals to open up like a spring instead of moving the valve, which was what was happening with the water valve on the roadster when fully shut. The later sheath does not do this and so you can get greater force on the inner when pushing, but you can then get the opposite problem that when you are pulling on the inner it pushes the softer outer through the clamp as it cannot be gripped as tightly ([see below](#)).

Note that there are different control mechanisms installed to the dash for heat and air direction, so if you remove both remember to label them or check the 'logic' of them before going to the bother of reconnecting the cables and installing them. As well as different mechanisms for air and heat there are also different ones for RHD and LHD, 4-cylinder and V8, and for various export markets - no less than 11 different types, plus 10 different knobs, and whilst later models had common knobs there were 4 different dials that went behind them! The controls have two locating pegs that fit into holes on the dash, each control can fit in one of two positions 180 degrees apart, so check that the legends on the control knobs align correctly with the datum pip in the dash above each knob also. Convention seems to be that the heat control goes above (dash-mounted) or to the left (console-mounted) of the direction control, on UK dashes at least, but I don't suppose it matters much.

Update September 2008: Bee's heat control has always been stiff to turn compared to Vee's and just lately seems to have been getting worse, nigh-on impossible to turn, so time to investigate. I disconnected both inner and outer from the valve, and it was almost as stiff as previously, whereas the valve was easy to move. Next I removed the control from the dash (very easy on the UK tin dash) and disconnected that from the cable as well. That was interesting, as not only was the control very stiff, despite a liberal coating of oil and grease, but the cable inner was also quite stiff to push/pull as well! I sprayed some releasing fluid onto the control, both the shaft the knob fits to and the part it turns to move the cable inner, partly to clean off the old grease and partly to see if I could ease it. Working the control back and fore

it eased up a lot. Wiped that off then sprayed on some light oil, wiping off the excess, in the hope that keeps it free. Also put some grease on the teeth of the 'rack and pinion' where the rotary movement of the shaft is converted to a back and fore movement of the part the inner attaches to. Next pulled out the cable inner (leaving the outer in-situ). Very sticky to the touch so cleaned that off with releasing fluid as well. I noticed some corrosion on the inner near the engine end, so rubbed at that with fine wet and dry to smooth it off as best I could. Started inserting the inner, daubed a bit of copper-grease on a short length then pushed that in, daubed a bit more and pushed a bit more and so on. Much easier than daubing the whole lot then wrestling with the greasy cable trying to get it back in round the curves. With a bit of pushing, pulling and rotating (the inner clamp from the valve screwed onto the cable aided this) I got it back in. Reattached it to the dash control (but didn't refit it to the dash yet!) and it now moved very easily. Reattached the cable to the valve, which needs fine adjustment to get it to just fully turn off as the control reaches 'Off', then reattach the control to the dash. 'Like a bit of egg on a shovel' (as my workmates used to say when I was an apprentice digging holes for telegraph poles).

Update July 2009:



I've always had trouble with Bee's heat control. If I adjust the cable so that it fully closes, then it won't open it again even when the dashboard control is fully open, it just expands the spiral-wound outer (plastic/nylon outers don't suffer from that problem, but have others). If I adjust it such that it will open again, it stops

short of closing fully so you can't turn the heat off in summer, and this was the same after replacing the valve. You can close the air direction flap, but then don't get cool air onto your feet. You can open the cold-air flap, but that only cools your knees. I did manage to get round it to some extent by stretching out the last 2 or 3 turns of the spiral outer to act as a short and very stiff push-off spring. That was just about OK, but needed the dash control to be fully opened before it would ping the valve open, and since removing and lubricating the dash control and cable in September 2008 I hadn't been able to get it right again. Some time ago I had the idea of putting a spring over the inner so it would be compressed by the moving lever as it closed, which would assist the inner pushing the tap open as the control was opened, and bought a pack of assorted springs. As long as the tweak to the outer worked I left things as they were, but now it was time to try the springs. I selected one with the longest free length, that would fully compress with the valve fully closed. Fitted it on, adjusted the outer and inner so the valve was just fully closed with the dash control in the Off position, then found the valve opened when the dash control was only about 1/4 open - result! Too long a spring won't compress enough to close the tap fully, too strong a spring would make it very difficult to close, and probably push it back open again!

I've had the opposite problem on the V8 with the plastic-covered nylon outer. That has longitudinal steel wire strands which prevent it expanding when pushing the inner, but because the outer is plastic and nylon it can't be gripped as firmly as the spiral steel and was pushing through the clamp at one end when it was pulling on the inner. I was able to wrap a turn of steel wire around the inner and clamp in such a way as to act as a buffer for the outer, but then the other end started doing it so I had to do that end as well.



Bob Muenchausen has done some sterling work on improving his heater valve that others have replicated with similar results. However that was on a non-OE valve and my OE valve does seem to be subtly different internally, as I discovered when I had the opportunity to section a failed OE valve from the roadster. What you may think of as just a simple 'tap', is actually quite a sophisticated three-stage system - a fine control, a coarse control, and a shut-off as the pictures (click the thumbnail) show.

I had always been curious as to why the roadster valve gave no fine control of heat around the WARM position whereas the V8 does, but after sectioning the old valve I could see that the cup and seat of the coarse-control valve were both heavily corroded which meant it would have been passing coolant even when on its seat and so bypassing the fine-control valve. When testing the new roadster valve it initially seemed no better at fine control than the old, hence still not as good as the V8. But maybe I just didn't wait long enough for the heat output to respond to a movement of the control during testing as later in the year when needing some heat on a run I had no problem in positioning the control to get warm air of the desired temperature, i.e. the new valve does offer fine control just like the V8.

Update August 2008: I'd noticed what looked like an anti-freeze stain down the side of the block by No.3 cylinder, sometimes wet sometimes dry.



It seemed to be coming from the head gasket, but further investigation showed it was from the heater valve gasket, running down the short distance to the gasket, then along the lip of that a little way until the shape of the gasket allowed it to run down the

block. Initially it was barely weeping, and certainly I could go many hundreds of miles before I had to add coolant to the radiator, but it was getting worse. The valve and gasket were replaced in 2002 when the valve started leaking slightly on a trip to Ireland so they weren't very old. I decided to cut a new gasket out of some thick gasket card I had, which was thicker than the correct item, so cut one to fit the old valve hoping to whip the old one out and the new one in before I lost too much coolant. I'd also decided to - unusually for me - use silicone sealant rather than the Hermetite Red I normally use hoping it would give a better seal. Undid the bolts and pulled the valve back (hose and cable still attached) and was standing by with a wooden plug cut to fit the hole in the valve, thinking that in the head would be about the same size. I was surprised to discover it is about double the size (click on the thumbnail). The effect of this is that the area for clamping the gasket and getting a good seal is very much reduced, as there is very little width between the edge of the hole for the water passage and that for the bolts. I also found traces of blue silicone sealant on the old gasket so I had used that last time anyway. I'd prepared my new gasket with a bead of silicone on both sides, offered it up, but found it was too far in from the edge to seal to the head, and in any case the coolant running out of the head simply washed it off. In the end I had to let it finish running out, then soak out a bit more with a cloth so I could dry the surfaces. I dried off the new gasket and put another bead of silicone round both faces, this time much closer to the outer edge, and smoothed it round with a finger-tip so not only did it stick to the gasket but also made a wider track, but thin. I've seen the effect of great wedges of silicone - it gets compressed down and most of it squeezes out sideways. Unsilently

on the outside, but on the inside it gets into the passages and that through the valve is only narrow anyway and could get blocked. I let it 'dry' like this for about half an hour, then fitted it and the valve to the now dry head. Tightened up, and there is only a tiny bead of silicone all the way round both faces of the gasket, so hopefully only a similar tiny amount on the inside. Added some coolant - but not the full amount that had leaked out in case I had to remove it again, and in any case the level in the radiator was still higher than the head port, even though the heater valve was open. Ran the engine to warm it up and all was well, then blanked off the front of the radiator to get the temperature up higher than normal, and still all is well. Switched off, let it cool down a bit, removed the radiator cap, and there was some gurgling and now the level dropped to just about the tops of the tubes. Let it cool right down before refilling the radiator, I shall run it up a couple more times before our next trip (this weekend!) and top up as required which should be enough to purge all the air, but I'll be carrying a spare couple of litres as normal. 480 miles later no topups needed, and so far no leaks either.

Update April 2011:



Went to get Bee out of the remote garage one beautiful Sunday morning to find a large dark stain under the engine. Oil, brake and clutch fluids all OK but coolant well down, and a drip under the heat valve. Not best pleased as it was replaced 'only' nine years ago.

Distributor cap well damp as it had probably been dripping for a week since the last run out so wouldn't start, and drying it as best I could there and then made no difference so I was unable to bring her back to the house. The silver lining in that cloud was that the weather stayed glorious for the rest of the week so I was using Vee every day, which I wouldn't have been able to do had I swapped the cars over at the time. Instead I brought the cap and leads back for a proper clean and dry awaiting ordering and receipt of the replacement valve. This arrived Thursday, so that night I swapped the cars over ready to work on the valve Friday morning on a rare day off at the moment. Low coolant level didn't bother me as it is only a few hundred yards and minutes from the remote garage to home. Disconnect the control cable and loosen the hose, and the old valve and gaskets were off in a few minutes. I have had to modify a 7/16" spanner by grinding the wall down a bit to make it thinner to get it on the bolt heads, then it is half a flat at a time on the lower bolt till it is finger-loose, but I can just get a 1/4" socket and extension on the upper bolt once slackened.



The removed valve shows slight corrosion, nothing like that on the valve I removed in 2002, which made that almost certainly the original and hence getting on for 30 years old, or nearly so.

Whilst nine years life of my first replacement doesn't seem too bad, current moans at the moment are that replacements nowadays only last a couple of years, we shall see. I bought the replacement from Brown & Gammons as it was only £1 dearer than the 'reproduction' from the MGOC. I would probably have got it from MGBHive except that they had closed for the day by the time I came to order it.



One difference between the old and the new is that the old has a circlip on the bottom of the tapered pin, whereas the new has a wire

clip. I don't know what the original had as it had completely corroded away! The circlip would probably tend to block the hole in the centre of the cup when the tapered pin is fully withdrawn, just before the cup is lifted of its seat for full flow.



Before fitting I noticed that the lever fouled the pop-rivet joining the two halves of the body, partly because the rivet was sitting a bit high and partly because the gap in the 'U' shape of the lever was wider than it needs to be. A quick crimp with a pair of pliers soon resolved that. No gasket with the new valve which is ridiculous, but I have some gasket card so made my own in a few minutes. Used Hermetite Red again, wondered why the old gasket had blue silicone as I don't normally touch that stuff, until I reread my August 2008 post! Bolted the new valve to the head, fitted the hose, then time to fiddle with the control cable. Switch the cabin control to 'off' reducing how much inner is protruding from the outer, straighten the end of the inner (if required) so that when slid through the outer clamp the end of the inner slots cleanly between the arms of the 'U' lever without jamming in the trunnion hole. Put the trunnion in the hole in the lever and orientate it so the hole in the right place, fit the spring over the end of the cable, then slide the cable through its clamp while feeding the inner through the hole in the trunnion. The natural position for the lever is half open/closed, so with the outer pushed in just far enough to poke a small amount of inner through the trunnion, tighten the trunnion screw onto the inner. Then pull the outer through its clamp until the valve is closed (remember the control is in the 'off' position), and tighten the outer clamp screw. Turn the control to fully open and check the valve has opened (I have had to fit push-off springs to mine) and closes enough when turned to off, and I hit it first time.



A lot of anguish has been expended on heater valves saying the originals don't open far enough for maximum heat, and it's true that because of the lost motion in the control and cable you can either set the cable to fully close the valve but only have it 3/4 open, or alternatively set it to fully open but not be able to close it. However once the valve is 2/3rds open or so it is fully open as far as flow goes! The coolant inlet and outlet are about 0.360" diameter or 0.1 sq in. The main part of the valve is 0.645" or 0.326 sq in, and the cup sitting in it is 0.520" or 0.212 sq in, giving a clearance between the two of 0.114 sq in i.e slightly more cross-sectional area than the inlet and outlet. There is also the hole in the middle of the cup with the tapered pin at its narrowest portion increasing this area, but it is complicated by whatever lifts up the cup - the spring clip will offer very little restriction, the circlip will close most of it off, but in the worst case it is still adding some flow. Therefore the cup only has to lift off its seat by .070" at the most to give the same cross-sectional area. I have measured the total lift at double that, and the lift starts occurring when the lever is mid-way on the ramp, therefore the lever only has to move about 3/4 the way towards fully open to give maximum flow. Michael Beswick's empirical tests have confirmed this, and also that the lever does not have to be fully towards the closed end of the ramp to fully shut off, further reducing the arc the lever needs to travel to go from zero flow to maximum flow. My own experiences of four valves on two cars also confirm that you have to turn the control from fully open

significantly further than half-way towards fully closed before heat output starts reducing. Therefore putting a stack of washers between the cup and spring-clip or circlip to lift it higher is almost certainly a waste of time, as well as destroying the fine control at the lower end by blocking up the hole through the cup for the tapered pin. Using a non-standard valve with an inlet the same size as the cylinder head port will remove that restriction, and a completely different mechanism may well give a larger through-area when fully open, but you will still be restricted by the bore of the outlet port, the OD of which at least must be similar to the standard valve in order to connect to the heater hose. Those people that claim that some cobbled together valve gives more heat, or modifying the standard valve to fully open it, are probably only compensating for some other defect in an old valve - in the former case quite probably because of gunge restricting flow. I was quite surprised by the amount of gunge in my 9 year valve, given that I have always used anti-freeze with a corrosion inhibitor.

The car was in the garage flat and level, so with the heater control fully open I poured a 33% anti-freeze solution in to cover the radiator tubes, and started the engine with the cap off. As it warmed up the coolant level started rising so I refitted the cap, but the heater return pipe and the vents remained cool, so I moved the car onto the drive into a slight nose-up attitude and the heater started blowing hot. Once up to temperature I switched off and allowed it to cool until the temp gauge was almost at 'C', removed the cap, and again the coolant level was below the top of the tubes, so added more coolant. It was only just below, so I added enough to get it about half-way to the bottom of the filler neck. A couple more heat-cool cycles should be enough to get it stable.

Matrix



A common problem is water flow through the matrix being reduced due to a build-up of rust 'silt' over many years. This can usually be cleared by repeatedly reverse and forward flushing the matrix until water flows clear. In severe cases you may have to add a flushing compound and leave it to 'soak' before flushing with clean water again. This can be done in-situ with hoses on both flow and return pipes to avoid dowsing the rest of the engine bay in rusty water. If you do get bright orange silt coming out of the heater matrix it might be as well to similarly flush the block (with a cold engine!) and radiator to aid cooling.

Updated January 2007 Of course anything that restricts coolant flow in the heater circuit will have the same effect and this includes the metal return pipe running across the top of the rocker cover (thanks David Witham for mentioning this) and hoses as well as the matrix.

Similarly the air passages in the matrix could be blocked with leaf litter. Mk2 cars had a mesh over the matrix inlet (not the air-box inlet, which is an aftermarket modification) to reduce the chance of this happening. If the matrix is blocked and compressed air from inside the cabin doesn't improve things removing it and poking the passages clear (trying not to puncture the water passages - test before refitting)

or fitting a new matrix.

A third possibility is the airflow bypassing the matrix, and hence not passing through it and picking up heat, because the foam packing surrounding it has decomposed. Not much you can do about this short of complete removal and dismantling, although it may just be possible to lever off the heater box lid whilst in-situ and wedge more foam in.

The matrix can corrode through or split, leading to water on the carpet or dropping on the ground from by the air vent drain tube. In the case of the former you may get the sweet smell of antifreeze in the cabin and heavy condensation forming on the screen above the air vents.

Enhancements

One of the simplest and cheapest 'enhancements' for 1972 and later models is to fit a cover to the external air intake at the bottom of the screen. With this fitted, and the fresh-air vents on the dashboard open and the fan running, the heater works in 'recirculatory' mode, taking air **out** through the fresh air vents into the external airbox, then back in through the matrix and the fan. As it is taking hopefully warmer air from inside the cabin and pushing that through the matrix, rather than bringing freezing cold air from outside, it should result in a warmer cabin in very low temperatures. But note that the fan has to be running and the fresh air vents open to get any air flow, there is no 'ram effect' pushing air into the cabin as you drive along.

Uprated fan blade assemblies appeared many years ago, most notably from Costello with a smaller number of larger blades than the standard fan, which can be likened to a hamster wheel (both in appearance and performance, some say). I don't know whether the Costello item is still available but the MGOC and Moss sell what are claimed to be improved versions. The pictures look just like the originals but apparently they are slightly larger diameter with slightly more blades. One opinion blithely hopes that this will result in more air movement for a given motor speed but a bigger fan would add more load which would slow the motor down, so you don't get as much extra output as you might expect. MGOC and Moss also offer uprated motors which hopefully would **at least** counteract the slowing-down effect of the bigger fan.

The MGOC and Moss offer uprated matrixes (matrixii?), Moss claims the standard matrix has a 1kW output and its uprated unit is 4.5kW. Whilst writing this the topic cropped up on one of the bulletin boards and someone claimed to have fitted the MGOC uprated motor, fan and matrix, couldn't see any difference, and wouldn't do it again. YMMV, or Caveat Emptor.

Radiator Blanking. Many claim that blanking off the radiator improves heat output in cold weather, but in very low temperatures the thermostat may not open at all so the radiator will be cold anyway. As well as air blowing through a hot radiator, engines are also cooled to some extent by air blowing over the surface of the block and sump, and in very low temperatures it is this that can prevent the engine getting

up to normal running temperature and so cause low heat output. If you have the heat on full and the fan blowing in an attempt to get some heat into the cabin this will reduce engine temperatures still further as the heater acts just like a radiator, of course (**Note:** In very **hot** weather this can act as a useful additional cooling system - if you can stand the extra heat in the cabin!). Because the radiator is shrouded in the MGB and most of the air flowing round the engine has already come through the radiator, blanking off the radiator cuts down this flow and hence its cooling effect dramatically, allowing the engine to get up to normal running temperatures and the heater to normal output. You shouldn't have to block off the rad for ambients down to freezing or even slightly below, but may have to if many degrees below. If your temp gauge is way down in not quite freezing weather your thermostat may be the cause. Don't block off too much or you will cause overheating, particularly when in traffic. And don't use aluminium foil as was popular in the 70s as this shreds into tiny pieces and blocks your air filters, as can cardboard when it gets soggy. When I was a lad I can remember an uncle having a radiator blind he could control from inside the car, starting off with it raised then dropping it as the temperature reached normal.

Cold is a relative term. Use the handy list below to overcome the confusion:

Degrees (Fahrenheit)

- 65 - Hawaiians declare a two-blanket night
- 60 - Californians put on sweaters (if they can find one)
- 50 - Miami residents turn on the heat
- 45 - Vermont residents go to outdoor concerts
- 40 - You can see your breath
 - Californians shiver uncontrollably
 - Minnesotans go swimming
- 35 - Italian cars don't start
- 32 - Water freezes
- 30 - You plan your vacation to Australia
- 25 - Ohio water freezes
 - Californians weep pitifully
 - Minnesotans eat ice cream
 - Canadians go swimming
- 20 - Politicians begin to talk about the homeless
 - New York City water freezes
 - Miami residents plan vacation further South
- 15 - French cars don't start
 - Cat insists on sleeping in your bed with you
- 10 - You need jumper cables to get the car going
- 5 - American cars don't start
- 0 - Alaskans put on T-shirts
- 10 - German cars don't start
 - Eyes freeze shut when you blink

- 15 - You can cut your breath and use it to build an igloo
 - Arkansans stick tongue on metal objects
 - Miami residents cease to exist
- 20 - Cat insists on sleeping in pyjamas with you
 - Politicians actually do something about the homeless
 - Minnesotans shovel snow off roof
 - Japanese cars don't start
- 25 - Too cold to think
 - You need jumper cables to get the driver going
- 30 - You plan a two week hot bath
 - Swedish cars don't start
- 40 - Californians disappear
 - Minnesotans button top button
 - Canadians put on sweaters
 - Your car helps you plan your trip South
- 50 - Congressional hot air freezes
 - Russian cars don't start
 - Alaskans close the bathroom window
- 80 - Hell freezes over
 - Polar bears move South
- 90 - Lawyers put their hands in their own pockets

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