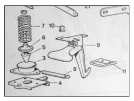
Bonnet & Boot Doors Arch Liners Instruments Radiator Grille Screens Seats Windstop

Bonnet and Boot/Hatch

Bonnet Boot/Hatch

Bonnet/Hood

Latch:



On the bonnet a pin with a head pushes through the latch on the slam-panel, with a strong spring behind the head to hold the bonnet firmly against rattling. The pin is threaded at the bonnet end and screws into a riv-nut for adjustment, with a lock-nut. Ideally slim spanners would be used to fit between the turns of the spring and avoid scratching paint when slackening and tightening the lock-nut. The business end of the pin has a screwdriver slot to turn the pin in the welded nut with the lock-nut slack.

Release:

Emergency release

According to the Parts Catalogue the latch on chrome bumper cars was 4G3035, changing to HZA4551 on rubber bumper, however suppliers only seem to list the earlier one for all MGBs. Having one of each I suppose I could take them off and compare them, but I'm not going to.

The release cable has a bracket under the slam-panel on the near-side of the latch for the outer to push against as the cabin knob is pulled, with a hole for the inner to pass through and pull the latch lever towards it to release the bonnet pin. The inner makes two passes through a trunnion to make a loop, passing through a hole in the end of the latch lever in between. There is a return spring from another hole in the latch lever to another bracket under the slam-panel on the off-side of the latch to fully close the latch when the cabin knob is released. The inner is adjusted in the trunnion to pull the cabin release knob back when it is released, leaving just a little slack in the cable to ensure the latch is fully engaged when the bonnet is closed.

When the cable breaks ...

... and they do, the rubber bumper car is not too difficult to get into - as long as you know what you are doing. It may be possible to gain access in a similar way through the recessed grill of 70-72, it isn't through the honeycomb grill of 73 and 74 (but see below), and it probably isn't in the pre-70 chrome slatted grill. The thing to bear is mind is that on the V8 and 77 and later 4-cylinder cars the rad is only a couple of inches behind the lock. So if the end of the rod goes too far it could puncture the rad. On mine, with the end of the rod just touching the rad at the angles shown, there is 10 inches of the rod sticking through the mesh. So if you wrap some tape around your rod, say, 9 inches from the tip, then at the angles shown as long as you keep the tape your side of the mesh you should be clear of the rad. The lock lever will require quite a push to release the bonnet pin, so be careful the rod doesn't suddenly slip and go too far.

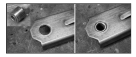
The only way I can see of doing it with the honeycomb grille is to push out the grommet in the left-hand inner wing that the lighting wiring goes through, then insert a length of stiff wire with a hook formed at the end, feeding it through straightening it as you go (you can't feed it straight in because of the wheel arch) then hook it round the release lever and pull. You **can** see to do this through the grille, but it will be fiddly. Should work for all the grilles, in fact.

Emergency release:

Once (hopefully) open, the first thing to do is give yourself a 'second string' in case it happens again. I have used a length of curtain pull cord, which is a very strong braided nylon, with one end tied round the lock lever and the free end pushed through the hole in the left-hand inner wing where the headlight wiring goes through. Tie a loop in the free end big enough to get your finger through and that will stop it working its way back out again.

Bonnet Strut: *October 2016*

I started looking into these when restoring Vee and wondering how far to go with her bits and pieces, and was surprised just how involved it all got! The intention isn't concourse standard, just a tidy driver, but nevertheless the bonnet strut and its fittings were fairly manky (as are both of Bee's) but cleaned up pretty easily, what looked like rust apparently just being staining. Originally the strut consisted of a solid bar, what follows is only concerned with the telescopic struts used from the start of the 1971 model year.



Looking in the parts catalogue the strut itself (AHA9717) didn't change, but there was a change in the fittings for the 1976 model year. The fittings originally consisted of a cylindrical spacer (BHH298), a 1/4" v 1" hex screw and a stiff-nut top and bottom (however an original 10/74 brochure shows a round-head Phillips screw in the lower position at least). The body and bonnet brackets are offset by the thickness of the strut, with the bonnet bracket being inboard of the body bracket. Because of the position of the release lever it is the channels that face the brackets top and bottom, and not the flat side of the strut. This is why it needs the cylindrical spacers - they fit in the channels of the upper and lower portions of the strut to hold the strut away from the bonnet and body brackets so they can pivot without damaging the paint on the brackets. The spacers have a 1/4" hole, and a 7/16" diameter shoulder at one end which fits inside the 7/16" hole at each end of the strut, and means the strut isn't pivoting on the threads of the bolt (a nicety they didn't bother with for the boot strut).

For the start of the 1976 model year at chassis numbers 386601 (roadster), 391501 (GT) and 2701 (V8) the parts catalogue shows the spacer changing (BHH1933). Moss (and others) only show the earlier item, but Brown & Gammons show both with one longer than the other, although not stating where each is used. The later hex screw changing to a 1/4" x 3/4". Quite why this change was made to all cars - including the V8 - is a mystery - or at least it was. I did wonder if it was primarily for North American spec cars following the introduction of the brake servo the previous year, to give more clearance, and applied to all cars for commonality. But Clausager quotes the same chassis numbers for the strut being moved to the right-hand side of the engine compartment of all LHD cars - "to avoid fouling brake servo". Perhaps originally it was thought that the shorter spacer would be enough, but it proved not to be the case. The other oddity is that the spacers are shown for all cars, i.e. including LHD with the strut on the other side. But in that case - assuming the release lever was still facing forwards (to do otherwise would be completely illogical not to say stupid) - the flat side of each half of the strut would be against its respective bracket, so the cylindrical spacers wouldn't be required at all (but see below for why they may be needed to clear relays, fusebox etc.) and a simple washer would suffice to prevent the strut rubbing against the bracket and visibly marking the paint as per the boot strut. That would leave the 1/4" bolt rattling about in a 7/16" hole, but a 1/4" spring washer GHF331 fits that hole perfectly.

August 2021:

Peter Mitchell wrote saying his upper mounting arrangement didn't look right so he fitted the spacer obtained from Moss, but the screw head then fouled the wing channel, which shows signs of having been relieved anyway. Being a 1978 he would have received the wrong spacer (Moss only show the earlier longer one), but no big deal as it can be cut down. Realising that the position of the bonnet bracket on the bonnet would have a major bearing on this I looked at both mine and they are welded, but only half on the strengthening channel whereas one would expect it to have been nearer the middle. But Peter's bracket is screwed, so that may prevent it from being as far across as mine. The irony is that if the bracket had been fitted the other way round there wouldn't have been an issue with any of it! Perhaps. Another irony is that just bending them towards the middle of the car might be enough by itself, Vee's in particular seems to be angled towards the wing and not a right-angle.

And yet another irony is that the upper spacer isn't really required at all! Both Bee and Vee came to me without one, by the simple expedient of fitting the flat side of the upper part of the strut against the inboard side of the bonnet bracket, instead of the channel part being against the outboard side. It does mean the angle the strut makes to the brackets changes fractionally but I doubt anyone would notice, and a washer between the two would be enough to stop them chafing. That leaves the 1/4" bolt rattling about in the 7/16" hole, but again a 1/4" spring washer GHF331 fits perfectly in the hole in the strut to support the screw. Having said that the correct spacers are available from the usual suspects for a couple of pounds or so. If that wasn't enough one of the Nylocs that came off Vee's strut has a shoulder of reduced diameter (similar to this) which is a perfect fit for the hole in the strut!

Then I found this Moss US document describing an after-market longer strut, which is also self-releasing. They are 4" longer, which makes quite a difference to the height of the propped bonnet ... although you need to make sure you have the headroom in your garage to be able to use it! It shows an LHD car with the strut on the right, but with the radiator mounted in the original position, which makes it a 1976 car (the strut only moved across in 76 but the radiator moved forwards for 1977). Amongst the original hardware it quotes two spacers BHH298, but according to the Parts Catalogue one of them should have been the shorter BHH 1933 by then. Step 7 shows and describes fitting a spacer to the **lower** mounting point, saying *"Without the spacer the support actually hit the lip of the channel in the fender up by the radiator support"*. That doesn't really make sense, as the only time the strut can hit anything by the radiator support is when the bonnet is closed, which is when the **upper** part of the strut is by the radiator support, so if anything the strut would need to be spaced inwards at the top. However it does also mention "equipment mounted to the inner fender on the RH side" and it makes more sense for the lower spacer to be needed to clear that, if not spacers top and bottom. As the strut has its flat face towards the body bracket, the spacer makes it stick out much more than usual, as can be seen in Fig. 5 of the Moss document. The story is similarly confusing regarding the bonnet bracket:

- Fig 1 shows the bracket with the strut mounting flange (very close) towards the edge of the bonnet, but Figs. 7 & 8 clearly show it positioned the other way round. Positioned as per Fig. 1 then it is almost certain that the bracket, and if not the bracket then the head of the bolt securing the strut to it, will foul the bonnet channel.

- It's reasonably clear that in the main picture of the engine bay the strut is on the inboard side of the bonnet bracket, which as that makes the channel face the bracket, a spacer is definitely needed. However Figs. 7 and maybe 8 show it on the outboard side, with no spacer. If there were a spacer here then again it would almost certainly foul the bonnet channel.
- Furthermore if positioned as per Fig.7, and it hits the bonnet channel, then you will have to fit the upper part to the inboard side of the bracket, which again will need a spacer.
- Fig. 6 shows how close the end of the upper part of the strut will be to the radiator mounting panel with the bonnet closed, and shows the channel facing inboard. However all the other pictures show the upper part of the channel facing outboard.
- Step 9 describes how to check the clearances with the bonnet closed, saying *"If the outer slide hits the radiator support you may have a vehicle that was damaged in the front, or the rear mounting bracket was mounted a little farther forward than normal. In any case some modification will be needed to fit the telescoping support*" without saying what they mean by 'rear bracket'. It seems to me that a good 1/4" could be cut off the end of the upper part of the strut to give more clearance, no information is given on what might be involved in moving the body bracket backwards. And whilst the test may be good enough to check for length (but see the next bullet point) it takes no account of lateral position i.e. how close it is to the bonnet channel, only fitting and careful closing while squinting in the gap, to determine whether you need an upper spacer, will do that.
- Step 9 begins by saying *"With the inner slide all the way inside the outer slide ..."*. Fair enough, but it is the position of the bonnet bracket relative to the body bracket that determines how far the inner slide goes into the outer slide with the strut fitted and the bonnet is shut. If the bonnet bracket is too far forwards, the strut may well not be fully collapsed, and hence may still hit the radiator support panel even though it didn't in the test, or even if the body bracket has been moved backwards so that it cleared it in the test.

Whilst I can see the point of a longer strut and no more catching the top of my head on the bonnet pin or safety catch, I have no time for gas struts given that you need to fit them both sides, and judging by other peoples comments and pictures having had no end of trouble getting the bonnet to fit flush as it did originally.

Bonnet Seals: *Updated February 2013*

Mk1 cars had a foam seal AHH 7120 sitting in the channel at the back of the engine compartment. The Parts Catalogue up to September 1976 then indicates that the foam seal was replaced by a rubber seal that fitted on the inner edge of the channel, across the back and part way down the sides. The September 76 and later Parts Catalogue i.e. for the 77 model year on (spotted by Brian Shaw) then indicates that **both** seals were provided, with the foam seal now part number BHH 2270. Some leave these off to improve engine compartment cooling, however you will then get hot air and fumes going straight into the heater intake and thence into the cabin, so perhaps not such a good idea. Whilst my V8 had the rubber seal I added the foam as I originally thought all Mk2 and later cars had both, and that did noticeably reduce fumes in the cabin.

There are also rubber buffers in the side channels, to stop the bonnet rattling which could wear the latch mechanism and cause the bonnet to pop up at speed. Mk1 cars without the rubber bonnet seal may have had two of these each side, Mk2 and later only seem to have one, near the front.

Insulation: *July 2022*

Yes or no? Some don't bother, but as both my cars came to me with it I've kept/replaced it as and when. Bee's would have been done over 30 years ago, I can't remember what adhesive I used, but it has been stuck fast ever since. But Vee's done in 2017 as part of a repaint, even though it was stuck down before the bonnet was painted and fitted, wouldn't stay on. Dangling bonnet insulation is an section 8.1.1 MOT failure:

8.1.1. Noise suppression system
...
under-bonnet noise deadening material fitted as original equipment

Defect	Category
...	
(b) Any part of the noise suppression system:	
(i) insecure	Major
(ii) likely to become detached	Dangerous

I know I used basic impact spray adhesive for that and although the front panel was OK the rear kept coming down, so eventually I took it off altogether (the insulation) and this time used "Trim Fix 500ml High Temperature Adhesive Spray Carpet Glue For Cars" after a recommendation on the MGOC forum. As well as masking off the rest of the bonnet and covering the engine compartment, wings etc. with a sheet, after refitting I put several sheets of thick card over the engine with folded-up dust cloths on top of that, the thickest in the middle, so with the bonnet lowered it would have the insulation panel resting on the cloths to keep it pressed up against the bonnet. I did that for a few weeks, replacing it on the return from a run, eventually I stopped doing that and left it to its own devices. All was well, including a very hot 100 mile run in late June. But in early July parked in hot sun all day at a family wedding and although the rear section was fine the front section had started to peel away. So a couple of days later repeated the process for that section as well. Unfortunately it was

the off-side that had started to peel and had been resting on the alternator fan/fan belt which has rubbed off the black outer coating. I'll disguise that later with some black paint. There are other considerations with the V8 insulation which has cut-outs for the carbs and radiator filler plug.

Bonnet Fitting/removal: by John Maguire *April 2019*

John sent me these pictures from Oz, which need very little explanation. By way of a change, removal would be the reverse of fitting.

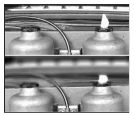
Alignment to grille: *August 2020:*

Pete Curtis posted a photo on the MGOC forum of poor alignment of his bonnet to the top of the radiator grille, as well as to the wing further back. His is a 1970 model which should originally have had a recessed or 'fishmouth' grille, but had the earlier chrome slatted type. While looking into that I came across a couple of pictures of other cars with the same problem having done the same mod, the implication being that the front of the 1970 bonnet was flatter than previously. I wondered whether the increased curvature was for the top-fill rad having the cap further forward, but that dates from 1967 and the Mk2. It may also be the case that the curvature was increased again for the honeycomb grille which to all intents and purposes uses the same surround as the slatted but that only came in 1973. There is also the curvature conundrum below. As far as the V8 is concerned the additional curvature may well have been needed again to clear the forward mounted radiator as I speculated at the beginning, and was then used with the honeycomb grilles. A pal (since deceased) had a car with a similar modification done by the time he got it, which certainly didn't suffer from the same problem. His bonnet still had the bright strip along the leading edge, which Pete's doesn't, but I don't know whether either of the bonnets were alloy or steel, or whether Pete's is the original bonnet with the trim strip fixing holes stoppered.

V8 Bonnet: *October 2017*

Insulation

There is much speculation in various places as to whether the V8 bonnet had an increased curvature to clear the carbs, and whether that bonnet was then used on 4-cylinder cars as well. David Knowles mentions it in his 'MG V8 ...' book on page 32, but he doesn't specifically state it was for the carbs, it could equally well have been for the radiator, in place of the MGC bulge. The Parts Catalogues do show a different bonnet for the V8, but even that is confusing. The pre-77 catalogue states that HZA4015 is 'except V8' and HZA4197 is 'V8'. It lists both those as 'NLA' and 'Use HZA4014 with (bracket) BHH1934'. HZA401 was the alloy bonnet, so HZA4015 is the steel that replaced it in 1969/70, and the implication is that HZA4014 replaced both steel bonnets some time after V8 production started. If the V8 bonnet did have greater curvature to clear the carbs, it would have to be very close to the rear edge as that is where the carbs are, and I don't really see how that could be done without changing the panel at the base of the screen as well. The insulation panels do have cut-outs for the carbs and the radiator, and the tops of the carbs had rubbed on the underside of the bonnet through the cut-outs but that was probably from when the near-side engine mount had parted and the engine lifted under acceleration. This V8 Register article sets out to measure the curvature for a V8 as against an alloy bonnet, but is inconclusive. It shows a V8 with 3mm more curvature at the centre reinforcing strut, but there is no measurement for the rear edge, which is surely more relevant. Their V8 centre measurement was 5.1cm and that at the carb cutout 5.6cm, whereas my V8 at the centre was a fraction over 5.7cm and that at the rear edge of the insulation (in order to compare with the roadster as that has no carb cut-outs) was 6cm, which is more of a difference between the two V8s than their V8 and alloy! My September 72-built roadster was a fraction under 5.7cm at the centre and 6cm at the rear, i.e. to all intents and purposes identical to my V8. However I have no way of knowing if either bonnet is original to the car. "We shall never know". Or will we?



Years later when thinking about additional spacers on the near-side engine mount to move the exhaust manifold further away from the inner wings I discovered that the present installation has a good 1/2" of clearance.

There is also the question of the panel at the base of the screen and its curvature. As I discovered when replacing Vee's heater intake grille - her panel and original grille is flatter than Bee's and the replacement, even though one might have expected it to be greater to follow a greater curve in the V8 bonnet to clear the carbs.

Incidentally, bracket BHH1934 is the bonnet telescopic stay bracket. The same article says that these were originally welded to the bonnet by the manufacturer, but when the bonnets were stacked one on top of the other it damaged the one underneath, so it wasn't fitted until the bonnet was fitted to the car. But more confusion: That article states it was V8 bonnets that had the problem but surely it would have occurred on all bonnets, and series production of the V8 didn't start until April 1973 whereas two suppliers list this bracket as being for chassis number 219001 (71 model year), which is when the telescopic strut replaced the prop rod (Clausager). So reasonable to assume the new strut had a different arrangement and the problem didn't occur before, but the prop rod had it's own bracket attached to the horizontal bracing bar. The Parts Catalogue has both types of stay but brackets for neither of them, implying BHH1934 as a separate part came after the

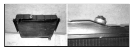
telescopic stay. Most suppliers show this bracket with two screw holes for attaching to the bonnet, both Bee and Vee have welded brackets with no holes, but Peter Mitchell's 78 has it screwed. Brown & Gammons describe it as the 'lower' bracket i.e. for the inner wing, not the bonnet!

August 2021:

Peter Mitchell wrote having corrected the mounting of the telescopic stay on his 1978 but then found the bolt fouled the wing channel, because Moss only have the longer spacer for earlier cars, and a shorter one was fitted from 1976. He sent me some pictures and he has a screwed bonnet bracket, so maybe that didn't happen until 1976! Full story by clicking the thumbnail.

Insulation:

During Vee's restoration I replaced the insulation as it had shrunk quite a bit and was very ratty. Holes for the carbs will have to be cut in the new insulation - and maybe for the radiator - as there are no pre-cut pieces for the V8, not even for 77 and later 4-cylinder cars with the radiator in the V8 position.



I gave more thought to the rectangular cut-out in the front section. On the face of it the rectangle is needed to accommodate the raised section on the left-hand one-third (or so) of the header tank. But in that section is the filler plug, the top of which is easily 1cm higher than the highest part of the header tank. As that is twice the thickness of the soundproofing, strictly speaking one only needs another circle for the filler plug - if anything at all. If the bonnet **is** that close, then it's going to be hitting the corner of the plastic filler plug, and could damage it. There are brass filler plugs, but any contact between them is going to be damaging to the bonnet and making a noise, I'd rather have a layer of sound-proofing between the two. So I left that piece until the radiator and bonnet were back in, and could more accurately measure the clearance or lack of it, as well as the positioning of a hole - if one is needed.

In the event none was needed, measuring with the bonnet closed there is still 1/8" clearance from the highest part of the plug to the underside of the uncut insulation.

Unfortunately despite attaching the sound-deadening before the bonnet was refitted making it easier to spray and locate, the rear section started coming free, and again after respraying, although the front shows no signs. Hotter at the back? Dangling bonnet insulation is an section 8.1.1 MOT failure:

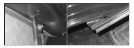
> 8.1.1. Noise suppression system
> ...
> under-bonnet noise deadening material fitted as original equipment
>
> | Defect | Category |
> |---|---|
> | ... | |
> | (b) Any part of the noise suppression system: | |
> | (i) insecure | Major |
> | (ii) likely to become detached | Dangerous |

It's wedged up at the moment with strips of hardboard (!) and wasn't mentioned at the MOT, but on the MGOC forum "Trim Fix 500ml High Temperature Adhesive Spray Carpet Glue For Cars" was mentioned so I'm giving that a whirl. Several weeks later including some runs in very hot weather all was well, but after being parked all day in hot sun the front section started to peel away, but the rear was fine, so the front gets the Trim Fix treatment.

Some have said they removed theirs altogether and that hasn't resulted in an MOT comments even though the Parts Catalogue indicates it was 'original equipment'. But it would require the tester to know that 60 years later, and given the amount of modification we are allowed to do to our cars it seems odd that removal of bonnet insulation isn't one of them. I suspect that like much of the MOT it's more applicable to 'modern' cars.

Boot/Hatch

Boot Strut:

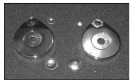


Again the body and lid brackets are offset by the thickness of the strut, with the lid bracket inboard relative to the body bracket. The boot strut is subtly different in construction to the bonnet strut - as well as being shorter the holes for the pivot bolts are also smaller at 1/4". Because the release lever faces backwards for the boot but is positioned as it is on the bonnet stay, when fitted both boot stay channels face the other way compared to the bonnet strut, which puts the flat sides of both halves against their brackets. So no need for the large spacers, instead there are 1/4" x 9/16" washers (PWZ104) between strut and brackets so the paint on the brackets isn't damaged as the strut halves swing past them. It does mean the strut pivots on the bolt threads though. If the bonnet release lever had been positioned on the other edge, and the strut turned round to suit, smaller holes in the struts and washers in place of the large spacers (when the strut was on the left as originally) would have done for that as well.

GT Tailgate Supports *November 2012*

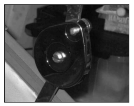
Breakage

Well, the spring covers, rather than the props as a whole. When Vee came to me 18 years ago the 'chrome' plastic covers were a bit tatty, and the domed cups that hold them on quite tarnished and a bit rusty, and the only change since has been for them to get worse. Someone on a BBS asked how to get the domed cups off, and that was a prod to me to do something about mine.



I got new covers and the two sizes of domed covers from Brown and Gammons, together with a bonnet badge for the ZS. This had faded badly in my ownership, as it was parked under a carport facing due south and so got about as much sun as it was possible to get. Now we have moved it faces East when parked, so gets the early morning sun, but much less than before (the boot gets more and that has started delaminating!). But I digress.

Getting the old covers off took about five minutes - the domed covers simply ping off, but it needs quite a hefty screwdriver to do so. You can lever the big ones off by jamming the screwdriver in, then twisting, as there is a metal piece behind the cover that you can lever against. The small ones have nothing to twist against, but if you angle the screwdriver across the centre spindle where the large one was and lever against that you can pop the small one off. After that the covers just come off the spindles.



The new covers didn't slip straight on the spindles, even though the smaller of the two holes is elongated, they aren't quite wide enough apart. I didn't fancy forcing them on only being plastic, and probably quite brittle at that. I compared the spacing on the old and new covers and they were identical, so had another go at easing them on, and that they did.

That was the easy bit. The cups were very difficult to get on. No matter how hard I pressed or squeezed with my thumbs, either square on or trying to get one side on first, I made no headway at all. I was gripping with my fingers round the back of the cover, and was wary about putting two much pressure on that and breaking it. Next attempt was a large hammer against the nut on the back, and tapping a mallet against the larger domed cap. Well that got it on, but at the expense of bashing the dome in a bit - most annoying. For the smaller one on that side I tried a folded cloth about an inch thick against the dome, and used a pair of channel pliers to ease an edge on, then worked round the edge to avoid pressing direct on the dome, but it still marked it a bit. What it needs is a concave domed surface to press over the whole surface including the edge. So I got a bit of softwood, and a 'ball' grinding wheel in a drill, and that made the perfect shape and size for the larger cap. Taped it in place, then with the large hammer on the back tapped the wood with the mallet and on it popped with no damage. I then cut a smaller depression for the smaller cap, and that went on just as well. Subsequently Ray Owen wrote to say before reading this he used a 1/4" block of balsa which deformed around the caps and also fitted them without damage.

Breakage: *June 2019*

Just after closing the hatch there was a bang, and I subsequently discovered the coil spring in the right-hand strut had broken, which had damaged the relatively new cover. Dismantling showed the central pivot (AHH7904 NLA) to be very badly worn, and the corresponding hole in the lever. Whether the resultant movement between the two had stressed the spring or not I don't know, but the other side is moving quite a bit so that is bound to be worn to a similar amount. Covers (AHH7899) and caps (large AHH7578 small AHH7579) are available, but not the springs or the central pivot (not be confused with the lower pivot which **is** available). Complete struts (AHH7901) new available from £67 to £80, 2nd-hand at £25 a pair from one source and £8 each from another. So order a single for the spring, maybe the central pivot if that is better then mine or try and weld mine up, reuse my levers (hole welded up perhaps) and caps (which came off OK), with a new cover.

Single strut from Andy Jennings arrives and is dismantled. Lever off the caps to remove the cover, and use a stout pair of pliers to grip the outer end of the spring and lift that off the post so it can be removed from the central pivot. Central pivot is worn much less than mine - a trick with that is to turn it through 180 degrees so it is acting on the unworn side. Mine being worn more than half-way through is beyond even that. The hole in the strut isn't as badly worn either, but the chrome is shot so won't use that. Can't see any cracking in the spring.

Reassembly is inevitably the reverse - checking the opposite side for the correct orientation of everything - don't dismantle both at the same time! Press grease into the turns of the spring, and apply to the central pivot. There is a crinkle washer on

the central pivot between the levers, a large washer on the outside, a lock-washer and a stiff-nut. Fit a new cover and my caps, can't find my bit of wood with the recesses so make another, and this time clamp it up in the vice to press the caps on, and it's ready to fit. The upper pivot is part of the upper lever, a crinkle washer over the pivot, through the tailgate bracket, large washer, lock washer and domed nut. The bottom pivot is bolted to the body bracket, a crinkle washer goes over that, then the lower lever, a large washer, lock washer, and domed nut.

GT Hatch Removal *January 2022*

From Willy Revit in Tasmania:

> "Remove the stays first, then from inside the car with the lid shut unbolt the hinges from the hatch then just lift the hatch off----If you're taking the hinges off the body to paint, you need to refit the hinges to the body only just tight first when reassembling then sit the hatch on and bolt it up otherwise you'll scratch the body with the hinges if they're bolted to the hatch trying to fit it as an assembly."

Boot and Hatch Seals *February 2014*

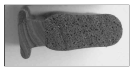
Hatch rattle

Originally the main seals on both roadster boot (AHH 6535) and GT hatch (AHH 7833) consisted of a sponge core with a smooth very thin outer wall to keep moisture out, the result was a very floppy and highly compressible seal. Originally the roadster seal was fitted to the boot lid, and quite fiddly as it has to be slotted into a channel running all the way round, as with the GT.

In March 1976 at chassis number 401000 the roadster seal was changed to HZA 5386 that simply pushes onto the lip around the opening in the body, and is much easier to deal with. This later seal has a completely different profile to the original, and I suspect is hollow and not sponge-cored, and I do wonder whether it (or maybe two to get the right length) might be suitable for the GT hatch opening.

I've had occasion to remove these seals on both roadster and V8 for painting. Best removed by carefully teasing out one end where the two ends join at the bottom of the opening, then pulling gently all the way round. For refitting although the T-section of the seal would appear to be a sliding fit in the channel on the lid and hatch, that only works for short lengths. Maybe easier to slot one side of the T in an inch or two at a time, then ease the other side in with a blunt flat-blade screwdriver, steadily working all the way round. Tension the seal slightly as you work round, so you are not left with a gap (refitting the old seal) at the end. Any excess can be worked back in the channel slightly, rather than cutting it off.

Moss state the main sponge seals are no longer available, and too expensive to reproduce, so have sourced a hollow rubber seal. However this is significantly harder than the original sponge, and can cause problems in closing the boot, and getting a good seal all the way round. This can be a particular problem in the GT hatch, where gaps can cause exhaust fumes to be drawn in. Other MG parts suppliers also seem to only have this hollow seal.



A number of specialist seal suppliers seem to have the correct item specifically for the MGB, but having obtained a sample these are much denser than the original sponge seal, and much harder to compress than the hollow seal, so I have removed the links to them.

That still leaves the problem of what to do when you have one of these new seals and you can't get the latch to click shut, even when the striker bar on the rear panel is in its highest position.

GT Hatch Seal:

The GT hatch has two seals - a full-length main seal AHH 7833 (see above), and a three/quarter (called a half or even a quarter seal in some places) upper seal AHH 9778 that runs across the top of the hatch and part-way down the sides. Both seals are of similar sponge-cored construction to the original roadster boot lid seal. The top section of the 3/4 seal is retained across the top by an alloy strip AHH 7818 with a series of screws PTZ 603 (pan-head, Pozidrive, No.6 x 3/8" long), and the sides are glued in position alongside that part of the main seal. This upper seal can only be removed/refitted with the tailgate off the car. The parts catalogue does not indicate any change to either of these seals, or that the main seal moved to the hatch opening during production. *December 2019:* The upper seal of the correct type seems to be available from several sources, unlike the main seal. It seems odd that someone would be manufacturing this complex seal using the original construction as seems to be the case, but not the simpler main seal. Maybe they are all NOS, and so a limited supply! Maybe the later roadster boot opening seal would be suitable as a GT hatch opening main seal.

Hatch rattle: *October 2020* Ever since the repaint Vee has had a rattle from the back when going over even slight imperfections in the road surface, but not bigger bumps - possibly being drowned out by everything else! The hatch staple had not been removed for repainting but the hatch had. I'm sure I adjusted the staple a small amount so the hatch closed tighter but that immediately makes it harder to latch and unlatch, I still had the rattle, and I didn't want to go any further. But eventually I decided I couldn't live with it any more and roped in a pal to crawl into the back and try and locate it. The trouble was finding a piece of road with enough slight undulations to make it happen several times but without any bigger bumps, and we couldn't find a quiet stretch like that with easy turning places at each end. Pal suggested it could be the spare wheel cover board so I took the fasteners out of that and laid several thicknesses of dust-sheet between the board and

the body structure it rests on all the way round but no difference. Next thing was to completely remove everything from the back, including the board and the rear seat back, and it still did it. Could it be the hatch struts? Took those off and just the same, which really does only leave the latch. So adjusted it further and finally it did stop, but it now needs more of a slam to close and the button needs quite a bit of pressure to release it, so I'm not really happy with that either. I'm thinking I might try and glue some more foam strip between seal and body, wondering if the additional pressure of that might be enough to find the sweet-spot between no rattle and not too stiff, as adjusting the staple at the moment is changing the compression over the whole length of the seal and so quite a 'coarse' adjustment. And a couple of inches just wedged in by the latch has done the trick.

Unable to open:

Whilst failure of the GT hatch release is annoying it is relatively easy to open it from inside the car, but failure of the roadster boot latch is a much trickier proposition. The problem can arise here from either failure of the mechanism or loss of the key. It happened (to someone else) on one MG run I attended and they resorted to taking the affected roadster plus another car to a workshop where they proceeded to cut an arm-sized hole in the rear bulkhead. Why did they need the second car? So they could work out how to manipulate the mechanism from the inside on the affected car, of course, where they were working blind!

Some say they have removed a reversing light then used a length of stiff wire to hook into the lock mechanism, which sounds pretty tricky, and I can't see how you would get the leverage to operate the latch from the side.

Denise Thorpe has said that if you twist the lock to one side or the other as far as it will go it reveals enough space to drill a small hole through the skin that will be covered when the lock is centralised again. Inserting a narrow probe through this hole, and fiddling about, should enable you to push the latch out of engagement and so release the lid. Someone has said their lock twists nearly 90 degrees, but that sounds like the key-way has been cut away (or maybe they are thinking of the push-button and not the lock as a whole!), both of mine barely twist enough to drill the 1/16" hole so that it could be covered by twisting the lock back the other way.

Roger Parker also writes with another tip here.

December 2011: Steve Leech wrote to me after fitting a new lock and push-button fitted to his existing latch, then closing the lid to discover he couldn't open it again! He writes:

> "After walking away and considering my options for a number of weeks (my usual approach in these matters) I narrowed down my options to either:
>
> "1. cut an access hole in the rear bulkhead and subsequently reweld and repaint. This presenting a high risk of damage to my show condition shell.
>
> "2. drill out the old button/lock mechanism and remove, thus allowing access through the void in the chrome button surround left by the button/lock. Again running the risk of a slipping drill.
>
> "Fortunately I had the old push button with cylinder lock to practice on. With the unit in the vice I was, with care and some force, able to drill a hole right through the button/cylinder lock of a size equal to their diameter, effectively removing the lock completely. I started with a 1/8th inch bit (using the key slot as a pilot hole), and then progressed through an intermediately sized bit to one the full diameter of the button/cylinder lock. The final drill bit was soon reassuringly contained by the chrome button surround and pull tab, and I progressed with some confidence. I encountered extra resistance when I hit the steel screw that holds the release cam in place in the centre of the lock; but with time and patience I removed enough of this screw for the screw head and cam to fall away. Henceforth I encountered little further resistance before drilling right the way through the lock. The entire process took less than five minutes, and gave me more than enough confidence to try the same on the car.
>
> "Again the process went smoothly and successfully on the car, but this time the lock material was much softer and I completed the task within a minute or two, and I was thus able to access the latch lever through the void vacated by the button/lock cylinder in the centre of the pull tab/surround and release the lid.
>
> "And the cause of my problem:
> Stupidly I had ordered by part number and expected the correct part or matching copy part to be supplied. Instead the part supplied had a release cam of a different size and shape, i.e. too short to contact and operate the latch release lever. Had I checked before fitting I could have easily replaced the new cam with my old cam; the remainder of the part being a faithful reproduction of the original. I have since wondered whether the part supplied to me was for a Midget, where logically the lock position could be closer to the latch in the scaled down boot lid.
>
> "I have always ordered by part number, but increasingly I find that mistakes such as these are made. I suspect that the supply chain is populated by business people rather than brown coat enthusiasts these days. But enough of that!!"

More lock/latch problems: *July 2015* Helping a local pal get his early Mk1 back together after a major restoration (that turned into a reshell, fortunately with another good original Mk1 shell), mainly with electrics, he asked my advice about the boot latch. Fortunately he had discovered before closing the lid that the cam on the lock was a good quarter of an inch away from the lever on the latch, and barely moved the latch even with the button fully pressed. He tried both old and new

button mechanisms, and cams, but the situation was the same. Most strange as he had never had a problem with his previous shell, and it is reasonable to assume that the PO of the replacement shell didn't either.


I took his latch and tried it on my roadster, and my cam rests on the lever of both his and my latches, so his latch isn't the problem. Next we tried my cam against his, and both his are about 1/8" shorter, but nothing like the 1/4" gap when fitted to his car. So I remove the button on both our cars and put a steel rule down inside to rest on the lever of the latch, to find his outer skin is another 1/8" further away from the latch lever than mine - eureka! Whether this is from a skim of filler from the paint shop, or something else, is unknown. Obviously that gap can't be altered on a newly painted shell, and although I could give him my longer cam it may still be marginal (as might mine with a shorter cam!). So we opt to build up his cam about 1/4" with weld. If he changes latches in the future it will be fine, but if he changes locks he will have to remember to change over the cam.

August 2015:


Roger Parker has contacted me with a photo of a different type of release cam. This is much narrower than mine, and does mean that any looseness could allow it to lose contact with the latch lever more easily. However he has also found that when one of these cams is just loose i.e. hasn't fallen off altogether, then pressing down very firmly on the release button so that the lid is deformed very slightly, can make the difference between releasing and not releasing. The panel is very springy so unless you really go for it will spring back and be none the worse. He did have one come loose, but noticed it from the button not feeling quite right before it failed to open ("Listen to your car, it is talking to you"), used some thread lock and refitted, and that is still holding 44 years later.


These photos (click the thumbnail) show the features of the release mechanism including what stops it twisting very far, what comes loose/drops off to cause the usual problem, and where to pull/push to open the latch. These are taken on a GT for ease of access but the lock on the roadster is identical.

A future project is to look at the feasibility of using a bonnet or choke cable mounted on the rear bulkhead and permanently connected to the lock mechanism. Whatever you use as a one-off or a more permanent 'emergency release' needs either to pull the upper part of the release lever (the part the cam bears on) forwards (i.e. towards the front of the car) or the lower part of the release lever (that hooks under the bar on the rear panel) backwards to clear the bar. On a GT a piece of timber with cross-section up to 3/4" high and 1 1/2" wide can be pushed through the loop of the bar to push the lower part of the release lever backwards and release the tailgate. It take surprisingly little force to do so, so there shouldn't be much pressure on any permanent 'emergency release' cable used on a roadster. Such a cable obviously introduces a security risk since it is easy for someone to gain access to the cabin of a roadster, but hiding the handle should reduce that risk. Watch this space.

In the meantime, get out there and put some Locktite on the screw and tighten it up!

Added November 2009:


Still watching? I'm still waiting to get a round tuit before looking at this but Bruce Mills has written to me with what he has done. As well as adding an emergency boot-lid release he has gone a lot further and added an electric release triggered from a key fob for both lid and doors. A 'popper' spring on the doors then pushes them open just a bit for you to open manually the rest of the way. The boot lid had one as well to start with but it exerted too much pressure on the catch so the solenoid was unable to open the latch and had to be removed. These changes have allowed Bruce to remove the locks and handles to get a smooth finish.

Given how close my pal above came to shutting his boot lid and not being able to open it again, I finally get a round tuit *July 2015.*


Bruce's arrangement did give me some ideas, although I didn't want to weld brackets to my boot lid, and thought there must be an alternative way. There are two holes in the exposed part of the latch frame, ideal for mounting a plate to support the cable. I cut a plate to size and drilled a hole in it for the inner to pass through, and welded a bar across the hole, to act as a radius to pull the cable inner round similar to Bruce's arrangement.


Looking at the pivoting part of the latch there is ample space to drill a hole for the cable inner to go through, in the part that the button cam bears on. It didn't take long to come up with that from bits of scrap, but I soon found that even with a relatively thin and flexible cable like on the choke the radius round the bar was rather small and the angle acute which made the action quite stiff.

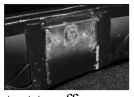

So plan B was to fix the outer to the plate in such a way that it had a straight pull through a hole drilled in a different place in the pivoting part, and that worked much better. The socket for the outer was a convenient spacer with a hole up the middle larger than the inner but smaller than the outer, which I drilled out part-way through to accept the outer. It was steel, so again welded to the plate.

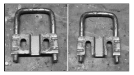

I have an old choke cable (replaced when it no longer locked) which looks to be an ideal length to reach the rear bulkhead. However two problems - one is that the exposed length of inner is rather short which means the cable clamp has to be adjacent to the pivoting lever, which interferes with its movement slightly, rather than being long enough to be fed through the lever and back towards the cable outer and

clamped to itself as in Bruce's picture (which incidentally is how the bonnet cable is attached to that latch). I could cut the outer back, but that would shorten the cable and may impact on it reaching the bulkhead. So the lock end works, but the second problem is that I don't think I'm quite ready to lose what is after all the only relatively secure part of a roadster i.e. a locked boot. Yes I know the objective is to be able to release the boot in the event of lock failure (or losing your keys, or shutting them in the boot ...), but with the hood up the release knob is likely to be quite visible, and rather obvious as to what it is for. OK it could be covered by a flap, but I think I'll do something else even more concealed, which I don't propose to go into.


So plan C uses a longer plate, with the outer positioned further away, and a longer cable with more exposed inner so that it can be fed through the latch lever and back towards the outer, to be clamped to itself. When ordering some other stuff I took the opportunity to order a bonnet latch cable as well, which has a hole through it large enough to for the inner to pass through twice. I have a bonnet cable with a T-bar handle, which as well as having a longer exposed section is also much longer overall, which gives me more scope for concealing the handle. That still needed the outer to be trimmed back, but only half an inch.

Striker: *March 2018:*


Bolted to a strut inside the rear panel, with two welded nuts behind. One chap was having problems attaching his and it looks like the welded nuts might have stripped, so someone had welded some more on the front! Needing load of weld as it is only that stopping the latch ripping the striker off the strut, which didn't leave enough room to fit the striker. Silly, really, as you can reach round the back of the strut to offer-up more nuts while you fit the screws. OK, needs a spanner on the back to hold them while you tighten the screws, but how often are you going to remove the striker?


What to do when you have new seals and you can't get the latch to click shut, even when the bar on the rear panel is adjusted to its highest extent? From tests inside his boot (!) Terry had come to the conclusion that his striker needed to be raised almost 1/4" before it would latch. The holes in the mounting plate are slotted for adjustment, so one could file them out, and there is about 1/4" 'spare' metal in the mounting plate to extend them. However my rat-tail file which is a good fit for the width of the slot made no impression on the metal at all, and neither did pressing down the flutes of a bit in a drill. I had already considered welding an extra piece below the mounting plate - the bars extend below it by about 1/4" - to strengthen the bottom of the extended slots. But now I think I'll have to use an angle grinder to cut into the slots in order to extend them downwards, which will mean I will definitely have to weld a strip across the bottom to close the slots.

Terry was also having problems getting his latch to engage with the striker - having to push the button in before the latch would start to move past it. It would only start to do that by itself if the striker was spaced forwards by maybe 3/16", even though the boot lid was positioned further back than it should be leaving an over-large gap to the part of the surround by the tonneau cover.


Terry's striker on my roadster had a similar problem, also with his latch, but his latch with my striker was fine. When I compared his to mine it was evident that his was twisted with one side further back than the other, both sides were further back than mine, and his had a rearward bend in the top part. Each of these factors were progressively moving the central part of his striker, that engages with the latch, probably 1/4" further back than mine, which clicks shut just from the weight of the lid - no pressing down or dropping. Not difficult to deal with, just clamp both bars in a vice, then whack Terry's with a large hammer until the vertical bars on his are parallel to mine, and then clamp up the top part of his bar in the vice to flatten the rearward bend out a bit.

V8 badge location *from MGSte*

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Doors and Glass

Roadster vs GT

The most obvious difference between the doors is at the top of the skin above the latch. The roadster skin comes all the way up past the drop-glass slot to the inner skin, whereas the GT stops at the beginning of the slot. This is to do with the GT roof-line being higher, hence the glass and quarter-light are taller, but there is the same depth inside the door for the lowered glass. That would leave the GT glass sticking out of the top of the door by about 1/2" (the roadster glass is about 1/2" lower than the top of the door), so to cover that the outer seal is fitted on top of a bright trim strip that sits on top of the door, and the glass drops out of sight on both doors. However I'm not sure why this required the change in the door skin, as it is it leaves a gap on the GT door below the trim strip and seal which has to be covered with a stainless finisher.

It's said that this is the only difference, other than that the doors are interchangeable, with the modification from one to the other relatively easy to make. Remember that there are very significant differences between Mk1 and Mk2 doors, windows and locking furniture, and converting between Mk1 and Mk2 is a very different proposition.

The 'Crack of Doom'

When I bought 'Bee' the drivers door had the 'crack of doom' which is split at the top of the door skin near the front door glass channel. After much study I decided there was a design weakness in the door skin, in that the flange that supports the outer rubber seal ends just before the front door glass channel. The MGB doesn't have much scuttle-shake - where the screen wobbles from side to side over rough surfaces - but there is some. If this is allowed to waggle the quarter-light frames from side to side, that's when you get splitting of the door skins. It's been claimed that this splitting is caused by using the top of the door to close it instead of using the internal handle, however that just doesn't hold water. If that were the case I'd expect GTs to show it more than roadsters given that there were significantly more of them sold in the UK than roadsters - 65,000 to 50,000, and they rarely do. Also if you do close a roadster door using the top of the door you are likely to be pulling on the waist rail, and that is attached to the inner skin not the outer. Whereas if you do it on a GT you would probably be using the finisher that carries the outer seal, which **is** attached to the outer skin. There are cases where it has happened to a GT, but that is more likely to be caused by pulling on the door by the raised drop-glass or top of the quarter-light as much as anything, or where the long leg on the quarter-light is incorrectly adjusted and it is being pushed outwards by the door seal every time you close the door.

To strengthen the skin I welded a small piece in such that it extended the flange alongside the channel and round the front, meeting up with another flange. The picture from Lyndsay Porters Guide shows the area quite well. The first shows the area that splits (arrowed), and the second where I have extended the flange in yellow and blue (false colour). Subsequently I saw a Heritage door that seemed to be constructed in just this manner (*December 2018: However in this Heritage video with an unknown filming date (ignore the posted date) the outer skin seems unchanged, at 4:33*). I MIG-welded the crack, and used a large oval plate behind the door skin to support the door mirror. It has a slightly larger radius than the door skin, so bracing the mirror over a large area.

Update January 2005: During a thread on this subject in a mailing list Rich Chrysler posted the text of a BMC (Canada) Technical Service Bulletin from 1963 showing this problem and saying a production change was being made. My first thought was "well, they never did" but by the date of the bulletin the MGB had only been in production little more than a year and less than 20,000 had been made, so the problem must have been serious. 30 years and 500,000 cars later we know it still occurs, but most cars **don't** have it, so I'm thinking that they **did** make a change which considerably improved things, but did not completely eliminate it. The drawing in the bulletin shows three edges joining at a single point, whereas the Porter picture shows a slightly

different arrangement, and the former **would** be more prone to cracking in my view, however the drawing may just be 'artistic licence'. For interest a scan of the complete document can be seen by clicking here.

Following repair it is vital that the way the screen and quarter-light interface with each other is correct to minimise any reoccurrence. 1. The front of the quarter-light frame must only just touch the bulbous part of the pillar seal and not depress it, and 2. There must be a small clearance between the side of the quarter-light frame and the thin part of the pillar seal. These two adjustments allow the quarter-light frames to be kept static even if when the screen wobbles.

1. The adjustment of the front of the quarter-light frame to the bulbous part of the pillar seal is done by adjusting the fore and aft position of the screen, and its rake. Other than moving the doors on the hinges (which should be done first to get the correct shut-lines) there is no other provision for fore and aft adjustment of the quarter-lights i.e. within the doors. Note that old seals can be hard and shiny, allowing some 'slip' between frame and rubber. However new rubber is 'sticky' hence the need that the two only just touch,

2. The adjustment of the side of the quarter-light frames to the thin part of the pillar seal to get a small clearance is done partly with screen leg shims to centralise the screen relative to the quarter-lights, and by an adjustment on the long leg of the quarter-light frame (except on early cars). This goes down to a slotted bracket at the lower front corner of the door, and the stud in the leg moves in a slot in the bracket to move the leg between the inner and outer door skins, which moves the top of the quarter-light closer to and further away from the thin lip of the pillar seal. Adjust the long leg stud to get an equal clearance all the way up, as far as possible.

Drain Holes *November 2016:*

There should be three drain holes along the bottom of each door - one at each end just before the carcass starts turning up, and one in the middle, all where the carcass meets the skin. The hole should be right through the carcass flange, so half of it is in the horizontal part and half in the vertical, so water in the crevice where the door skin meets the carcass flange has a chance of draining out. Unless your car never gets wet water will always get into the doors, so it's really important to use Waxoyl, Dinitrol or similar to creep into the crevice and keep water out, indeed across the whole skin including behind the brackets. Make sure the treatment doesn't block the holes!

Hinges:

77 and later cars got modified hinges with a check-stop which I think allows you to half-open the door without it drifting further out into anyone alongside you. They have been described as preventing a gust of wind from taking the door out of your hand, but I doubt it's protection against much more than a light breeze. Interchangeable with the previous 'drift open' type, but whereas upper and lower hinges each side were originally the same part number - HZA366 RH and HZA367 LH - the click-stop hinges were only fitted in the lower position making four part numbers - HZA5208 RH upper, HZA5290 LH upper, HZA5206 RH lower and HZA5207 LH lower. Rimmer Bros indicates that the upper non-check-stop hinges are for earlier cars even though they are a different part number, and Brown & Gammons give different numbers for all four - BHMnnnn - again with plain upper hinges and check-stop lowers.

With extra pieces on the 'cheeks' the implication is that they will need a wider hole in the the A-post to fit them, and Clausager does state it was changed for the 1977 model year. However a few hundred chassis numbers later in the same month (June 76) he says the doors changed as well, speculating it was for speaker wiring (my 75 V8 has grommeted holes in the doors, but they could be non-original) so it's possible there was a change in the A-pillar for the grommeted hole where the speaker cable exited the cabin, but suppliers pictures of A-posts don't show an extra cut-out there. According to the Parts Catalogue the RH roadster (for example) A-post was HZA442 changing to HZA5212 for 1977, but suppliers indicate the later part is for all rubber bumper cars, and Moss for example says the CB item has been superseded by the RB item. Current A-posts do seem to have a cut-out in the in-board vertical for the upper hinge which is strange if that didn't change, and it's not the full height of the vertical which it would need to be for the modified hinge. The lower hinge aperture appears to be wider, with the same cut-out. Attempts to obtain pictures and measurements of a 78 'in the wild' have not been successful, and whilst Bee's (CB) are basically square holes but a bit chewed on the inner edge and Vee's (75 RB) have a square lower hinge hole the upper has a small semi-circular cut-out on that inner vertical edge which is yet another variation!

March 2024: Incidentally I have been asked whether the sill and A-post form a right-angle or not. I'd have said 'yes', but using a combination square it seems to be slightly less as the ruler touches the top hinge about 5mm short of the bottom hinge, on the driver's side of both my cars. They both have stainless tread plates, so some scope for doubt.

Hanging and Adjustment

I see the objective as four-fold:

1. To get the crease where the chrome strip goes running in a straight line from the rear wing, through the door and into the front wing when the door is fully shut.

2. For the door to achieve that from open **without** the rear of the door being raised or depressed by the action of the lock on the striker-plate or binding on the pin and catch.

3. For the wing sill and door panels to be flush with each other all the way round.

4. For the gaps to be even all the way round.

There are no less than twelve separate steps to correct alignment of the doors and 1/4-lights to aperture front wing and windscreen.

On my drivers door the front and rear wings were not in line, so lining up the rear of the door with the rear wing and the front of the door with the front wing resulted in a zig-zag. I had to slacken the bolts holding the front wing, put a piece of timber from the top of the wing to the bottom of the garage roof, and jack the car up to press the wing down into the correct position! Sounds drastic but it worked.

Adjusting the overall height of the door is set by sliding the hinges up and down wrt the A-post. As well as the four visible Philips screws there is a nut behind the front wing which is accessed by removing the splash-plate aft of each front wheel. *May 2016:* The four screws go into two sliding tapped plates, which are in slots behind the trim panel in the footwell.

Getting the leading edge of the door flush with the front wing is set by sliding the hinges in and out (relative to the car as a whole) on the A-post, and getting the top of the leading edge adjusted relative to the bottom is achieved varying how much each hinge is moved relative to the other.

September 2009: There has been some discussion of this area recently on a mailing list. John Davies nearing the end of a restoration has found that the bottom of his drivers door needs to be moved out by about 1/16" or so to clear the wing. Opinion was that the hinges can't be adjusted on the A-post, even though they have sliding threaded plates like in the door and for the striker plate. Even if the screw holes for the hinge in the A-post don't give enough adjustment I can't see any reason why they can't be filed out a bit to give more movement, but of course that would leave a mark, if not a gap in the paint, around the hinge and is why this adjustment really needs to be sorted before painting. There was talk of putting a shim in the door, but the threaded plate the hinge screws go in to is boxed in so may not be accessible. Then John described a method of bending the hinges his local garage showed him, which would achieve much the same thing without actually moving the hinge relative to the A-post. Basically you put a wedge into the hinge and close the door onto it. Pushing against the door carefully should tend to bend the part of the main hinge body that the pivot is attached to (which is much thinner than the tongue itself) and will have the effect of moving the pivot and hence the door out from the body slightly. Of course you can go too far, and it is not possible to bend it back again without removing the hinge from the body and door, or revert to Plan A and move the hinge on the A-post with all that entails. Care required!

Adjusting the height of the rear of the door relative to the front is the second-easiest of the adjustments to perform. Each hinge-to-door fixing has three Philips screws that go through the door panel, through the hinge and into a sliding threaded plate inside the door. This plate doesn't seem to be a listed part and seems to have been installed during door manufacture, and is not easily replaceable if you should strip the threads, unlike the plates in the A and B posts. If you slacken all of these you should be able to imagine being able to slide the whole door forwards and backwards on the hinges, and this sets the basic fore-and-aft position of the door in the aperture and hence the front and rear gaps. With the same screws loose if you let the door go the rear edge will drop right down, the top hinge will slide out of the door and the bottom hinge will tend to slide into the door. Likewise if you lift the rear edge of the door the top hinge will tend to slide into the door and the bottom hinge will slide out and that is how you set the height of the rear of the door relative to the front. But before you slacken the screws you need to decide whether you want the top of the vertical gap between door and front wing to get smaller or the bottom of that gap to get larger. If you want a smaller top gap you slacken the top screws fully but just slightly loosen the bottom screws. Then when you lift the rear edge of the door it will pivot about the bottom hinge and the top hinge will slide further into the door. If you want the bottom of the gap to get larger you just slightly loosen the top screws and fully slacken the bottom screws, then lifting the door will pivot it about the top hinge and the bottom hinge will slide further out of the door. However if the hinges themselves are worn or bent you there may not be enough adjustment left to raise the rear of the door to the correct position. In that case you may be able to get by with swapping top and bottom hinges over (there seems to be no difference in top and bottom hinges, only RHS and LHS) or another possibility is to shim the lower hinge to get more 'lift'. However both these will disturb the 'up and down' and 'in and out' settings of the front of the door.

With the height of front and rear and the panel gaps set there are now four more adjustments left to do - yes four. You may have to twist the whole carcass of the door in order to get the rear edge flush with the rear wing for the whole of its length. The factory used a large bar that clamped onto the top and bottom edges of the door to achieve this, Herb Adler describes the principle here.

Finally you adjust the striker plate in and out so that the rear edge of the door is flush with the rear wing and up and down so the door does not lift or drop as the lock engages, and add/remove shims between the striker plate and the B-post so that the lock opens and closes cleanly and doesn't bind. *May 2016* Again the striker-plate screws go into two sliding plates that are in slots that can be accessed by removing the trim panel.

July 2019:

A comment on a forum that amongst other problems the rear vertical edge of an owner's door was quite a bit proud. As above this is set by positioning the striker plate appropriately and a couple of us responded that this does mean that the seal is compressed by the striker plate, which perhaps might seem wrong. There is also the question of the seals themselves - whether replacements are too hard/and or too bulbous as others have reported problems here. All four of my doors (original seals) close very easily, and if only half-clicked they can be pushed fully shut without having to open and slam them. Unlike the ZS 180 which needs a good hard pull/push to close.

However if the sills and rear wing have been badly fitted, or the door skin, it will be very difficult to adjust the door to compensate - or even fit properly. For that reason you should remove the minimum of front and rear wings and door whilst fitting new sills, even though the door will be in the way. They are vital to get correct alignment.

Happy hanging.

Update September 2003: I was never happy with the fit of the drivers door which had always used the striker plate to lift the door into position slightly, which is something it shouldn't have to do. This makes a bit of a clatter when closing, and unless the lock and striker plate are kept lubricated with a smear of grease it can need a push to open and the grease can get on one's clothes. I knew this from the outset but I'm sure I originally spent ages trying to get the door-to-hinge adjustment correct so this wasn't required but was unable to do so. Finally I decided I had to try again and blow me if slackening the top hinge to door screws alone allowed me to raise the rear edge of the door into the correct position, it only taking a few minutes including removing and replacing the trim. However that moved the lock slightly forward in relation to the striker plate and the two were now binding a little. There were already three shims under the striker plate, so I used one as a pattern to make another out of even thicker plastic, and one thick and two thin have now put the striker plate in the correct position, and the door now shuts with a nice click and springs open instead of needing a push.

Key Lock

How the keys are coded to the locks
Keys

One of the first things you should consider doing, and certainly if repainting the doors or working on the locks, is to replace the very poor arrangement for holding the external lock in the door skin. This is nothing more than a flimsy spring clip which at best allows the lock to rotate in the door skin slightly, wearing away the paint around the hole and allowing rust to set in. At worst the locating 'pegs' in the door skin that stop the lock rotating too far can wear and allow the whole lock to be rotated far enough to unlock the car just with a screwdriver in the key slot.

There is a much better 3rd party lock fitting kit available from many of the usual suspects which secures the lock positively in the door and giving it no chance to move and chafe the paint - MRD1067. It is quite easy to fit once you have the door trim off, you just have to remove the existing spring-clip, ease the lock out of the door slightly to be able to fit the circular washer over the end (chamfered side facing the door skin) of the forked lever that operates the locking rod sticking out of the latch assembly, relocate the forked lever over the rod, then the C-shaped washer just slides into the groove vacated by the spring-clip. Tighten the grub-screws equally, and Bob is your Mother's Brother. Note that to remove the door trim you will need to remove the door-pull/armrest, the window winder, and whatever arrangement you have for opening and locking handles, then unscrewing or carefully levering up the concealed snaps. On Mk2 cars with the rectangular safety handles simply slide the top half of the plastic finisher upwards and the bottom half downwards, being careful not to tear the vinyl. The screws in the window winders seem prone to seizing, but if you remove the waist rail as well then once you have released all the trim panel snaps you can rotate the panel downwards about the winder handle and that will give you sufficient access. Remember to refit any polythene sheets over the holes in the inner skin to protect the hardboard trim from rain-water, and if you don't have any then fit some!

August 2023: Of a number of jobs on Geoff's GT one of them is the door locks. The drivers-side had been disabled in some way with no effective wafers so anything would unlock the door. That side was bad enough trying to lever the factory retaining clip off but the passenger side was impossible. Instead of the 'legs' of the clip springing away from the sides of the lock to sit behind the panel both were stuck fast to the sides of the lock, so nowhere to get the finest point under to lever them off. In the end I had to resort to using a drift and hammer to punch the lock out from the inside. The legs were than away from the sides so must have been stuck inside the hole somehow, and here wasn't even a fibre washer against the outside face of the door. Needless to say when I knew the locks were going to be changed I said to get the after-market fitting kit as well as a pair of locks. Not knowing what came with what I also said to get a couple of fibre washers - in the event there was a pair with the locks as well as a pair with the fitting kit so he now has six!

November 2009: Cars used in all weathers and particularly those kept outside can suffer from the locks getting stiff, as can garage locks and padlocks. You can ignore it until the key snaps off in the lock, or do something quick and easy sooner rather than complicated and expensive later. Vee was kept under a car-port for a long time with the prevailing weather against the drivers side, and that lock periodically used to stiffen-up, rather than the little-used passenger side. I've seen various recommendations for oil, silicone and Teflon sprays, and graphite powder each usually stating that only they should be used! This advice from a locksmith and safe engineer says silicone and Teflon can be used, but graphite is better, and oils like WD40 should definitely not be used. I see silicone and Teflon advertised but not specifically mentioning locks, so I'd steer clear of those. Graphite powder specifically for locks is available in small quantities, but for small quantities like a lock you can make your own (as recommended on the above site). Take a graphite pencil, and cut back the wood to expose 1/2" or so of the graphite core. Fold a sheet of paper in half and cut a diagonal, so that when opened out again the crease forms a point, like an arrow or a paper dart. With the pencil held over the crease scrape down the exposed graphite with a sharp blade held at right-angles to the graphite until you have a little pile of powder. Fold the paper and tap the pile into the crease. There should be little shutter in the lock across the key entrance, wedge this open with a matchstick, put the tip of the crease in the folded paper into the slot, angle the paper and tap it gently so the graphite powder trickles into the lock. Don't do this in windy conditions or it will simply blow away! Remove the matchstick and use the key in and out and turning it to distribute the graphite and it should soon ease up. Normal use of the lock will distribute it further. In exposed conditions like Vee's you may need to do this once or twice per year.

Keys *November 2010:*

How the keys are coded to the locks

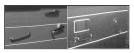
Replacement keys can be tricky. Using blanks and worn keys as a template is very iffy, I had a spare ignition key cut from the only key that came with the car which was itself a copy, which tended to jam in the lock. Subsequently the 'original' key started jamming as well, so I replaced the lock. Both lock and ignition key numbers should be on the Heritage Certificate so potentially available for purchase 'new' rather than recut, but needs the original locks to be on the car of course. Easy to check with door etc. locks as the number was stamped on original keys (unless you already have a recut), but not the ignition key. A spare door key seems to have been attached to the car - the firewall in the engine compartment, inner wing, and inside the glovebox have all been mentioned. Blanks are available from the likes of Triple-C (USA and Canada) but in all cases it is the pattern of length-wise grooves that is most important. Triple-C don't give these - you have to know the blank pattern number - but Moss US (but seemingly not Moss Europe) and LBCarCo show these patterns for ignition keys at least. The latter indicates which years have which pattern, but compare to your existing key before purchase and cutting. *March 2019:* Moss Europe have FS door keys.

External Handle


Pull-handle prior to April 65 then push-button (and hence all GTs), my experience is only with the later type. The earlier are only attached to the door at the pivoting end with two screws inside the door, with a rubber buffer in the door skin at the pointy end of the handle. The later types are secured at each end with nuts and spring-washers on studs, with fibre gaskets (617403 and 617402) between the handle and the door to protect the paint. Equivalent washers aren't listed for the earlier handles.


The later handle push-button operates a rod with an adjustment screw in the end bearing on the latch lever, to open the door. A drop of oil or smear of grease on the rod at each end where it passes through the handle casting will keep it free.

Latch


From April 1965 'anti-burst' locks were fitted, and although the part numbers for the latches differ between the later Mk1 and Mk2 the parts involved with opening and locking/unlocking seem to be much the same. The internal handle on the Mk1 uses a bar for both functions - the internal handle being moved down to open and up to lock, whereas the Mk2 uses two rods from two handles inside the car, one for opening and the other for locking/unlocking. Mk1 cars had surface-mounted handles and Mk2 had safety recessed handles. What follows relates to the Mk2.


The 'opener' rod pivots a lever on the latch to release it, and the 'locking' rod slides another lever to prevent or allow the external button to open the door. Another rod on the latch engages with the key lock to lock and unlock the door from the outside.

I noticed Bee's driver's door button was suddenly stiffer than usual, and as it seemed to be getting stiffer thought I had better have a look as I didn't want it to suddenly fail altogether (remember Nory's wisdom: "Listen to your car, it is talking to you."). I hadn't lubricated it in 20 years, although with the door open, even with the latch pushed into the closed position with a screwdriver, it was very light to operate. So I removed the latch (remove the trim panel, but just the shoulder rail and pulling the trailing edge of the door card back should be enough to disconnect the two internal handle rods from the latch levers). The old oil was pretty sticky, but everything seemed to be moving well enough. Nevertheless I cleaned all the old gunk off and put new oil on, and the levers did seem to be a little easier. However back on the door (grease the plate the button bears on, and peer down through the window slot to engage the latch bar in the forked lever of the key lock) the button was just as stiff. Just as an experiment I eased the striker plate forward about 1/8", which did seem to help a bit. It subsequently struck me that the button in the handle may need lubrication as well. That can be accessed from above just by removing the shoulder rail with the window wound down, and pressing the button in then putting a bit of copper grease on the exposed pin has also made it a bit easier. Time will tell if that is enough. *September 2010:* A couple of weeks later I suddenly realised I wasn't noticing stiffness any more, and when deliberately trying it found it really easy, so perhaps the grease has worked its way into where it was needed.

In the meantime, literally a couple of days after my initial investigation, Herb Adler writes to me from Oz having had exactly the same problem, although more severe as his was so stiff that he had broken the internal handle. However he cured his problems by dismantling, cleaning and lubricating the latch, which he describes here. He also describes installing central locking part 1, and part 2.

October 2021:


Vee's driver's door latch breaks. Return from shopping, get out and unload, get back in and put the car in the garage ... and I can't get out! Have to open the window and operate the external button.

Door Pulls *May 2011*

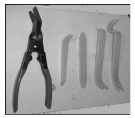
Early cars had a simple handle - Mk1 at an angle and Mk2 horizontal under the new internal door lock control, and from 1973 a combined pull and 'arm rest'. But despite having a thick wodge of hard foam around it the latter is more for safety than comfort and in the roadster does get quite uncomfortable on long runs. However my V8 has a different design extended further


backwards and angled slightly downwards, and is much more comfortable. I'd always assumed it was original as there is no sign of extra holes in the handles, door panels or cards, but in response to a question about the lack of comfort I checked a number of catalogues looking for mine and couldn't find them. I then looked in my original 75 model year GT and V8 brochure to see the shorter ones depicted and not the long ones, so it is looking like a PO swapped them for something from another BL model, probably for reasons of comfort. Anyone know where they might be from?

June 2019:


They attach to the door using screws, until 1973 the plain handles had self-tappers going straight into the door skin through the card, with the combined door pull and arm rest there are nylon 'nuts' pushed into the door skin and fatter self-tappers that screw up at an angle through the pull into the nuts. This must mean that prior to 1973 there was just a small plain hole in the skin as there is not an equivalent nut shown in the catalogues, the plastic nuts needs a larger specially-shaped aperture as shown. However the different handles seem to have had different fixing centres as well. One day while trying to close Vee's door from half to fully shut while in motion just by pulling on the handle rather than opening and closing the door I managed to pull the rear screw out of its nut stripping it. So when ordering something else I ordered four GHF1027 (originally 13H2494), two to fit and two for spares for one or other of the cars as and when.

Door Cards *March 2021:*


I bought the orange set some time ago but the pliers type are far more effective.


Someone without his car available, or the doors, or the seats I can't remember which, asked for some info about positioning of the cards using the seats as a reference. He was talking in terms of making new cards and using the size of the door as a guide, but didn't mention the fact they do not go right up to the edge. I'm pretty sure Vee's cards are original, and whilst there is a sliver of painted door visible down the front edge of the passenger door, at the rear the seal just catches the edge of the card. So on that basis the cards are probably meant to be a neat fit between the seals, although as there is no scope (with the later trim clips) for positioning the card on the door, where the card ends up in relation to the seals is probably down to door adjustment, and shut-lines almost certainly trump anything else.

November 2014: Just a fitting tip really. From 1970 on the door cards or liners had plastic clips that fit in cut-outs in the back of the liners, and are simply pushed into holes in the door frame. Before that they are attached with a series of screws and cup washers, which are OK for refitting originals, but it seems that replacement liners from some sources at least have no holes. So they have to be drilled, but have to be to the centres of the holes in the doors. You could make careful measurements, but that's not feasible for my blind pal Terry. I suggested he screw self-tappers in from the back of the door frame so the points were sticking out, then using the window winder to locate the card, and feeling round the edges for equal gap, thump the liner over each screw to leave an indentation, which he could use to drill to. That worked well, and only a thump from the palm of his hand was needed. But there were some positions he couldn't get a screw in from the back. For those he cut the head off, and screwed the stump of the shank in from the outside - brilliant!

January 2024: Another couple of tips - when fitting cards to doors with the later safety internal handles make sure the rectangular aperture in the card is fitted over the handle frame before pushing the plastic clips into the holes in the doors, or you can get an edge of the card stuck on the outside of the frame and have to pop the clips out again. Also check the alignment of the hole to the handle frame using a couple of fasteners where their tips in the door hole as guides - that they are more or less central to the hole. If they are biased to one side or the other then the U-shaped plastic trim pieces may 'fall' into the gap between the handle surround and the edge of the hole rather sitting on top of the card. The handle surround can be slid back and fore relative to the door, that may need the threaded fittings at the latch end of the rods to be adjusted.


Note that some supplier photos only show one handle hole on the front and others show three holes on the back. This is probably because the different handles have different fixing screw centres, use the handles you are going to fit to determine where the other one should be. This can apply to both screwed and clipped cards, and the change from screwed to clipped was for the 1970 model year. When the cards get old and soft, and especially if damp, the clips can pull straight out of the cards ripping them unless a trim-removal tool is used that fits closely round the shank of the clip.

Door Seals *February 2019*

Drop-glass seals
Quarter-light seals

A common complaint with replacement seals seems to be that they are too fat and/or stiff and the only way to get the latch fully closed is when the door protrudes a bit i.e. is not flush with the rear wing, which start making the door harder to close when it is still ajar by several inches. Mine are very soft and compressible and if anything are not fat or hard enough. On both cars if the doors are closed to the first latch click then can they be fully closed with just a push quite easily. On Bee when we have spent some time touring country lanes on organised runs the doors can start to rattle in the latches over rough surfaces. I've 'adjusted' the striker plate to pinch the latch between the bottom flange and the pin, just short of binding, but it still happens a bit. Possibly

made worse by wear in the latch and striker plate, but I'm not going to risk (very expensive) modern replacements given the quality of stuff these days.

May 2024:

As the seals are hollow I pondered pushing something round down them. Rubber cord ideally, but you wouldn't be able to push much in. Next thought was round mains flex, stiffer, goes in quite easily, and I was able to feed in at least a foot. Door closed very nearly as easily, on short runs no rattle, and on the Ratae Run in June over some very poor road surfaces still no rattling. So a success - only taken me 35 years 😀 Next job is the rattling squeak that seems to be towards the front left to the Navigator, rear left to me, which has been evident for the same length of time under the same circumstances.

September 2023:

Helping Geoff to get his 78 GT back on the road I had noticed that both doors had to be pushed firmly from about six inches short of latching just to get the latch anywhere near the striker-plate, and had to be slammed to close, and when releasing the latch the door would spring out about a foot! After fitting the door cards it wouldn't close at all. My first thought was that the seals were closing onto the cards, and they may have to be moved or trimmed to fit flush with the seals rather than overlapping. But looking at the seal flange beside the dashboard it bulges towards the door at that point to meet up the the quarter-light, and the seal was being crushed so hard that it had torn where it was closest. The door was aligned with the wing so that wasn't the problem, so the flange will have to be 'adjusted'. Couldn't get grips in to bend it away from the door as the dashboard was in the way, so had to resort to a hammer and drift with the door only half open/closed to give the best access. A multiple-thickness flange at that point it took several firm whacks to dress it in. Another point being contacted too closely was at the top of the quarter-light, and excessive pressure on that can cause the Crack of Doom. First step was to look at the adjustment of the bottom of the long quarter-light leg, and it was pushed out as far as it would go i.e. pushing the top of the Q/L into the seal. I couldn't move that very far as the screw attaching the bracket to the door was too long, so that had to be removed and cut down, then the Q/L leg positioned fully towards the middle of the car pushing the top out. Still more pressure on the seal than I would like, so got some grips on the flange and bent it in a little. Now the door closes more easily with the card on than it did before with it off.

A number of posts recently from people having problems preventing water ingress on GTs, particularly around the raised drop-glass. Quarter-light adjustment is a factor here, slots at the bottom of the long leg and the rear channel allow the QL and drop-glass to be moved in and out to some extent, however people are saying that they still have a gap. Another possibility is tapping the flange the seal clips onto out a bit, but that's bit crude, and could cause the paint to crack and start rusting. Replacement seals are often mentioned, and it seems these have a smooth rubber surface to the face that should contact the glass, whereas the originals have a raised rib (as in the attached thumbnail) the full length of the seal. With replacement seals there is also the distinct possibility that that are a stock item from one of the seal specialists and not even the rubber tube is to the same dimensions. Things like this, and the general poor quality of replacement parts from the usual suppliers, is why these days I only replace stuff if I have to. I replaced all the trim (bar the door seals) when I repainted the roadster 30 years ago, but for the GT in 2017 I only replaced the heater intake as the original showed some corrosion, and even that has a different curvature so I had to use some of the original spire-clips rather than the plastic sockets that I had intended to use.

Another question has been whether to use the GT seals with the bonded upper-rear corner as the main suppliers seem to have, or use seal cut from a continuous strip which some of the smaller suppliers have. Vee's came with the car and could well be original, are not bonded, but that join has never rain in.

May 2022:

Gary Robert's wrote to me about gaps between the door and the seal particularly at the lower front corners, Bee and Vee are like that but to different degrees. The original intention may have been for the door to just close onto the seal, and the door card to exactly fill the space between the upright parts of the seal so no paint is visible internally. But with replacement wings front and rear, door or skins, seals and door cards almost certainly being more common than not these days things probably don't fit as well as they should - if they ever did. In theory one could position the door on the hinges to achieve it but the external shut lines are surely more important. To get the door right wrt the seals one could position the wings for example to suit, but that is a big job and has implications elsewhere on the car, which leaves modifying the flanges the seal sits on.

Drop-glass and Regulators *August and October 2017*

There were three types of regulator used over the years, but roadster and GTs of the same era always used the same one. Pull-handle roadsters (there were no pull-hand GTs) used a unique regulator, the remainder of Mk1 roadsters and GTs used another, and Mk2 and later roadsters and GTs used the third type - all different for RH and LH of course

A handy video from Graham Moore of a regulator on a board and powered by a motor, which shows how everything moves as the window is raised and lowered:

Robin Guojah is having problems getting the windows to go all the way up on a pull-handle rebuild with a mish-mash of parts. He says there seems to be some kind of physical stop in the mechanism (the stop-bolt is not fitted) and he has one (or two) bent teeth which may be causing the problem. These bent teeth seem fairly common, although I can't see them in Graham's video, and in any case where they do exist on Mk2 regulators they are at the other end of the large gear, i.e. the lowered end, as arrowed here.

Removal: A bit of manipulation is needed to get the regulator in and out of the door, and connected to and disconnected from the glass. All the following applies to later regulators, i.e. Mk2 on, but the Mk1 probably isn't much different. Originally written with more description than pictures in August when fitting-out Vee, John Maguire from Australia sent me his version in October which consists of a number of captioned pictures and a video. What's more, with a genius bit of lateral thinking he has come up with a method that pulls the glass and top of the regulator out of the top of the door, so the glass can be slid straight off the rollers of the regulator. This results in drop-glass removal being accomplished in about 15 minutes, and refitting in not much more, so I've replaced my method with his. Drop-glasses were always curved, and handed.

The vent/quarter-light frame can be removed with the glass still in place ...

... or the glass can be removed with the quarter-light in place, depending on which component(s) you need to get at.

Reinstallation

Largely the reverse of removal.

Channel brackets:
Confusing! In more ways than one. The first confusion is just how many different brackets there were originally. The Parts Catalogue lists HZA226 (RH) and HZA227 (LH) originally, with quantity shown as '2/1' for both. Then it lists HZA2066 (RH) and HZA2067 (LH) for GTs, with a quantity of 1 each, so as well as being handed side to side, GTs are handed front to back as well, although for roadsters it looks like front and rear are the same. The Catalogue doesn't indicate whether the GT items go at the front or the rear, but the implication is with the different quarter-light assembly it will be the front, and several online catalogues confirm that. This leads to the second confusion, in that unless you keep each bracket with its channel - especially for GTs - the subtle differences in shape and which way round and up they go as well as in which position will keep you occupied for hours.

Then from chassis number 146104 i.e. July 68 four different brackets are listed with HZA678 (RH) and HZA679 (LH) with two per side for roadsters and one for GTs, with HZA2086 (RH) and HZA2087 (LH) additionally for the GT fronts, so eight different types altogether.

Then Brown & Gammons confuse things still further by saying that both HZA226 and HZA678 for example i.e. the early and late universal brackets have been superseded by HZA2086, which is the later GT RH front bracket. And out of 18 entries covering all eight part numbers all refer to HZA2086 and HZA2087. The implication of that is that the GT front brackets can be used both front and rear, roadster and GT. However the descriptions say 'Single screw fitting GT & V8', which conversely implies that they are only for the GT fronts! Not cheap at £18 for a bare bracket, when Ashley Hinton are showing a pair of HZA678 and HZA679 with fittings for £19.

Ashley Hinton also refer to them as MB70R and MB70L, and Googling those numbers comes up with this Moss page which clarifies everything by just listing those two items and saying "These brackets are now manufactured with multiple fixing holes to suit front quarter light channel and rear channel fixing." so should be correct for both roadster and GT, front and rear. Even more expensive at £20 each for a single bare bracket. Motaclan/Leacy have them at £16, but it would be worth checking with Ashley Hinton as to whether their MB70s can be used both front and rear in GTs.

Adjustments:

The bottom of the 1/4-light long leg can be adjusted but it's primary purpose is to get the correct alignment of the quarter-light to the windscreen upright. The top of the channel at the lock end of the door and also one of the two possible adjustments at the bottom should lightly hold the glass to stop the glass jumping out as it is wound up and down. Pressing too hard on the edge of the glass will make it stiff to wind up and down, but too much slack on the GT will allow the glass to touch the B-post trim.


There is a stop-peg near the top of the inner skin by the regulator handle so that wound fully up the top of the glass just tucks neatly into the rubber piece at the top of the 1/4-light frame.

Lower stop:

This is a bracket in the bottom of the door AHH7550 (RH) and AHH7551 (LH) on which sits a felt pad AHH6434. **Note that in September 2023 Moss Europe show two pads on the item page but only supply one unless you specify a quantity of 2**. The Parts Catalogue indicates they are held in place with screws and spire nuts, but neither my 73 roadster nor my 75 V8 have screw heads on the bottom of the door or the inner skin, i.e. they are welded in place. The 77 and later Parts Catalogue does not list those screws and nuts, so I presume at some point they were welded in, maybe before 1973, or at least before the doors that came with both my cars were made! They seem to be stainless now - certainly not for appearance, but maybe to prevent them rotting-out as the originals have done. However if the remainder of the door is still painted mild-steel that's still going to rust. At the time of writing I've seen an eBay source for these at £29 plus £5 P&P - which made me choke. Motaclan/Leacy for example has them at £23 plus P&P, and if buying with other parts the P&P for that item will be marginal.

Seals: *August 2020*

Inner 'furry' seals are stapled to the vinyl-covered waist rail. On the roadster outer rubber 'scraper' seals are pop-riveted to the door skin directly, and on the GT they are clipped to the bright finishers (AHH7476/7) which are pop-riveted to the door skin. To access either the drop-glass has to be removed, and on the GT because the outer rubber seal is clipped to the door finisher it may be necessary to remove that from the door which will need the GT quarter-light to be removed as well.


There is also a glazing seal at the bottom of the drop-glass to the channel that is raised and lowered by the regulator - 37H4297 (78447A from Rimmers), which is a flat strip the same as for the quarter-light vent glass. This has to be folded into a U-shape, which some have said is extremely difficult, but it can't be as difficult as when the same strip is used for the 1/4-light vent that has to go round two corners as well! But researching this seal I came across this U-channel seal AHA7486M for the 1/4-light vent glass (but you still have the problem of getting that to go round the corners) shown as an alternative to the flat strip for the drop-glass. In theory both should be easier for the straight drop-glass channel than the vent glass, and the vent glasses weren't that difficult on the two sets I have done.

Stiffness when winding seems to be the biggest problem, so much so that people break the plastic handles and replace them with after-market metal ones. With several BL vehicles over many years I've never had this problem, but as I say many complain of it. The glass slides up and down in 'flocked' rubber inserts fitted into the metal channels of the 1/4-light frame and another plain channel at the lock-end of the door. These rubber strips can rip and cause the glass to jam, and if the flock wears off the rubber may well make the action a lot stickier. The two channels may also not be in line so are trying to flex the glass as it moves up and down, and the regulator mechanism may also be stiff from rusting or lack of lubrication. The first thing to do is to determine whether it is the regulator or the glass that is causing the problem.

There is quite a bit of lost motion in the regulator and this can be used for diagnosis. Wind the window down, then start winding it up. Now grasp the top edge of the glass and lift - it should come up at least an inch or so. Now turn the winder again in the 'up' direction. It should move easily for an eighth of a turn or so before it starts trying to raise the glass some more, then you know the problem is with the glass and the channels, and it was probably very stiff when you tried to pull it up by hand. But if the glass moves relatively easily when pulling it up by hand but the winder remained stiff while taking up the lost motion, then you know the regulator is the problem. In theory if the glass gets easier to move as it is wound up that could well point to the lock-end channel being the problem, as there is progressively less of that in contact with the glass as it rises. But note that the regulator should move **very** easily back and fore through its lost-motion area, this can be checked in various places between fully up and fully down, but pulling up the glass by hand will always exhibit a certain amount of resistance. Of course you could have both problems! In which case deal with the regulator first, then you will know how much of a problem the glass is. There are quite a few pivots, gears, wheels, and a large spring in the mechanism, any one or more could be seized or stiff, so you will have to work through them all. If the car is a daily driver and is regularly going to get wet use waterproof (white) grease to avoid rain running down through the doors washing it off. For 'dry' cars a general purpose grease should be fine.

I've seen silicone lubricant spray recommended for easing the glass channels, but what long-term effect it has on the rubber, and whether any short-term benefits are then replaced by a worse long-term situation I don't know. Much better is a suggestion from Mark Robinson to use graphite powder, put some on your finger-tips and you can feel how slippy it is, but it never attracts dirt or gets sticky, which is why it is used for lubricating locks. Making your own like for door locks probably isn't feasible in this case due to the quantity that will probably be required, Googling 'graphite powder' came back with several sources at under a fiver a bottle. However the point is that like metal winder handles, it shouldn't really be necessary, and it is better to fix the root cause once and for all rather than bodge it and have the problem arise again later, and adjusting the rear channel may be the answer. Examine the condition of the rubber inserts and if in any doubt as to their condition, replace them. Physical wear and tearing of these can be caused by incorrect adjustment of the lock-end channel or buckling or crimping of either channel so this should be checked before using new inserts. It's possible new non-OE rubber inserts are too fat or too sticky, which leaves you with a bit of a problem. It will be possible to open out the lock-end channel a little which should at least halve the problem, more care will be needed for the 1/4-light frame, especially the upper half.

October 2022: Someone on the MGOC forum is complaining that his drop-glass is stiff because the regulator is imparting a side-ways thrust to the channel clamped to the bottom of the glass, which is forcing the glass into one or other channel as it is wound up and down. There are two buttons or bobbins on the lifting/lowering bar of the regulator that sit in the drop-glass channel and this video from Graham Moore shows that they have to slide several inches back and fore in the channel as the glass is raised and lowered, so they and the channel need to be free-moving and well lubricated, with waterproof grease if your car regularly gets wet. Excessive sideways thrust on this posters car must be coming from a stiffness there, that shouldn't be there. Either there is a lack of lubrication or perhaps the channel is distorted and is binding on the buttons/bobbins or the lifting bar.

June 2019: Since reassembling Vee after her repaint in 2017 I'd been conscious that the drivers side was a bit stiff ... then the handle broke. Really quite stiff grasping the glass by hand pulling up and pushing down (i.e. glass binding rather than regulator), so door card etc. off and I was able to move the rear channel back about 1/8" top and bottom, and now it is really easy. Don't fancy the chrome and especially the alloy replacements, so go for standard. Some sources recommend an original at about £5 and a copy for about half that, others only offer the cheap one but don't say that it is a copy. For that money it's not worth messing about with a copy, and I get a pair in case the design has changed (which it hadn't ...). Subsequently I felt that perhaps it was too loose, and a slight rattle made me wonder if the edge of the glass was chafing the B-post trim-strip while under way, so I moved the channel back in a bit. That gave me the opportunity to replace the two door-pull nylon nuts in that door as the screw pulls out of the rear one if I pull on it too hard.

Jumping out of the channels:

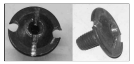
> One of a number of jobs helping Geoff get his car back on the road . The lower bracket for the rear channel was home-made out of tin and had buckled, a new one was bought and fitted but just the same. Then I realised that a corner of the glass was coming out of the channel about half-way up/down, squinted down inside the door and could see it was buckled behind the inner skin and otherwise out of sight. Removed, and whilst the sides of the channel are supposed to be curved to follow the curvature of the glass, the back of the channel is supposed to be flat but was also curved, buckling the side out. Fortunately holding a straight part in a large vice and working along bit by bit I was able to straighten it out. No more jumping out but it was very stiff, and pulling the rear channel back a bit it started jumping out again. This time we got the glass, regulator and channel out to lubricate the regulator and the runners at the bottom of the glass. Better, but still struggling, so we opt for a new rear channel as they are not that expensive at £18 (MGOC, quite a bit dearer elsewhere) AHH8403 LH, 8404 RH. This is the outer metal channel only, the inner rubber/flock channel didn't look like it was coming out without damage so that was ordered as well. Originally AHH8405 for the correct length, suppliers either just have only the longer front channel AHH7448 which can be cut down for the rear, and some have a long length suitable for all four.

As well as being buckled and having the wrong brackets it's fitted with metric-head UNF screws which is irritating, and missing the stud from the bottom of the channel so using a nut and bolt instead, which was a fiddle. But at least the old channel came out the top with the glass and regulator in-situ, the new one with the stud at right-angles to the bracket won't go in that way. But winding the glass up it can be fiddled in through one of the door apertures and fed up - at least it can within the inner flexible channel fitted, it remains to be seen whether it can be with that fitted, or whether the glass will have to come out again.

Handles and Screws:

Mk1 regulators HZA2118 and HZA2119 with the hex spindle for the handle 34G2528 use fibre washer ADA5669 between it and chrome escutcheon AHH6336 against the door panel, and fixing screw ADH834. The escutcheon has two spikes which look like are pressed into the door card when the handle is screwed to the regulator, so the escutcheon does not turn with the handle. Shown by suppliers but not in the Leyland Parts Catalogue is sponge pad AHH6337 which almost certainly fits over the regulator spindle behind the door card to press the card against the spikes on the escutcheon. Screw is 54K205 with 10-32 UNF (3/16") x 1/2" thread. Spring washer WL700101 is also shown but will make the pan-head screw stand proud of the escutcheon. Also shown for the Mk2 but none of mine have one and have never come loose, so I don't think it's necessary.

Mk2 is a lot simpler and used black plastic handle CZA7109 with fibre washer CZA2279 against the door card. The fixing screw threads are No.10 or 3/16" UNF x 1/2", originally black flanged screws CZA7194, but are now ZKC3317 which consists of a black screw with shallow domed head and separate washer. The later chrome screw is PMP308 and the escutcheon CZA2367, as shown in the 77 and later Parts Catalogue, and B&G additionally show them with a No.10 spring washer WL700101. Unlikely to have been used with the original flanged screw, and a shiny washer between the black screw and separate washer would look odd.



Bee originally had the flanged screws which was useful when I found one of them seized in the regulator and stripped the cross-slots. I was able to drill two holes in the flange and use a pair of stout pointed pliers in those holes to undo the it. Initially I cut a slot across the head to reuse it, but eventually replaced both with the separate black screw and washer. Vee has the later chrome screw and escutcheon, and when removing them in 2016 for the body repaint (even though they had been off several times before) the drivers handle screw had to be drilled out as again the cross-slots stripped. This meant that the regulator needed to be drilled and retapped - preferable to replacement of the whole regulator! Fortunately Vee was at a workshop with a pillar drill at the time, so I was able to drill an accurate hole through the stub of the old screw and tap to 3/16" UNF. More recently still someone was asking about longer screws - perhaps having stripped the existing thread in the regulator so had to drill and tap deeper. A Mini site quoted CMZ312 which are 3/16"UNF x 3/4" so the length is OK, but they are countersunk and yellow zinc. You would need PMP312 for chrome pan-head, or PMZ312 and paint it black.

Quarter-lights *March 2013*

The quarter-light frames were chromed brass until May 1972, changing to stainless. The vent handles were curved on Mk1 cars and straight on Mk2.

Early roadster QLs had a relatively flimsy bracket at the front screwed to the top of the inner door skin. Later units and all GTs replaced that with a more robust short leg that goes down inside the door and secured with two bolts through the front of the door casing. Even with the more robustly attached later unit you should still avoid pushing the door open or closing it using the drop-glass or quarter-light.

Roadster QLs sit on a short rubber gasket on top of the door, and GT QLs sit on a thin horizontal part of a vertical finisher that runs the full width of the door.

August 2021:

A question has cropped up about the screws securing the triangular finishers at the lower front corners of the quarter-lights. The side one is behind the bright trim strip that runs across the top of the GT door (they are above the rubber strip on the roadster), and Graham Moore rebuilding his doors said they were too big and pushed the trip strip away from the finishers leaving a gap. Vee's trim strip is almost flush with the finisher, I can't get a finger-nail in the gap, although I notice that the strip does move out a bit where it encounters the edge of the finisher, but then lies flat against it (the rubber strip on the roadster is the same). My screws are self-tapper with very low-profile domed head and integral washer, and are also used on the front edge of the quarter-light. Not listed in the Leyland Parts catalogue for the GT ... although 17H2503 is shown for the roadster. Suppliers catalogues show the same screw for both roadster and GT, with

Moss showing either 17H9953 or 17H2503 as alternatives although the former is a completely different countersunk screw which would never fit correctly, Brown & Gammons only show 17H9953 also countersunk. Googling 17H2503 does **picture** the correct screw from several sources, but may not be what you get.

Removal/refitting:

The quarter-lights can be removed with the drop-glass still in place. When refitting it's important to tighten the three sets of nuts and studs in the correct sequence or the door frame can become distorted and the quarter-light incorrectly positioned. There are two studs that go down through the top of the door that take deep nuts, two bolts that go through the front of the door into the short front upright (except early cars), and the adjustment stud at the bottom of the long leg which is done last. The upper long nuts and the forward-facing bolts must be tightened progressively to pull the quarter-light forwards and downwards into the door frame, while the quarter-light is being pushed downwards and forwards. If the front bolts are fully tightened first the quarter-light may not be fully seated down onto the top of the door, and tilt as the stud nuts are tightened, or if the stud nuts are tightened first the quarter-light may not be fully forwards in the door casing.

Adjustment: This is vital to get right if splitting of the door skins - the Crack of Doom - is to be avoided, or even cracking of the screen (one person has described how closing his door physically moved the screen and eventually cracked the glass), and is a combination of door, screen and quarter-light positioning and how they interface with each other. There are three parts in obtaining the correct adjustment, and they need to be done in the right order. The positioning of the door and its hinges, the fore and aft positioning and tilt of the roadster screen, and the long leg of the quarter-light going down to the bottom of the door.

October 2022: A couple of people on the MGOC forum have mentioned recently that the top rear corner of the drop-glass fouls the B-post bright trim with the door shut. As well as everything else it's important to tighten the four QL to door bolts and nuts correctly otherwise the QL can end up in the wrong position. But even then it can be a function of the basic door shape and positioning especially it it has been reskinned. One possibility to correct this problem is to put a spacer on the rear QL stud where it goes though the top of the door, which will tilt the whole QL forwards slightly, being in mind that if you go too far it will then hit the underside of the gutter trim.

Glass: Roadster quarter-light glass (the opening vent, not the drop-glass) was originally flat, with a single part number for both sides, until the change to stainless frames in April 72 when they gained a slight curve. GTs always had two part numbers, so may well always have had curved glass and hence had a different part number for each side. The drop-glasses on both models were always curved, and handed.

Seals:

Vent Seal: - *July 2019*

Some anguish about these on the MGOC Forum on a couple of occasions recently, unsurprisingly with replacements. The biggest problem seems to be that there is a large gap between the seal and the lower part of the vent frame which exposes the pivot. On my originals there is no apparent gap on Vee, and only a tiny gap on Bee if you really look for it. The gap between the visible parts of the fixed frame and the opening vent is about 7 to 7.5mm on both cars. The shape of the moulding is also different alongside the pivot along that lower edge. In front of the pivot the seal covers the vent frame as that part turns inwards as the vent is opened, but aft of the pivot the seal is flush with the bottom of the vent to allow it to open. On mine that transition is angled, whereas current replacements are cut off at a right-angle. And contrary to the usually held view that all suppliers get their parts from the same manufacturer, those from Rimmers and MGOC appear to be different to each other in this area. None of my seals are visually perfect by any means, but they don't let in rain and given the quality of replacement parts these days especially rubber I don't change stuff unless I have to.

Vent Glazing Seal:

When restoring both Bee's and Terry's quarter-lights getting the vent glass into the opening frame with the seal was a challenge. The glazing seals (27H8705) are flat strip and I couldn't see how I was going to get that folded into a U-shaped channel to fit around the edge of the glass as well as go round the 90 degree or so corners. In the end I cut darts at the corners leaving just a narrow joining strip and that seem to go in fine ... then it oozed straight back out again! For Bee I left them clamped up both horizontally and vertically in a wood frame for a few days, but for Terry's I think only overnight, and they've been fine ever since.

February 2019: Since then I've read of a method that avoids cutting the darts. This involves putting the strip in hot water and stretching it lengthways, then laying it lengthways along the edge of the glass, and at the corners the sides shrink back to lie almost flat against the glass as it is pressed into the frame. Probably advisable to clamp it up as before, and to leave the trimming for a few days in case it shrinks back from the edges and leaves gaps.

January 2021: But Richard shows that by far the bulk of the seal will be trimmed off, leaving just a relatively small amount to be squashed into the corners, and fitted his without darts or hot water. Note that the rain channel at the front lower corner lies against the glass, the glazing seal is wrapped around it.

August 2020: In an MGOC forum post Ben Columb shows a moulded glazing seal being used for the front quarter-lights, similar to that used for the rear Q/Ls. The rear channel is noticeably deeper than the front channel, and the moulded seal protrudes slightly, but doesn't protrude any more from the shallower front channel, implying it's either a different seal, or has been trimmed in advance. He says both old and new were the same and he got the new from the MGOC (or maybe Moss ...). They specify 27H8705 but Googling that just comes back with the flat strip type from anyone with pictures.
September 2020: The topic has arisen again and this time I happened to rediscover a picture of a partially dismantled GT rear quarter-light vent which I think resolves the conundrum. Although the rear channel is almost twice as deep as the front channel, it's obvious that the rear seal goes nowhere near the bottom of the channel, and so it's probably that rear seal that Ben used in his front vents as he shows it prior to trimming and it is much longer than needed.

July 2022: Spotted this version of the glazing seal at Brown & Gammons which is already in a U-shape) (but not moulded like Ben's) - AHA7486M, as an alternative to the flat strip. It still has to be turned through two corners though.

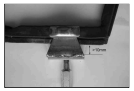
Repair and Restoration: Not content with reassembling a GT 'All by Touch' a couple of years ago my blind pal Terry bought a 67 roadster in a similarly dismantled condition. This had most of the outer bodywork done and had been primed, but then had been abandoned for a long time, and underneath was in very bad condition in places. He had the body finished and painted elsewhere, but again is doing almost everything else himself. (He completed it to gain its MOT at the first attempt in June 2015, but by the end of July he had succumbed to cancer and passed away).

Whilst he could tell the chrome on the quarter-lights wasn't too bad he still wanted them rechromed. One has a broken top mounting stud and on the other the bottom stud plate has corroded away. Three out of the four hinge parts had broken or were missing, and a bolt had sheared-off in one of the front mount threaded plates. I found several rechromers in Birmingham and the West Midlands quite near to me, hanging on from their industrial past, and one of them will rechrome them for £70 each. They know MGB quarter-lights and do them for someone else restoring them. He wants £350 a pair for restored - exchange - with a £200 surcharge each in case your exchanged unit can't be restored! A retailer of restored units wants £250 exchange each!!

For rechroming they need to be completely dismantled, and what with that and the several repairs that needed doing it was going to be more than Terry could manage. I offered to do them for him, and he jumped at it! Terry already had the four upper stud plates and nuts which he sent up with the quarter-lights, and doing some research I found that Brown & Gammons seem to have practically everything else I might need, including small parts like the handles and pivots (expensive though!) if they can't be rechromed successfully. Fortunately the main frame, the opening vent, capping and rain channel and the glass are all in good condition, even the felt channel in the long leg. The only part that no one seems to have is the rivets to secure the rear top mounting stud and the latch plate for the handle on the opening window (but see below). The rivets for the hinge and the handle pivot on the opening vent are available, but they are smaller. As I recall the handles are held on with a roll-pin which can be driven out.

Interestingly the hinge on the main frame is held on with two countersunk slotted screws, one of only two places I'm aware of where they are used (the other being used to hold the mounting plate for the distributor in the block). However on the later stainless units both halves are riveted. One of Vee's - the vent half - was broken when some scrote got inside, but each half is available separately (gotta love these cars), and I was able to drill out the old blind-rivets to get the broken-off bit out, and fit the replacement with pop-rivets.

Also interestingly the replacement top stud plates have threaded holes for a screw, the same size as the hinge screws. And whilst a screw was originally used for the front stud a pop-rivet will be perfectly satisfactory, as the only thing it needs to do is hold the stud from flopping about while the quarter-light is being fitted and the nut attached to the stud. Once tightened it serves no purpose at all. However screws are no good for the rear stud as the latch plate for the handle on the opening window sits on top of it, which is why that one is riveted. The original rivets are flush both sides, but whilst pop-rivets are nearly flush at the one end, at the other there is always the crumpled tube and ball from the end of the pin sticking out, and I wondered whether there would be enough clearance for that. There is even less clearance below, just the thickness of the gasket between the quarter-light and the top of the door.



In fact there is plenty of space in the channel between the latch plate and the bottom of the seal for the vent. However I'm still wary about using pop-rivets as the handle closing the window against the latch will tend to bend it back and fore, which could well loosen it. The stud plate itself is fine as that is pulled down onto the bottom of the channel by the nut underneath. So a screw up through the frame, the stud and latch plates, with a nut on top of the latch plate, seems the way to go.

Ready to go to the chromers now, with the lower stud plate repaired, and the forward-facing threaded plate repaired. I removed that, thought gripping the remainder of the bolt that had gone through the plate with a pair of grips was worth a try, and with a bit of releasing fluid it just unscrewed. Refitted that with pop-rivets as again that is simply pulled against the channel when the deep-head bolts are tightened.

To be continued ...

May/June 2013:

Took a while to get the parts back from the chromers - Castle Chrome at Dudley. Initially they said they would be four weeks, and to ring a couple of days beforehand. I did and they said they would be ready for 5pm on the Friday, which is no good to me at that time of day because of the traffic between Solihull and Dudley, so I'd collect them Monday lunchtime. They then said that helped them as they were a bit pushed, i.e. they hadn't started them yet. After another repeat of that I realised that each time I agreed a date it was going to be 5pm that day, so agreed a date but didn't go, then double-checked next morning that they were actually ready before setting out! All a bit casual, I was beginning to think they had lost the parts. Even more so when I did go, the goods receipt and despatch area is a large warehouse full of pallets of industrial-size and quantities of stuff for plating, and amongst them is my two frames and handful of small parts. But carefully packed and wrapped, and opening them up the results are absolutely superb, well worth the cost.

In the meantime I'd obtained a considerable number of replacement parts, so now it was a case of very careful reassembly so as not to mark the new chrome. You have to work out the correct order of doing things, like rivet the hinge into the opening part before fitting the glass and glazing seal, which involved working out the best way of closing a blind rivet without a press. One of the trickiest jobs was getting the glass and glazing seal into each frame. Despite clamping them up it just wouldn't go in as far as it should. Eventually I realised that to secure the handle brackets in the opening frame I had used pop-rivets as the correct blind rivets weren't apparently available from any of the usual sources, and the bobble on the top was sticking up too far and stopping the glass going down and hence in as far as it should. So more research, and then I find that the correct rivets (AHA7554) **are** available from Moss Europe, but they are only listed for some of the models and not the MGB. Earlier I had also found that some of the parts listed by another supplier are incorrect and vary from model to model, so more research was needed to find the correct ones. (*December 2017: Currently available from Moss, Motaclan/Leacy, and several others.*) After that the glass went in fairly easily as I'd previously replaced Bee's in 1991 and repeated that process.

When I restored Bee's in 1991 one part that wasn't available was the brass (apparently) distance tube on the pivot under the frame, and Bee's were beyond re-use. A spring goes over the tube and a Nyloc nut and washer fitted, and this provides the friction to keep the vent in the desired position against air pressure when driving. I could have left it off and just tightened up the nut until the vent had suitable friction, but thinking "brass tube - model makers" went to a local modelling shop. One size went over the pivot nicely and another inside the spring, but both were pretty thin as far as the walls went. However the smaller of the two was a perfect fit for the inside of the other one, so that was me sorted. The tubes were about 14" long originally so I had plenty left over for Terry's (and for several more). The usual suspects do list the tubes now - but oddly a different one for roadsters (17H2518) to GTs (27H6875), and only the roadster one is currently (August 2020) available.

I can understand the pivots being different (roadster 17H2512 for the curved handle vent and BHH717 for the flat handle, GT AHH7691 for the curved handle and BHH716 for the flat) as the vents are different heights and pivots at different angles. The springs are the same for all four (AHA7544), but the roadster pivot has a straight shank whereas the later GT is stepped which could require a larger diameter tube. However the earlier GT item is straight like the roadster so why the difference in tubes? Unless the tubes are a slightly different length (shorter on the GT so the spring applies more tension to keep the larger vent open against external air pressure? The QL on both roadster and GT sits on top of the door, the bright trim strip of the GT sits alongside the QL, so the assembled pivot, tube, spring, nut and washers just go through a hole in the top of the door when the QL is fitted so length is not an issue there.

One of the most annoying things was the poor fit of the replacement hinges from Brown & Gammons. They attach to the frames OK but are dimensionally incorrect, mate together very poorly, and position the opening vent too close to the back of the channel for the drop-glass so the edge of the glass and the corners of the frame foul the seal. Others have said that Moss males don't fit their females. I'd previously spoken to someone else who restores these, and they said if they have to replace the hinges they don't guarantee the fit afterwards, and I can see why! I spent more time getting these to fit decently than anything else, which involved some careful 'machining' to improve the fit by over-drilling the inside of the hole while leaving the entry the same size. (*December 2017: Michael Nunn on the MGOC forum said he got his from MGOC about May 2014 and had no problems. January 2018: Jim McCrae said MGOC had told him they get theirs from the same place as Moss, bought some from B&G and they were fine! So the upshot seems to be to keep buying from different sources until you get two halves that fit together and position the vent correctly!!*) I got one working nicely, but the other was still binding, which I eventually discovered was because the main channel was bowed in towards the vent instead of being flat. I'd not noticed that before, as all the hinges had been broken so I couldn't see the fit before I started. I didn't fancy trying the straighten the newly chromed frame, so settled for relieving the seal instead and that is now much better. Still not perfect, but I don't see how I can improve it any more. So then it is a case of parcelling them up with copious bubble-wrap between two sheets of hardboard, hoping that they don't get bent. I'll have to insure them for at least £750, as that is the cost of replacing them if they get damaged beyond repair.

Sill Threshold Plates *July 2019*

I'm not usually one for blingy trim but I made an exception for sill threshold plates. A nice finisher to the door opening and they do prevent the top of the painted sill from getting scuffed, stainless with a number of logos and patterns available from the usual suspects. Bee came without any so I added some after the paint job. Normally secured to the sill by stainless round-head screws, drilling the hole for the front lower screws either

needs the doors to be off or a low-profile right-angle drill so I left that one out. There is also the question of whether drilling holes will introduce a rust point, and John Maguire in Oz opted to use self-adhesive magnetic strip to attach his. Vee came with threshold plates and on removing them for inspection I did find some rust underneath, but treated and Waxoyled and it didn't get any worse - which is what I did to Bee's from the outset, working it into the screw-holes. John had a different problem in that the flange on the plate was too deep for his sill step so he had to cut that down to 8mm, which put it right through the screw holes. I don't know why that should be, both Bee and Vee have about 16mm to the step, the same as the threshold plates, and whilst the edge does go right to the bottom the top surface is flush with the sill. It may have been a side-effect of Australian-produced body panels. I know the shells were assembled there, and also that at one point they modified the doors for close shut-lines but found that when the car was on its wheels they couldn't get the doors open! Lots of info on Australian cars here.

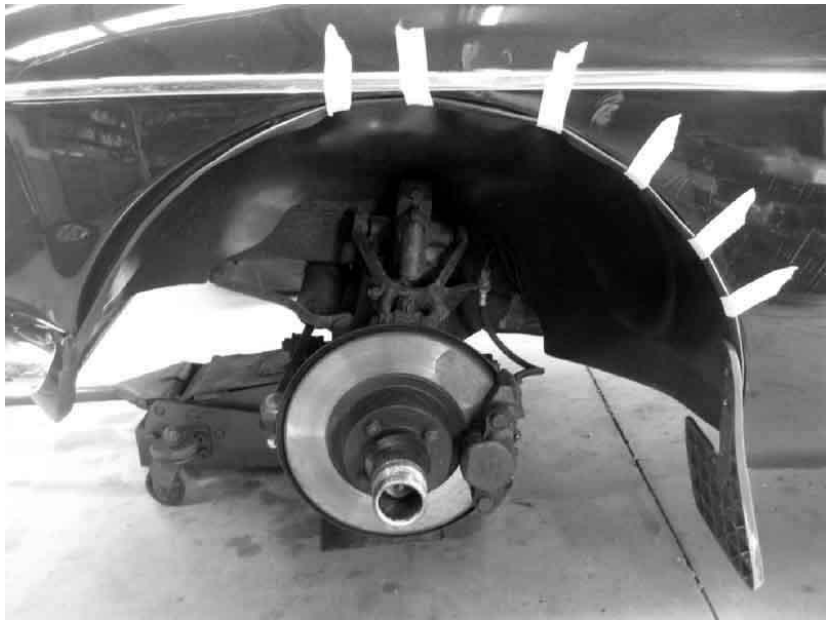
THE NEVER ENDING SAGA OF THE BL---Y B

by Herb Adler 5243 3409

OK, so I got a bit paranoid about rust up in the mudguards, and other areas where mud could accumulate. So I invested in these thingys, Moss calls them "front wheel liner sets". Lets just call them wheel arches.

Well they arrived after about 6 weeks on back order. So to install them. They came supplied with 4 humungous screws and washers per side. Internet wisdom said DO NOT USE these screws, they are ugly. Luckily I have oodles of small stainless self tappers, so I used those instead. Installation consisted of jacking up the front of the car, removing the wheels, and with a pressure washer thoroughly cleaning the mudguards and surrounds, before fitting.

To fit, according to the instructions, you use a length of flattened Z shaped plastic strip, which respectively clips over the edge of the wheel arch and then the other half is hooked on to the lip of the 'guard. Screws are then drilled for and screwed in. As the photo shows, I used masking tape to hold it all in place, whilst the screws were being inserted. I started screwing from the middle out, so that it would all be even.

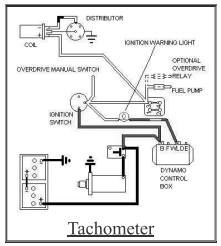


Now that they are fitted I can rest easy, knowing that one source of rust has been thwarted.

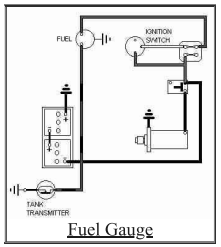
About a week after fitting, I came across an article, on the internet, that had a better way of fitting. Using a piece of edge trim over the wheel arch edge, fit the arch to the inside of the 'guard lip and fasten with screws, through the lip and into the metal of the trim. A much neater looking finish. Ah well, one day I might try it.

Gauges/Instruments

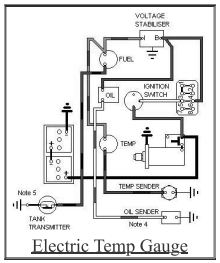
Schematics:



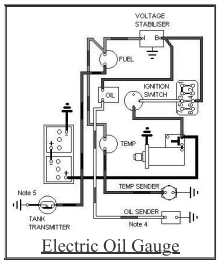
Tachometer



Fuel Gauge



Electric Temp Gauge



Electric Oil Gauge

The smaller gauges are secured in the dash with a small 3BA knurled nut (thumb nut) 17H932 and various U-straps. Early gauges have external illumination with strap AJH5185 (fuel) and AJH5186 (dual) that carries the bulb, later gauges with internal illumination use AJH5187.

The electric gauges are usually powered from the green circuit (fused ignition), the one exception is the early electric tach from 64-67 which was powered from the white (unfused ignition) as well as having another white coming in to the pickup from the ignition switch and going out to the coil. I have no experience of electric temp and oil gauges in MGBs but the following info on fuel gauges may be of some use in faulting them. What I can give is the wiring colours. All run off the green circuit, either direct or via the voltage 'stabiliser' as follows:

- Fuel: 62-64: green circuit - fuel gauge - green/black - tank unit - black - boot earth
- Fuel: 65-on: green circuit - stabiliser - light-green/green - fuel gauge - green/black - tank unit - black - boot earth. From about 75 on for North America, and 77 on for the UK, there was no longer a wired earth at the tank sender.
- Temp: (North American spec 67-on, UK spec 77-on) green circuit - stabiliser - light-green/green - temp gauge - green/blue - temperature sender
- Oil: North American 67/68: green circuit - stabiliser - light-green/green - oil gauge - white/brown - oil pressure sender
- Oil: North American 69-71: green circuit oil gauge - white/brown - oil pressure sender. From 72-on North American spec reverted to a mechanical gauge

Speedometer

There were many different speedos used over the years (I have found 50 so far!) according to year, market and vehicle spec.

Secured into the dash with two large 3BA knurled nuts 17H1304 and spring-washers, with a U-strap AJH5176 to September 64, separate 'legs' 17H3744 on each threaded stud from then until July 74, and 17H1339 until the 1977 model year. 1977 and later have a much better arrangement where the speedo and tach have three studs in the instrument case, and by turning them clockwise 30 degrees these studs will align with cut-outs in the dashboard to allow the instrument to be withdrawn. Unfortunately LHD only.

As well as the obvious physical differences in size and markings the 'turns per mile' (TPM) varied over the years, that is the number of turns of the speedo cable to register a mile travelled. This has to be matched to the drive gearing in the gearbox output shaft, the rear axle ratio, the wheel size, and to some extent the tyre size. Get the TPM wrong and both speed and distance travelled indications will be incorrect. Speed is relatively easy to compensate for by making internal adjustments but to correct the odometer different gear sets are required. The table below has been developed largely from the Leyland Parts Catalogue and Clausager and examination of many speedos at autojumbles, with additional information from other sites such as NAMGBR, Autochart and Paul Tegler. However these other sites either don't include TPM figures, are limited in scope, or disagree to some extent with information from other sources.

I am indebted to Ian John of Caerbont Automotive Instruments for supplying me with a list of TPMs for these speedos.

Note that speedos **not** in the list with the exact reference number, even though they have the correct TPM figure, may have different speedo cable fitments, or night-time illumination/ignition warning lamp/main beam tell-tale or fitting arrangements, making fitting them in an MGB not straightforward.

Speedometer Reference Numbers

Market	Date	Chassis No. From - To	Gearbox	MPH/ KPH	Part No.	Serial No.	TPM/ TPK	Size	Comments
All markets except Germany	1962 - Oct67	101 - 138400	Standard	MPH	BHA4478	SN6125/04, SN6124/04A, SN6144/00	1060* 1040? 1040*	4"	Jaeger Note 1 Smiths Smiths
				KPH	BHA4479	SN6125/05, SN6125/05A, SN6144/01	660* 660! 660*	4"	Jaeger Smiths Smiths
			Overdrive	MPH	BHA4480	SN6125/06, SN6125/06A, SN6144/02	1040* 1020! 1020*	4"	Jaeger Note 1 Smiths Smiths
				KPH	BHA4481	SN6125/07, SN6125/07A, SN6144/03	640! 640! 640!	4"	Jaeger Smiths Smiths
Germany	1962 - Oct67	101 - 138400	All?	MPH	BHA4574	SN6144/05	1040!	4"	560 - 14 tyres
			All?	KPH	BHA4636	SN6144/15	660!	4"	560 - 14 tyres
			All?	KPH	BHA4637	SN6144/13	660!	4"	155 - 14 tyres e.g. roadster
			All?	KPH	BHA4638	SN6144/14	640!	4"	165 - 14 tyres e.g. GT
Not Canada, USA, Sweden, Germany, or V8	Nov67 - Nov73	138401 - 332925 138401 - 332394	Standard	MPH	BHA4707	SN6144/20	1280*	4"	
				KPH	BHA4709	SN6144/21	800!	4"	use BHA5280
			Overdrive	MPH	BHA4812	SN6144/23A	1280*	4"	use BHA5281
				KPH	BHA4813	SN6144/24	800!	4"	
	Nov67 - Sep68	138401 - 158230	Automatic	MPH	BHA4707	SN6144/20	1280*	4"	
				KPH	BHA4709	SN6144/21	800!	4"	
	Nov68 - Aug73	158231 - 328800	Automatic	MPH	BHA4868	SN6144/28	1216!	4"	Note 11
				KPH	BHA4869	SN6144/29	760!	4"	Note 11
	Nov73 - Sep74	332926 - 360300 332395 - 36100	Standard	MPH	BHA5279	SN6144/20BS	1280!	4"	
				KPH	BHA5280	SN6144/21BS	800!	4"	
			Overdrive	MPH	BHA5281	SN6144/23BS	1280*	4"	
				KPH	BHA5282	SN6144/24BS	800!	4"	
	Sep74 - Jun76	360301 - 410350	Both	MPH	BHA5339	SN5230/13	1000*	80mm	
			Both	KPH	BHA5340	SN5230/14	620!	80mm	

Canada	Nov67 - Jul68	138401 - 153877	Standard	MPH	BHA4707	SN6144/20	1280*	4"	
				KPH	BHA4709	SN6144/21	800!	4"	use BHA5280
			Overdrive	MPH	BHA4812	SN6144/23A	1280*	4"	use BHA5281
				KPH	BHA4813	SN6144/24	800!	4"	
	Aug68 - Jul71	153878 - 258000	Standard	MPH	37H 3766	SN5226/03, SN5226/05, SN5227/07	1280! 1280! 1280!	80mm	
			Overdrive	MPH	37H 3768	SN5226/08, SN5227/12	1280! 1280!	80mm	
			Automatic	MPH	37H 4180	SN5227/16	1216!	80mm	
	Aug71 - Apr72	258001 - 282419	Standard	MPH	BHA5084	SN5231/00	1280!	80mm	
			Overdrive	MPH	BHA5086	SN5231/04	1280!	80mm	
	May72 - Sep74	282420 - 360300	Standard	MPH	BHA5161	SN5230/06S	1280!	80mm	
			Overdrive	MPH	BHA5163	SN5230/08S	1280!	80mm	
	Sep74 - Jun76	360301 - 410000	Both	MPH	BHA5339	SN5230/13	1000*	80mm	
	Jun76 - 1978	410001 - 447000	Both	MPH	AAU 3027	SN5373/00	1000!	4"	
Japan	Sep 77	443981 - 447000	all OD	KPH	?	?	620	4"	LHD to North American spec
Canada & Japan	1978 - 1979	447001 - 501000	Both	KPH	?	?	620	4"	Note 2
Canada & Japan	1980	501001 on	Both	KPH	?	?	620	4"	Note 2
USA, USA for Germany	Nov67 - Jul71	138401 - 258000	Standard	MPH	37H 3766	SN5226/03, SN5226/05, SN5227/07	1280! 1280! 1280!	80mm	
			Overdrive	MPH	37H 3768	SN5226/08, SN5227/12	1280! 1280!	80mm	
			Automatic	MPH	37H 4180	SN5227/16	1216!	80mm	
	Aug71 - Apr72	258001 - 282419	Standard	MPH	BHA5084	SN5231/00	1280!	80mm	Note 10
			Overdrive	MPH	BHA5086	SN5231/04	1280!	80mm	Note 10
	May72 - Sep74	282420 - 360300	Standard	MPH	BHA5161	SN5230/06S	1280!	80mm	
			Overdrive	MPH	BHA5163	SN5230/08S	1280!	80mm	
	Sep74 - Jun76	360301 - 410000	Both	MPH	BHA5339	SN5230/13	1000*	80mm	
All LHD	Jun76 - Jun79	410001 - 498440 (Cal) 410001 - 503250 (other)	Both	MPH	AAU 3027	SN5373/00	1000!	4"	Note 3
	Jun79 - Oct80	498441 (Cal) on 503521 (other) on	Both	MPH	?	SRM6006/00	1000!	4"	Note 4
Sweden, Germany	Sep69 - Jul71	187211 - 258000	Standard	KPH	BHA4924	SN5227/20	800!	80mm	Note 10
			Overdrive	KPH	BHA4925	SN5227/22	800!	80mm	Note 10
			Automatic	KPH	BHA4926	SN5227/24	740!	80mm	Note 10
	Aug71 - Apr72	258001 - 282419	Overdrive	KPH	BHA5087	SN5231/08	800!	80mm	Note 10
	May72 - Sep74	282420 - 360300	Overdrive	KPH	BHA5164	SN5230/09S	800!	80mm	Note 5
	Sep74 - Jun76	360301 - 410000	Both	KPH	?	?	620	80mm	Note 6
RHD (not Police)	Jun76 - Oct78	410001 - 480296 GT 410001 - 481115 Roadster	Overdrive	MPH	AAU 3035	SN5234/00	1000*	80mm	Note 7
RHD (not Police)	Oct78 - Oct80	480297 on GT 481116 on Roadster	Overdrive	MPH		SN5234/02	1000*	80mm	Note 8
RHD (Police)	Jun76 - Oct80	410001 on	Overdrive	MPH	AAU 3036	Z 65465	1040!	80mm	
V8 (not Police)	Dec72 - Jul76	101 - 2903	Overdrive	MPH	BHA5210	SN5230/11S	960*	80mm	140mph
V8 (Police)	Dec72 - Jul76	101 - 2903	Overdrive	MPH	BHA5317	Z 63973	980!	80mm	Note 9

Notes:	TPM/TPK	MPH speedos have a 'turns per mile' number on the dial, whereas KPH speedos have a 'turns per kilometre' number, and there are 1.60934 kilometres to the mile. Thus a Mk1 car with a 1020/1040/1060 MPH speedo uses the same gearbox components as a car with a 640/660 KPH speedo, a Mk2 chrome bumper with a 1280 MPH

		speedo has the same gearbox components as one with an 800 KPH speedo, and a rubber bumper car with a 1000 MPH speedo has the same gearbox components as one with a 620 KPH speedo. This means that cars can be converted between MPH and KPH simply by fitting the 'other' speedo.
	'*' and '!'	'*' after the TPM indicates that I have confirmed the figure on an actual example of the speedo **and** the number has been confirmed by a manufacturer and repairer of the instruments. '!' after the TPM indicates the number has been confirmed by a repairer of the instruments.
	1	The Parts Catalogue shows these serial numbers as having the same part number but actual instruments and manufacturers data show different TPMs.
	2	Clausager shows Canada and Japan having KPH speedos from 1978, and Canada and Japan 1980 models having 6 - digit odometer, but these changes are not shown in the Parts Catalogue.
	3	North American spec including Japan had 4" speedos for 1977 on. 77 to 79 were 120mph, chrome bezel, 5-digit odometer
	4	1980, 85mph, plastic bezel, trip-reset on the face, 6-digit odometer. Not in Parts Catalogue.
	5	Parts List shows this type continuing till Jun76
	6	Clausager states 80mm from Sep74 LHD roadsters only made for North American market after Jun76
	7	Reads to 120mph, additional kph markings. Figures outside markings, numbers go 10/20/30.
	8	Reads to 120mph, additional kph markings. Figures inside markings, numbers go 10/30/50.
	9	XA5(XAS?),175x14 tyres, 140mph
	10	Use with right-angle drive when the cable enters the cockpit at the right-hand side and goes across to the left behind the dash. Not required where the cable goes across the car in the engine compartment and passes through the bulkhead straight into the back of the speedo
	11	Axle ratio changed and hence speedo

Updated August 2010: Note that 1280 tpm overdrives were used V8s and 4-cylinder chrome bumper cars (the latter having a black label) whereas 1000 tpm ODs were used on 4-cylinder rubber bumper cars and had a blue label. Thus on V8s there seems to be a mismatch between the 1280 tpm overdrive and the 980 tpm speedo, but this is almost exactly counterbalanced by the different axle ratio used on the V8. See here for more information on label colours.

Lights: *July 2020*

Instrument illumination is at the top, the bulb-holder (single wire, red/white) is push-fit, but usually pretty tight so may need to be pulled to one side to get it free. CB cars main-beam bulb (also single wire, blue) is at the bottom, also push fit but much easier to get out and back in.

Faults and Repairs:

Whatever you do don't use carb cleaner on the speedo e.g. to wash out oil that has come up the cable as recounted below. Whilst it fixed the speed indication problem it caused the tiny cogs in the main odometer to partially melt and completely jammed it. Fortunately I could re-use the cluster from Bee's old speedo as a temporary measure while I see if there is a reoccurrence of the oil problem, and when I'm sure that is fixed I'll send the speedo off for a proper repair/refurb. Out of interest I tried brake cleaner on the already damaged parts and it had no effect ... but try it at your own risk!

I've had a copy of a Repairing Jaeger & Smiths Speedometers document by Anthony Rhodes for a long time. That used to be online although harder to find now, it has been rewritten into a web site for Sunbeam Tigers. The Tigers web site has more written information (albeit over 17 pages which is a bit inconvenient), but the original document has more pictorial information and is easier to scroll back and fore, hence both are linked from here.

However with Bee's 4" speedo it was nothing like as easy to get the guts out of the case as Rhodes states. The trip reset protrudes much too far and will not 'push into the case' as described, and it only allows the mechanism to be moved forwards a few mm with the rear screws removed. I did not fancy trying to remove the pointer from that tiny spindle, so removed the screws holding the dial to the mechanism and with that free to move about under the pointer, and pushing the rubber gasket around the rear shaft up into the case, gave me just enough room to manipulate the mechanism out of the case. However trying to replace it the pointer did ping off - fortunately not snapping the spindle as I first feared, but leaving me with the problem of where to reattach it. That was done successfully, and on a subsequent occasion slotted the hole in the case for the reset shaft and that allowed removal without removing the dial screws.

June 2024:

Noticed Vee had clicked over to 30k ... then the next trip it out was just the same! Five minutes saw the speedo out (both cars came to me with only the tach-side mounting leg installed which can be accessed by reaching up behind the tach), another minute it was out of the case, and the main driving wheel was jammed. All the wheels were jammed, including the 10k digit, so it looked like that had failed to complete its turn and jammed all the way back. On the desk upstairs I consulted my previous experiences with the odo and just by removing the blue driving wheel and giving things a wiggle there was a click

and everything was free again, and that had taken another five minutes. Back together turning a screwdriver in the cable drive started advancing the tenths wheel, and a drill and end off a broken cable drove the speedo round to 140mph with the tenths advancing merrily. I wanted to put the known 'missing' miles back on, but that way would have taken ages with the drill, so back out of the case again turning the driving wheel beside the tenths with a thumb soon put 75 miles on pending a trip out and refuel to give another estimate of mileage but it was about right so fastened back in the dash. Which took three goes feeling for the stud with the 'leg', earth wire and spring washer on, and a bit of a fiddle to get the knurled wheel started but no more than ten minutes. Will it happen again at 40k? Watch this space ...

May 2021:

Guy Renou has written to say he was able to remove the pointer surprisingly easily by putting a cloth over the dial, then using the curved tines of a table fork to gently lever it off! With the dial then removed you should be able to manoeuvre the mechanism out of the case with the rubber gasket pushed inside the case, but it does need to be orientated in a particular way, and again to get it back in. But with the dial off you can remove the small circlip from the reset shaft which allows the shaft to be removed, then the mechanism comes straight out.

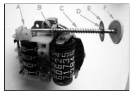
April 2024:

Suddenly had the thought that trim removal tools could be used to remove the pointer ... and they can.

July 2020:

On the way up to the Lake District Vee's speedo started flicking and I wondered whether it was the new cable that had been in about 500 miles. Then it started flicking higher and higher, and when it got to 120, 140 and then the back of the needle stop I knew it had to be the speedo itself. Finally it stayed at the back of the needle stop until we came to a halt when it slowly returned to zero, going round to the stop as we started moving again, confirming it was the speedo. Back home it took about 10 minutes to get the speedo out and opened up (much easier than Bee's) and the problem was immediately obvious - black oil in the mechanism and causing the spinning magnets to pull the needle cup round by much more than the usual magnetic force.

Note that it is not magnetism that drives the needle cup directly but induced eddy currents, as the cup is aluminium which is non-magnetic. What happens is that the spinning magnet induces a current in the aluminium cup, and the effect of that current flowing in the aluminium is to generate an equal and opposite magnetic field which opposes the field created by the spinning magnet. This opposition cannot slow down the spinning disc, so it causes the needle cup to be dragged round. This effect has been used in electricity meters and to control the speed of roller-coasters and high-speed trains for many years. For the roller-coaster all it needs is permanent magnets on the car, and aluminium vanes on the track. No power supply, no moving parts, nothing to go wrong.



December 2014: I needed to get into the mechanism in order to modify the mileage reading. Bee's trip odo has been jamming regularly this year, which made following Tulip instructions tricky. Fortunately the tenths was still going round, so I was having to add that to the main odo reading, then add to that the next inter (distance to the next turn) for the Navigator to write down. Bad enough, but because the trip and main odo aren't in synch sometimes I ended up a mile out either way. I was going to send it away over winter to be repaired, there are a couple of people who can then set any mileage you require (ordinarily it would be zeroed), but at £90 it's quite pricey and they take several weeks to do it. I'd got to the point of investigating how much new ones were for insurance purposes if mine should get lost, when I thought of looking for used on eBay. I found two, one was exactly right for Bee going by the reference number on the dial at £40. The other wasn't a very good picture but from what I could see looked right, at £20 in 'good condition and fully functioning', both mileages way different to Bee's of course. No shipping price in the ad, and you don't get that until you commit to buy which isn't helpful. Emailed the seller asking them to confirm the numbers and shipping price, but had to wait several days for a reply. Not exactly right - it was originally used on 74 models, but specified in the Parts Catalogue as being backwards compatible with earlier Mk2 cars so fine for me, and shipping a reasonable £5. By that time the £40 one had gone, so I committed to buy this one, then had to wait another week or so with no further info from the seller as to whether it had been shipped or not, before it turned up. First thing I did was test it with my drill on reverse, and the speedo goes smartly round, but neither bloody odo worked! Annoying, as the face and the numerals were in as-new condition, and the bezel and glass were no worse than Bee's. I could have sent it back of course, but more hassle and aggro, and no further forwards. So for the sake of £20 I decided to use it as a learning experience and open it up and have a look at it. Same problems with getting the guts out as with Bee's, which I'd already tried months earlier in an effort to see what was wrong with her trip. See the full story here on fixing the odometers on both speedos as well as a description of how they work.

Speedy Cables is often mentioned as a source of speedo repairs, but there have been complaints of these taking several weeks.
JDO Instruments offers a 48 hour turn round which has been verified by members of the MGOC MGB Technical forum. But for the purposes of balance someone ringing JDO about a repaired speedo that had failed had the phone

slammed down on him with the words "I'm 80 years old and I don't need this", and someone else said he had used Speedy Cables with prompt return. So there you are - your choice.

Speedo Drive Gears: *March 2008*

Whereas for the 3-synch cars the speedo tpms varied between non-OD and OD cars (but by less than 2%) the speedos for 4-synch cars quote the same tpms (1280 for chrome bumper cars and 1000 for rubber bumper) but there are still different part and reference numbers for the speedos according to whether the car was non-OD or OD. This continued up to September 76 and the 77 model year, when suddenly there is only one speedo (different again for the 'new' plastic dash) for LHD and one for RHD, still at 1000tpm as for previous rubber bumper cars, but no corresponding change in gearboxes or ODs.

Looking at the parts lists there always were different speedo drive gears and pinions, with different ratios, between non-OD and OD. But whereas the ratio difference is nearly 3% for the 3-synch gearboxes, it is only 1% for the chrome bumper 4-synch (I don't have all the ratio information for the rubber bumper cars). 1% is insignificant (given that speedos in the UK are allowed to over-read by up to 10% but not under-read) so having the same tpms for both is reasonable, but why the different speedo part and reference number if everything else is the same? Even 3% difference for the 3-synch is not that significant in the grand scheme of things, but the speedo tpms for non-OD and OD cars did take this into account. Although even that isn't straight-forward, as the information I have is that Jaeger instruments were 1060 for non-OD and 1040 for OD, whereas the later (1964) Smiths were 1040 for non-OD and 1020 for OD! Whilst the change from crossply tyres to radial may have required a change in gearing, radials weren't available until 1965, and crossplies remained standard on UK cars until 1972.

The bottom line is that while changing a non-OD gearbox to an OD gearbox using 3-synch will introduce an error of nearly 3%, on a 4-synch car changing from a non-OD to an OD gearbox **of the same era** will only introduce a 1% error and can be ignored. The important thing to remember on 4-synch 4-cylinder cars is that the OD units changed from a black label to a blue label between CB and RB so if you put a rubber bumper OD gearbox in a chrome bumper car or vice-versa, and don't change the speedo, you will introduce an error of around 20% which is very significant. However the speedo size changed at the same time so it's not simply a case of fitting the speedo that came from the same car as the gearbox. V8s used a black label on both CB and RB, so no change in speedo tpm and all V8 tach and speedo instruments are 80mm.

Paradoxically using a 3-synch speedo on an RB car or vice-versa would only introduce a 2% to 5% error, unfortunately the speedos are different sizes at 4" and 80mm on RHD cars. One of the great mysteries of life is why LHD cars reverted to 4" from 80mm for the latest plastic dash in 1977 when RHD stayed at 80mm. On the face of it one of those would fit, but RB speedo and tach don't have provision for the ignition and main beam warning lights.

What speedo drive gears and pinions were used, where and when:

	Gearbox	Worm Gear	Starts	Pinion	Teeth	Ratio
Chrome bumper 4-cylinder	3-synch non-OD (dipstick level/filler)	1H3369 (white plastic)	9	11G3264 (white plastic) or 22H1420L	28	1:3.111
	3-synch OD (dipstick level/filler) D-type OD	7H8294 (metal)	5	17H8021 (metal?)	16	1:3.2
	4-synch non-OD (dipstick level/filler) and Auto	22B468 (metal) or 22B649 (white plastic)	10	22B654 (white)	26	1:2.6
	4-synch OD (dipstick level/filler) LH-type OD (black label)	37H3464 (blue)	8	37H3463 (white)	21	1:2.625
Rubber bumper 4-cylinder	4-synch non-OD (side-plug level/filler)	DAM686 (black)	9	DAM687	30	1:3.333
	4-synch OD (side-plug level/filler) LH-type OD (blue label)	37H8844 (red)	6	37H8845 (red)	20	1:3.333
All V8s Note 1	4-synch OD (side-plug level/filler) LH-type OD (red label but see Note 2)	37H3464 (blue)	8	37H3463 (white)	21	1:2.625

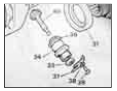
Note 1: Using the same pinion and gear as the chrome bumper LH OD may seem incorrect as the 4-cylinder chrome-bumper car has a 1280tpm speedo and the V8 a 960tpm. You have to take into account the rear axle ratio as well, and the lower ratio of the V8 (prop-shaft turns slower for a given road speed) almost exactly balances the difference in speedo TPMs.

Note 2: Label colours are nominal, with MGC having green according to one source and V8s red, however my V8 is black and Geoff Dunlop's in Australia is green. Ex Laycock people at Sheffield Overdrive Services have told me that if they didn't have the right colour available they used whatever they had to hand albeit stamped with the correct reference and serial numbers.

'Starts' refers to the number of threads on the worm gear fitted to the gearbox output shaft (a standard bolt only has one start). The number of starts is another way of setting the ratio between worm gear and cable drive pinion, the greater the number of starts the faster the pinion turns in relationship to the worm gear. This Wikipedia page explains the principle very well and has an animated graphic demonstrating a 4-start worm gear.

SC Parts Group has exploded diagrams of all the OD components (as well as the gearboxes) for all the MGB variants. All the pinions and drive gears are priced, implying that all are available.

Pinion Housing: *August 2020*



The LH OD housing (non-OD and D-type are different) has an O-ring seal to the gearbox body and a lip-type seal in the housing to prevent leaks from the pinion shaft. After replacing Vee's cable the new one is drawing oil up the cable to contaminate the speedo, so investigation with a view to seal replacement was called for.

Why is this cable drawing oil up when the old one hadn't? There is a seal on the drive spindle, which seemed initially to be missing so I fitted one, but subsequent research indicated it should be well into the housing so one is probably already there. Checking about 50 miles later more oil has worked it's way about one quarter the way up again, so I'm going to have to get the housing and pinion out for inspection and replacing the original seal - probably with yet another new one. That means working with the back of the car as high as possible to limit the amount of oil that can run out, but some is bound to.

Late October after a 200-miler I take the speedo cable inner out ... and it was slathered in oil again right to the top. So oil still getting into the cable somehow, but the inside of the speedo was clear so maybe just caught it in time. Next step will be to disconnect the cable from the gearbox and see if anything drips out, and keeps dripping. Also to check the oil level and colour to see if it is as black as what's in the cable.

Early November I check the gearbox and the oil is clean as it should be, so the standard lubrication of the new cable is what must be blackening it. The level hasn't dropped in fact it's a bit high so I let some trickle out. Started removing the cable and the knurled nut didn't seem to be turning more freely or the cable coming loose in the nut, then I noticed the housing was turning! So out from under and back again with a selection of spanners to tighten the forked clamp that holds the housing in, didn't go fully tight, but after a few flats I tried again and this time the knurled nut came free. No oil came out, but I jacked up one rear wheel and ran it in 1st gear for a few minutes with the cable removed, to find a tiny drop of oil where the pinion exits my extra seal, so the housing will have to come off and the seal and pinion removed, examined and maybe replaced. I could replace just the seal at a few pence, but if the problem is the pinion it'll only happen again, and if I think it's fixed I probably won't know until the speedo packs up again. A pal had an OD rebuilt and the drive flange oil seal leaked straight away, they sent him a new seal and flange, so I'd expect the same.

Still under guarantee from the rebuilder (who sent the OD elsewhere) and he says if I can get them out to see what needs replacing he will contact the OD rebuilder. That's complicated as it may take a while to get the parts, I could get them locally but why should I? Also the back of the car would need to be raised quite a bit to prevent oil running out from the housing hole - OK for a removal and replacement with parts to hand, but I don't want to leave it like that. So it'll need draining. But unless I can catch it in a clean container for reuse that means another £40 for oil - which is almost twice the parts! I can use an empty oil can from an engine oil change earlier in the year as they are clean. But that will need a funnel or it could be very messy, and the funnel needs to be bigger than the drain hole or the funnel will overflow! Also the car needs to be high enough to get the can and funnel underneath and still leave space for me to remove the drain plug, without dropping it, for if that goes in the funnel it will block it and overflow!! But up on my full-length ramps it should be high enough, and will be level so safe to leave with the housing out for a while if needs be, but I'll need an oil change drain bucket to hand just in case, which will mean losing the oil. So much to think about and plan for, and yet another saga.

Late November: I decide to drain the oil so I can get the car up on the full-length ramps for ease of working underneath. I have an almost empty plastic 5L engine oil can with a short flexy spout. That and its housing can be levered off to leave a large hole in the can, which an old 1L gear oil container with the spout removed fits neatly inside to act as something of a funnel - I don't fancy unscrewing the drain plug and trying to get the sudden flow in the can otherwise without making a right mess. Underneath the drain plug moves easier than I expected - I don't think I checked its tightness on reinstallation! Too much room now, I'm going to have to hold the can and 'funnel' up closer to the gearbox while I'm undoing the plug. Do it over one of my large plastic drip-trays - just as well as some does run down the outside, but at least I don't drop the drain plug in as well, which was another fear. Drains in a few minutes so refit the plug - tightly! Only 2.25L in the can with 3.4L capacity quoted in the manual, something that figures as after draining and up-ending the gearbox after removal, then laying back down again, I did get quite a bit more out. Hope the remainder doesn't run out of the OD with the pinion housing removed!

7/16" spanner to remove the bolt holding the forked clamp for the housing, and the housing starts sliding out on its own. Get the drip tray underneath while I fully remove it, thankfully no more oil. On the bench I remove the O-ring that seals the housing to the OD casing and the pinion slides out. A long fine scratch the length of the shaft i.e. passing through the oil seal - source of the leak? Closer examination shows witness marks from the seal round the shaft, but there is a definite gap part way round which indicates that part of the shaft was not in contact with the seal, and so a more likely source of the leak. My extra seal comes out easily enough, and is a good fit to the pinion shaft in terms of the resistance I can feel, but with the pinion back in the housing there doesn't seem to be any extra resistance from the original seal than there is from the housing itself. Now how to remove the original seal, which is well recessed in the housing?

Really it needs some kind of puller that goes in from the speedo cable end, with fingers that go through the seal and can lock behind the metal surround. Then the housing would need to be held firmly while the seal was pulled out - back in the OD!? I opt for bending the end of an old flat-blade screwdriver towards a right-angle, and rounding the ends, to put in from the pinion end and drift it out rather than be pulled, and after a bit of tweaking that does the trick. While writing this I Googled 'small oil seal puller' and found someone else had done exactly that! Someone on that thread mentioned drilling and putting in a sheet-metal screw and pulling it out with that which I know can be done with larger seals but I think this is too small. However it did occur to me that a large screw through the centre of the seal biting into the metal surround might do the same job, but you would have to avoid damaging the part of the housing the pinion shaft runs in which is very close to the seal. Other possibilities were a pick with the tip partly curled back on itself, and other gadgets too complicated to explain and a lot more expensive. Anyway, it's out now.

Two problems immediately apparent - one is a fine scratch the length of the pinion shaft which may well be too fine to cause a problem, but the other concerns the witness mark of the seal on the shaft. There is a distinct gap in the witness mark, as if the pinion shaft has a slight flat at that point and isn't touching the seal, and I can definitely imagine that resulting in a leak. I email pics of both those areas to the gearbox man, together with a phone call, asking for replacements of pinion and both seals from the OD rebuilder, so Vee is out of action for the time being. If they refuse to cough up at least I can get them from Leacy's when I collect the front screen.

Time to ponder fitting the new seal - fill the (small) gap between seal and housing with grease as an additional measure? At the very least it would lubricate the new seal and pinion shaft before oil works its way down. A second seal again but pushed all the way down if there is enough plain shaft left on the pinion spindle?

Tony at Geartech gave me the number for David at Overdrive Spares in Rugby who overhauled the OD and he sent me a new pinion, seal and O-ring with no quibble. When they arrived I tried the new seal on the new pinion and it seemed a much better fit than the old pinion had been in the old seal. Prior to fitting the seal I injected some grease in the seal end of the housing then pressed the seal into the housing using a suitably-sized socket. I then fitted the old pinion just into the seal from the 'wrong' end, and fitted the new pinion from the correct end, the intention being to squeeze the grease between the two pinions to fill the cavity between the seal and the shoulder in the housing, which worked well. Otherwise the end of the pinion would have pushed the grease straight out of the seal without spreading it round to fill the gap. Fitted the O-ring and bagged the assembly up prior to refitting tomorrow. The question then, will be whether to run the gearbox and overdrive after putting the oil back but before refitting the speedo cable ... or just to go for it. I wasn't bothered about doing that jacked up with one wheel removed when the car was on the ground and the wheel ramps, but doing that on the full-length ramps is a less attractive proposition.

What a pain in the backside that was! It's bad enough that the housing is above the fixed crossmember with the bulge of the OD one side and the narrowing tunnel the other, so even with a smallish hand I can barely get two fingers on the head of the bolt from behind, and with another finger on the other hand from in front I can't see the hole I'm trying to get the bolt in. Not that I can see the hole with the Y-clamp in the way, to know I'm in the right place to start turning the head. I tried using a long screwdriver to position the head and allow me to see but it flapped about all over the place, and I can't feel when the end of the screw is in the hole, let alone lined up. The threaded end of the screw is recessed from flat which makes it worse, so I file the edges off to make it slightly rounded, but still no go. So housing out and try the bolt without the Y-clamp and it goes in straight away. Try the bolt and the Y-clamp and still no go, but try a 7/16" 1/4" drive socket as a 'holder' for the bolt and eventually it goes in, after packing the socket with paper so enough threads protrude and to wedge the bolt. At some point during all this the bolt slips out and falls onto my neck while lying horizontally underneath, then goes into my shirt so I have to crawl out from under and delve in my clothing to find it. Back under again and I realise I'm missing the lock washer, so back out again and more delving to find that. I then come to the realisation that the problem is caused by the housing flange coming right up to the edge of the bolt hole, so whilst I can tilt the bolt in most directions to help align the threads there is a good 90 degrees or more where I can't tilt the bolt towards the housing, so it has to be dead on square while I'm turning it up to a full rotation to pick up the thread. I'm sure it's easy enough off-car where you can use a nut driver on the bolt head and attack it square on, but in-situ it would make it so much easier if the flange on the housing were an 1/8" or so smaller, it's not as if it needs to be as wide as it is. Eventually I do manage to get it started using the socket as a holder, but it has to be spannered in the whole way as it must be right up against the flange on the housing. I found the same when removing it but didn't think much of it, whereas without the housing in place the bolt went in easily with finger-tips. Another few minutes fiddle saw the speedo cable connected, and that 2 hours was more than enough for the morning session!

After lunch it's refill with oil, I have a 1L bottle with flexy tube with about 500mL left over from filling it after the rebuild, plus the 2.25L I drained out this time in a clean 5L 'can'. So about half a dozen trips under the car after filling the 1L container to squeeze in as much in the side filler as I can which is about half a litre each time, before crawling out again to top up. Eventually I empty the big container and oil starts running out of the side filler so refit the plug, and there is a shade over 500ml in the 1L bottle so not quite as much in now as before. I'll leave it to settle then try again another day after having run the gearbox and OD to be sure oil has got everywhere, but that means getting it off the big ramps which means getting both cars out which needs a dry day! Not that I mind as I'm pretty knackered after what should have been no more than a few minutes to fit the housing and attach the cable. Subsequently checked and all OK.

March 2021: Only a few dozen miles done because of the poor winter weather, but worth a check to see if any more oil is being drawn up. Some at the top which isn't surprising as the inside of the outer would have been coated all the way up and excess would have beef driven upwards as before, but nothing more than what would seem like 'normal' lubrication the rest of the way down and particularly at the bottom, so hopefully problem resolved. I've not refixed the speedo back in the dash yet though until I've done a good few more miles, hopefully a 200-miler to son's and back ... when it's allowed!

April 2021: An Easter trip to son's sees said 200-miler sees the inner out next day. Only a little more than I would expect at the top and 'normal' at the bottom so it looks like the seal has done the trick, but I still only put the speedo back temporarily. Just as well as when I went out in the car the speed wasn't registering but miles were ... odd. Took it out, spinning a screwdriver in the cable drive registered on the speedo, so back in, but still no speed. Waggled it in the dash and the needle went up a bit ... then stuck there! Back out again needle has returned, took the mechanism out of the case and can't find anything wrong. Back in the car,. and at some point a light-bulb moment - literally. I suddenly remembered that when fitting LEDs to the instruments I had to put a sleeve on the speedo holder to stop it going in as far as the longer LED 'bulb' was interfering with the needle disk! Somehow each time I had put the LED back in I had contrived to push it in too far, and withdrawing it a little solved the problem. Phew! Still haven't fully refixed it back in the dash though.

Speedo cables *March 2010*

Speedo Fitting
Erratic readings
Cable Replacement
Cable Routing

Chassis No.		Gearbox	Cable	Length	Notes
101-9402 (May 62-Mar 63) 101-138400 (May 62-Oct 67)	RHD LHD	non-OD	GSD103	1143mm (45")	It seems highly unlikely, if not impossible, for RHD and LHD cables to be the same length
101-10611 (May 62-Apr 63)	RHD	OD	GSD116	1422mm (56")	Not listed, some suppliers show GSD115 as 57", but GSD117 at 60" allows the speedo to be pulled forwards far enough to remove/refit that end in front of the dash rather than behind.
101-138400 (May 62-Oct 67) 10612-138400 (Apr 63-Oct 67)	LHD RHD	OD	GSD117	1542mm (60")	It seems highly unlikely, if not impossible, for RHD and LHD cables to be the same length.
9402-138400 (Mar 63-Oct 67)	RHD	non-OD	GSD111	1219mm (48")	
138401-410000 (Mk2-Jun 76)	RHD	non-OD	GSD249	991mm (39")	
		OD	GSD116	1422mm (56")	Not listed, some suppliers show GSD115 as 57", but GSD117 at 60" allows the speedo to be pulled forwards far enough to remove/refit that end in front of the dash rather than behind.
138401-153877 (Canada) (Mk2-Aug 68) 138401-187210 (roadster) (Mk2-Oct 69) 138401-187840 (GT) (Mk2 - Sep 69)	LHD	non-OD	BHA4596	1270mm (50")	not USA, Sweden, Germany
		OD	GSD151	1829mm (72")	not USA, Sweden, Germany
138401-282419 (USA) (Mk2-May 72) 153878-282419 (Canada) (Aug 68-May 72)	LHD	non-OD	GSD104	1373mm (54")	North America, Sweden, Germany, without service indicator
138401-410000 (USA) (Mk2-Jun 76) 153878-410000 (Canada) (Mk2-Jun 76)	LHD	OD	GSD151	1829mm (72")	North America, Sweden, Germany, without service indicator
187211-328800 (Oct 69-Aug 73)	RHD	Auto	GSD103	1143mm (45")	

	LHD	Auto	GSD116	1422mm (56")	not USA, Sweden, Germany. Not listed, some suppliers show GSD115 as 57", but GSD117 at 60" allows the speedo to be pulled forwards far enough to remove/refit that end in front of the dash rather than behind.
			GSD117	1542mm (60")	North America, Sweden, Germany, without service indicator.
282420-410000 (May 72-Jun 76)	LHD	non-OD	GSD145		North America, Sweden, Germany, without service indicator
360301-386600 (Canada) (Sep 74-Sep 75) 360301-422791 (Sep 74-Jan 77)	LHD	non-OD	BHA5351		North America, Sweden, Germany, gearbox to service indicator
		OD	BHA5360	1016mm (40")	North America, Sweden, Germany, gearbox to service indicator
		all	BHA5359	584mm (23")	North America, Sweden, Germany, service indicator to speedo
410001 on (Jun 76-on) **Whilst all previous cars seem to have the same sized fitting at the speedo end, RHD cars from this date, and from what I can tell LHD cars as well, have a bigger fitting so are not compatible with earlier cables, and vice-versa.**	RHD (all)	OD	GSD315	1450mm (57")	
	LHD	non-OD	AAU3868	1200mm (47")	without service indicator
		OD	AAU3870	1700mm (67")	without service indicator
All V8	RHD	OD	GSD116	1422mm (56")	Not listed, some suppliers show GSD115 as 57", but GSD117 at 60" allows the speedo to be pulled forwards far enough to remove/refit that end in front of the dash rather than behind.

Speedo Fitting: *May 2021:*

RHD speedos on 1977 and later models use a different fitting to earlier and the two are not compatible. Indications are that all LHD are the same.

Erratic readings:

Someone having problems with erratic readings which JDO said might be because the cable inner is pressed into the speedo too far. Cables do vary, with 77 and later appearing to project much further than previously, so I've taken some measurements, see the detail from clicking the attached thumbnail.

Under reading of both the speedo and odometer can be caused by the gearbox drive flange nut not being tight enough (the drive gear is not splined into the shaft), D-type OD should be 100 to 130 ft lb, LH OD 55 - 60 ft lb, non-OD 150 ft lb. See here for how to hold the flange still while tightening (or undoing) the nut.

Regular downward pulsing of the needle, if coincides with the ODO tenths wheel moving, can be caused by a dry cable or speedo input shaft, a single drop of oil on the end of the shaft will cause no harm. If it flicks more frequently than that it is probably broken strands in the inner.

Cable Replacement: *March 2020*

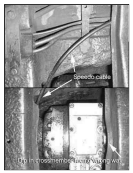
Vee breaks her cable and as well as the turmoil created by Coronavirus and companies trying to keep going with people working from home, the part numbers and lengths are very variable between suppliers, which led to some head-scratching.

Eventually resolved that, then about 150 miles later on our way up to the Lake District in July the speedo started flicking - damned new cable, I thought. But the flicks were upwards, getting higher and higher, until eventually the needle went all the way round to hit the back of the stop. Until we came to a halt, when it slowly went back to zero again, only to move all the way round again as soon as we started moving. That's got to be the speedo itself, and proved to be oil having worked its way up the cable and into the mechanism, acting as a viscous coupling between the spinning magnet and the needle disc. Eventually got that cleared, but not without damaging the main ODO in the process although I was able to replace it with the one from Bee's old speedo. Cleaning the cable an a few more miles showed more oil - so why not with the old cable? But all I can do is investigate the pinion housing.

Cable routing

On non-OD boxes the cable attaches after the gearbox main casing, which on 3-synch at least is just forward of the removable crossmember, as in this image from Clausager.

On OD gearboxes the cable attaches further back on the output of the OD and above the fixed cross-member. This cross-member on 4-synch cars has a notch which together with the connection being angled slightly forwards allows the cable to leave the gearbox at almost a right-angle, the bulk of the curve turning forwards being in front of the



cross-member and under the floor. Early cars do not show this notch (Clausager p76), but 3-synch gearboxes with the earlier D-type OD do seem to offer more space to allow a right-angle drive to be used. However if a broken right-angle drive on a non-OD gearbox was not replaced (they are expensive) this may need a slightly longer cable to avoid a tight turn.

It should then pass under the removable cross-member and be supported by a P-clip, however both Bee and Vee have theirs above and cable-tied to the other cables and pipes. In Bee's case the cross-member is the wrong way round so the tapped hole is on the other side. And whilst Vee's is correct, and I could have fitted it in the correct position, where they are is more protected from any rocks, traffic-calming measures etc. and as neither have exhibited any problems in my ownership where they are I've left them be (until I replaced the cable).

Clausager shows a clip holding it to the tunnel wall by the clutch slave on a Mk1, no reason to assume it isn't the same on later cars although neither Bee nor Vee have it.

On RHD cars it passes through the bulkhead via a hole in the top of the drivers footrest, and from there makes a graceful turn up and back into the RHD speedo head.

There is also the question of right-angle drives.

The Parts Catalogue doesn't show or list one with the 3-synch standard box but does show and list 13H2567 (120694) with the D-type OD. The drive on the 3-synch standard box exits pointing slightly backwards, and on the D-type OD comes out at a right-angle to the line of the gearbox, which means especially for the non-OD gearbox a right-angle drive allows the speedo cable to run straight forwards and makes sense.

It lists but doesn't show the same item for 4-synch non-OD boxes but lists and shows it for the LH-OD but is completely unsuitable for both. The drive is angled forwards, which not only makes it difficult to attach a right-angle drive and cable especially on the OD with its casting bulge right next to it, but the fixed crossmember has a notch to allow a longer cable to make a smooth turn direct off the gearbox or OD, and the removable crossmember has provision for a clip to support the cable closer to the chassis rail.

It lists but doesn't show it for the automatic box, but exiting at right-angles similar to the 3-synch it does need one.

An important factor on BL gearboxes at least is the provision of copper spacer washer 3H550 between the angle-drive and the gearbox, usually listed in the Parts Catalogue with the angle-drive. Without that there are excessive end-loads on the angle-drive resulting in premature failure, possibly from the square drive shaft protruding too far.

What about the speedo end?

The Parts Catalogue indicates one for the speedo as well - BHA 4794 - for Sweden and Germany from chassis number 187211 (1970 model year), North America from 258001 (1972 model year) to 282419 (May 1972), then 13H2567 for apparently all 1977 and later LHD cars. It would have been needed where the cable came up into the right-hand footwell as for RHD cars (which is at the top of the clutch foot rest) then across the car behind the dash. This would have resulted in too tight a turn behind the LHD speedo in the limited space available, hence the second unit. A number of people with LHD cars have said their cable comes up past the RHD entry point, across the engine compartment at the heater shelf, then in through the bulkhead in front of the driver direct to the speedo, rendering a speedo head right-angle drive unnecessary. This includes 3-synch cars using the large hole under the hinge slot, although Clausager appears to show a 74 car routed in this manner but using a smaller hole further above and towards the centre of the car than the large hole (which contains the heat control cable?).

The question is what happened on LHD cars prior to the 1970 model year? Did they run across the bulkhead in the engine compartment like post-May 72 cars and hence not need one? If so it seems odd that they then brought it inside the cabin for two years, needing a second drive, but a different part to the gearbox one. But this 1968 model has the cable inside the cabin in the right-hand footwell, and has a right-angle drive on the speedo.

EGR Service Indicator

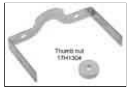
North American rubber bumper cars had an EGR valve service indicator from 1975 which was a warning light triggered every 25,000 miles. A resettable counter intercepted the speedo cable, and was positioned on the bulkhead as shown here on Bill Etter's car. The warning light was illuminated each time the car was started as a lamp test facility. The service indicator was deleted for Canada from 1976 on, and for the rest of North America from 1977 on, which ties in with one of the speedo cable changes listed above.

Tachometers:

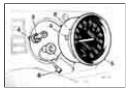
Prior to the electronic tachometer used from October 1964 a mechanical i.e. cable driven from the engine block rev counter was used.

Schematics
Description
Problems
Electronic ignition
Testing *October 2013*
Internal and external seals

Description: There have been two types of electronic tachometers - the earlier RVI inductively-coupled type (which came in two versions - positive earth and negative earth) and the later RVC directly connected type. The inductively coupled type uses the white wire that goes from the ignition switch via the tach to the coil for triggering. The wire is looped round the tach pick-up and will only work the right way round. The RVC directly connected type was only used on negative earth cars and uses a black/white from the coil -ve (the same terminal as the points wire from the distributor) which terminates on a bullet-type connector at the tach rather than a flat spade. 1962-64 cars used a mechanical rev-counter.



Secured into the dash with two large 3BA knurled nuts 17H1304 and spring-washers, with a U-strap AJH5176 to September 64, separate 'legs' 17H3744 on each threaded stud from then until July 74, and 17H1339 after that until the 1977 model year.



1977 and later have a much better arrangement where the tach and speedo have three studs in the instrument case, and by turning them clockwise 30 degrees these studs will align with cut-outs in the dashboard to allow the instrument to be withdrawn. Unfortunately LHD only.

The tach is powered from the white (unfused) ignition circuit on Mk1 cars, then for Mk2 cars onwards from one of two green (fused) circuits. Until 1978 this was the green circuit in the fusebox, but when the ignition relay circuit on RHD cars was modified sometime in 1978 and a second in-line fuse between brown/white and green wires was added under the fusebox, the tach is powered from one of these - the one with the thinner wires, the other with thick wires being for the cooling fan. For more information see the ignition schematics.

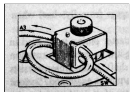
Tachometers were marked with the **original** polarity - positive and negative - from inception, at least until they changed from chrome bezels to plastic for the 1977 model year. But bear in mind that a PO may have changed the internal wiring of a positive earth tach and not changed the legend on the dial.

Serial numbers (on the faceplate) were as follows:

Year	Chassis Nos.	Market	Battery Earth/Ground	Sensing	Pickup Location	Size	Reference No.
1964-67	48766-138360	All	Positive	Current	External	4"	RVI/2401/00B
1968	138401-153877	Canada	Negative	Current	Internal	80mm	RVI/2430/00
1968-71	138401-256646	USA	Negative	Current	Internal	80mm	RVI/1433/00
1968-71	153878-256646	Canada	Negative	Current	Internal	80mm	RVI/1433/00
1968-72	138401-294250	Not North America	Negative	Current	Internal	4"	RVI/2430/00
1972	258001-294250	North America, Sweden, Germany	Negative	Current	Internal	80mm	RVI/1439/00

1973-74	294521-360069	not North America, Sweden, Germany	Negative	Voltage	N/A	4"	RVC/2415/00AF
1974.5-76	360301-409401	not North America, Sweden, Germany	Negative	Voltage	N/A	80mm	RVC/1410/00AF
1973-76	294251-409401	North America, Sweden, Germany	Negative	Voltage	N/A	80mm	RVC/1410/00AR
1977-80	410001-on	RHD	Negative	Voltage	N/A	80mm	RVC/1414/00F
1977-80	410001-on	LHD	Negative	Voltage	N/A	4"	RVC/2432/00F
All	All	V8	Negative	Voltage	N/A	80mm	RVC/1810/00

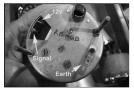
Note 1: There were two arrangements for the RVI tach - Mk1 cars had an external pickup and Mk2 to 1972 had an internal pickup.
Note 2: The change to 1968 Canadian models occurred part way through the year.
Note 3: There were gaps in chassis numbers. From November 1967 with the advent of the Mk2, most model years thereafter started at a 'round number' e.g. the last 1971 model was 256646 (a GT) and the first 72 model was 258001 (a roadster).



The RVI with external pickup either uses a white wire from the harness through the pickup, or may have a short section of white wire with bullet ends already in the pickup. In the former case there may be a long length (4 ft has been mentioned) of white coming out of the harness with a spade on the end, and this goes through the pickup then connects to an 'ignition on' spade on the ignition switch. This makes it easy to determine which way the wire has to go through the pickup. In the latter case the harness may have two separate whites with bullet ends, but it's an easy job to swap them over if at first the tach doesn't work. These tachs will only work with the current going through the pickup in one direction and you have to reverse it if you convert a positive-earth car to negative as well as reversing the 12v and earth connections. You will not harm the tach if the pickup is wired the wrong way round, but may do if the 12v supply is incorrect.

The RVI with internal pickup has male and female bullets on the back of the case, and corresponding bullets on two white wires from the harness. Note that these seem to be smaller than the standard wiring bullet and connectors at 4.5mm instead of 5mm (Malc Gilliver). The spade for the 12 supply to the tach electronics is close by the bullet connectors. The harness now has separate white wires with female and male respectively bullet connectors, meaning incorrect connection is not possible. Both RVI type tachs sense coil current and respond to the current pulses through the coil as the points open and close. If that circuit breaks the engine stops, if it shorts to earth you fry the harness! The earth wire for both the electronics and the instrument lighting is under one of the knurled wheels holding the tach into the dash.

See here for a description of the external pickup type from Mark Olsen's Sunbeam Tiger pages, and here for the later 2430/00 RVI with internal pickup by Herb Adler. However neither say much about the thermistor, this thread from The Sunbeam Owners Club of America states the original should have a value of 150 ohms at room temperature, but items in the 200 to 500 ohms should be able to be used successfully. A negative temperature coefficient (NTC) item is required, there are positive temperature coefficient (PTC) items around which are not suitable. Unfortunately suppliers in the UK only seem to stock items in the thousands of ohms, not hundreds of ohms.



With the RVC voltage-operated type the ignition current does not go via the tach, instead a wire from coil -ve/points connection goes to the tach on a white/black wire, which responds to the voltage changes as the points open and close. If this circuit breaks the tach ceases to register and the engine continues to run. If it should happen to short to earth the engine will stop, but not fry the harness. (In fact this makes a nifty anti-theft device using a hidden normally open switch connected to the wire at the tach rather than in the engine compartment.) Since the current flowing through the coil has a direct relationship with the voltage at the coil CB or -ve terminal it follows that the two types indicate the same thing.

See here for information about the RVC tach by Herb Adler, Franz Hubl and Rick Astley.

Problems:

Internal modules

Typical problems are sticking, wavering, or simply not working at all. Sticking, where a rap with a knuckle on the glass fixes it, and it only occurs after being parked for a while or at certain times of year, is almost certainly a mechanical problem with the movement itself.

Wavering or flicking about, if accompanied by changes in the idle speed, have a good chance of being caused by bad connections in the ignition LT circuit that is ignition switch - coil (via tach where appropriate) - points - earth.

Wavering or flicking about **not** accompanied by changes in idle speed, randomly dropping to zero for longer periods, or not working at all, could be either the 12v supply to the tach, the connection between coil and tach on the later voltage-operated types, or electronic problems inside the tach itself. From 64 to 67 the tach was powered from a third white (unfused ignition) wire and black earth but after that it was from a green (fused ignition) and black earth for

both current- and voltage operated types. In no case is the tach powered from the instrument voltage stabiliser as the output from this is 12v switched on and off about once a second and so is unsuitable for the tach for obvious reasons. Get a multi-meter with an rpm range, connect it to the points-side of the coil, and compare that with the cars tach. If they shows similar variations then there is a problem in the ignition LT circuit through the ignition switch, coil and points. If it is steady when the cars varies, and you have the voltage operated tach, then connect the multi-meter to the white/black at the tach. Variation here but not before would indicate problems with the white/black wire or connections between tach and coil. If that is steady too, or if it was steady at the coil and you have a current-operated tach, monitor the 12v supply and earth at the tach. If these are steady too then the problem must be inside the tach itself.

If it works normally with the lights off, but doesn't work at all with them on, then the earth supply is probably missing. Early tachs have the earth connection as a tag under one of the knurled securing nuts (as on the other gauges). Later cars have a spade spot-welded to the back of the case, as well as the insulated 12v spade. A similar problem can affect headlights where relays have been installed when the speedo earth is missing and the main-beam tell-tale is in the speedo.

Very occasionally there are reports of the tach shooting up when the ignition is turned on but before the engine is started, or swinging right round to max with the engine running. About all you can do here is to unplug the illumination bulb and disconnect the trigger wire or wires, and see what happens with just the green 12v supply wire (white on Mk1 cars) and black wires connected. If you have 12v between the spade the green (or white) is connected to and the case, and zero volts between the case and a known good earth elsewhere on the car, and the tach is still registering incorrectly, then it is an internal problem. If it has suddenly happened it is quite likely to be a dry joint or cracked PCB track which may be visible, or a component fault which probably won't be. If you have less than 12v between the green (white) and the case, or any voltage at all between the case and a known good earth elsewhere, then the 12v supply or earth is faulty.

Internal modules: *May 2009:*

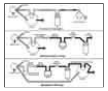
There are several sites around showing how the original tach circuit can be replaced with one using a 555 timer - two examples here and here, and another example using a different IC here. All can be done to both RVI and RVC tachs, although in the first and third cases this would effectively convert an RVI to an RVC and would need a trigger wire from the coil CB or -ve instead of sensing the current pulses in the white wire going to the coil SW or +ve. Initial testing and calibration can be done using a basic battery charger as described here, then comparison with a separate instrument such as in a strobe light or automotive multi-meter which are likely more accessible.

July 2024: If you are not into building circuits there are also a couple of options to convert faulty RVI tachs to RVC using a pre-built circuit board from here and here which looks like the same module but cheaper for slower delivery. The modules may or may not fit into an RVC case. Also here where the UniTacho option can apparently be used with both RVI and RVC tachs.

Electronic ignition: *July 2011:* If your RVI tach (64 to 72) doesn't work with your shiny new electronic ignition system, there are a couple of things you can try, depending on whether you have a positive earth car or a negative. Originally the 'fix' was to try changing the wire going through the pickup from two passes (one turn) to one pass (half a turn) and recalibrating. You will need to dismantle the tach to get at the pick-up on later versions. Subsequently Herb Adler reported that a 123 used with an RVI tach on a negative earth car (67 to 72) caused problems when following the instructions to connect the red (power) lead of the 123 to the Batt (+12v) terminal of the coil. He found that connecting this to an alternative 12v ignition source that didn't come through the tach pickup, e.g. the white at the fusebox, solved the problem. This shouldn't be necessary with the later RVC tachs, but is worth trying if you have other electronic ignition systems and tach problems. Note that this alternative connection is often recommended when putting electronic ignition on rubber bumper cars (i.e. with the ballasted ignition system), as the electronics are then fed with the full 12v and not the reduced and varying voltage.

Herb also reports that an RVI tach he had modified for 6-cylinders has R6 (see the above Tiger pages) at 820 ohms instead of 470 ohms.

Positive earth cars: *June 2021*



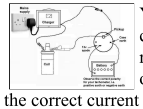
Pertronix/Aldon positive earth Ignitors are wired completely differently to negative earth in that the Ignitor is in the 12v supply to the coil (SW) instead of replacing the points, and the points side of the coil (CB) is taken direct to earth. This means that the alternative source of 12v for the Ignitor to allow the tachometer to work correctly cannot be used, and Aldon for example say that the tach might have to be converted to the later RVC (which at the time of writing is an additional £42). But this Lotus Elan site suggests an additional wiring change which should - in theory! - work. That is to remove the existing white wire from the tach pickup and run a new black earth wire from the coil CB terminal round the tach pickup (in the same direction as the original white wire) and then to the tach earth.

Updated April 2012: In response to yet another complaint of an RVI tach not working with electronic ignition I dug out an old tachometer adapter that came with my Sparkrite ignition kit in the late 60s to see what it involved. It's no less than four transistors that basically provide a clean signal to drive the tach, probably together with powering the module from an alternative ignition supply. I no longer have the connection information for it but I suspect the adapter gets its input from

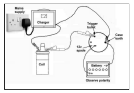
the coil CB/Points terminal, has a second terminal going to earth, and the output terminal connects to the ignition feed via the tach. And whilst searching for information on connecting it I found these Sparkrite SX2000 instruction sheets. Steps 9 & 10 of the first one set and page 5 e) of the second basically say if you have problems with an RVI tach, the Sparkrite unit has two wires that would normally connect to the coil SW or +ve and you move the red one to an alternative ignition supply, i.e. basically the same thing, so worth trying first. 123 distributor, and the Pertronix, Aldon Ignitor and Powerspark under-cap modules are 3-wire systems that use a connection to each of the two coil spades and an earth from it's physical installation to the block or distributor, suggested wiring of these with the RVI tach is shown here.

July 2014: I suggested moving the red wire to new owner Bob Warwood, who had installed an Accuspark electronic ignition system, where the tach was reading about 800rpm high after installation ... but not if the lights were on! It seemed to me that he probably had a tach earthing problem, and with the lights on the voltage to the tach electronics was being reduced, and that overcame the problem caused by the electronic ignition. Bob reported that moving the red wire to the fusebox fixed the over-reading problem.

Testing: *October 2013* I've always noticed my tachs give a little pulse of the needle if I turn the ignition on and off without starting the engine. I'd imagined this was from the trigger pulse as a 4-cylinder engine usually stops in one of two positions with the points closed, but a recent topic on the Yahoo MG-MGB list about this jump got me thinking. So I disconnected the coil and tried again, and still got the jump, therefore it's the power being disconnected from the tach electronics that causes the jump. If your tach suddenly stops working in the car turning the ignition on and off and looking for the jump as you turn it off would be the first test, which would indicate that the electronics were working - partially at least, and that the movement is working. It would also prove that the tach had the 12v and earth supply to the electronics. However both my tachs are the later voltage pulse triggered type with an RVC reference number on the dial, not the early current pulse type. A sample of one RVI tach is a little less clear. The first and second times the ignition was turned on and off the tach needle did jump, but on the third it did not. Neither did it jump when the white wire was disconnected from the coil and the ignition turned on and off again. On a subsequent test with the white wire disconnected the tach didn't jump, but when it was reconnected it did jump. As I say it's not clear yet, but the possibility is that the tach only jumps when the trigger circuit is complete i.e. the white is connected to the coil, so would be no help in diagnosing a non-functioning RVI tach.



You can go further with a bench-test and a conventional battery charger (i.e. not one of the more modern conditioning chargers that are designed to be left connected to the battery long-term, I don't know what results these would give). For the earlier RVI-type tachometer connect the output of the charger to a coil or similar load, with one of the wires going through the tach pick-up in the appropriate direction to give the correct current pulse. Connect a 12v supply from a battery to the tach electronics via the usual insulated spade and case, observing the polarity of both the battery and your tachometer. With the charger switched on a 4-cylinder tach on 50 Hz in the UK (60Hz in the USA it seems, so in the remainder of this section figures in brackets refer to 60Hz mains supplies) should read 3000 (3600) rpm. I've not been able to confirm this as I don't have an early tach, but there are plenty of web sources indicating that this is the case. A 50 (60) Hz mains supply has 50 (60) positive pulses per second and the same number of negative pulses per second. If only the positive pulses are used (half-wave rectification), 50 (60) pulses per second, times 60 seconds, gives 3000 (3600) positive pulses per minute. A 4-stroke engine has two firing strokes per revolution so ordinarily you would have to divide that by two to get the expected reading on the tach, i.e. 1500 (1800) rpm. But most battery chargers should convert both positive and negative half-cycles of the AC supply to positive output pulses (full-wave rectification), which will give 100 (120) positive pulses per second, hence 100 (120) pulses times 60 seconds gives you 3000 (3600) rpm. If you have a charger with low and high settings, you might find that the low setting only has half-wave rectification, hence only 50 (60) positive pulses per second, and in this case you would see 1500 (1800) rpm on the tach.



The later RVC-type tachometer can be tested in a similar way, but in this case the charger negative needs to be connected to the car body (in-car test) or the tachometer case (bench-test). Remove the wires from the coil +ve and connect the charger to the coil +ve. Disconnect the black/white from the distributor (25D4) or open the points. Turn on the ignition (in-car test) or connect 12v to the tachometer (bench-test) from a battery with +ve going to the insulated spade on the tach body and -ve to the tach case. With the charger switched on you should see the same tach reading as above i.e. 3000 (3600) rpm with a full-wave rectifier in the charger, or 1500 (1800) rpm with a half-wave rectifier. Note that unless the points are disconnected or opened the tach will not register. This test can be performed on rubber bumper cars with ballasted ignition and 6v coils as well as chrome bumper with unballasted ignition and 12v coils.

This test also gives you a very accurate way of checking the calibration of a tach. V6 engines have three firing strokes per revolution, so the V6 tachs readings would be 2000 (2400) rpm on full wave and 1000 (1200) rpm on half-wave. A V8 has four firing strokes per revolution, so those tachs would read 1500 (1800) rpm on full-wave, and 750 (900) on half-wave.

Fuel Gauge:

Calibration
Gauge identification
Internal and external seals

Originally Jaeger gauge BHA4214E was used with a screwed tank sender, changing to Smiths BHA4470 in October 64 between chassis numbers 47112 and 48767 also with a screwed sender but electrically very different. In March 65 at chassis number 56742 the tank changed and the sender with it to one secured with a locking ring. This is the same electrically as the later screwed sender and Smiths gauges and continued to the end of production. Both these gauges have external night-time illumination with holes round the edge of the case to let the light in, and a fully exposed pointer. Mk2 cars changed to one with a partially shrouded pointer and internal illumination (BHA4736 or BHA4685 according to market with leaded fuel, BHA 5342 for the USA with unleaded fuel). All these have 'hanging' pointers, and use a sender with a locking ring. The final change was for the 77 model year and the plastic dash - to AAU3032 for leaded fuel and AAU3031 for USA unleaded fuel, with the indicator pointing upwards. The sender for these changed to one combined with the fuel outlet pipe, and as the North American electric temp gauge and sender both changed at the same time, and it is known mismatches between that sender and gauge cause incorrect readings, I had wondered if the same would apply to the fuel gauge and sender, but the resistances are very similar. All the gauges require an earth for night-time illumination, Jaeger and early Smiths (FG2530/70) gauges also need an earth for correct operation.

Externally illuminated types are fixed in the dash with bracket AJH5185 which includes bulb holder, the rest with AJH5187. These fit over a central threaded stud and are secured with thumb nut 17H932 with spring washer WL700061.

Early vs late systems: *July 2015:*

The 62-Oct 64 cars use a system that is similar to the MGA, after that it was completely different. Both types are 'stabilised' to ignore changes in system voltage which can vary between 12v and 15v and would otherwise cause a significant variation in readings. The Jaeger and early Smiths system uses a resistance network consisting of three fixed resistors in the gauge and the variable resistor in the tank. Two of the fixed resistors are electro magnets acting on a magnetic pointer, similar to a 'moving iron' meter. As the fuel level varies the current through each coil changes and hence its magnetism - one going up and the other down - to pull the needle one way or the other. A non-magnetic counter-weight on the needle pulls it to the E position when the ignition is switched off. The gauge is technically quite complex and expensive and requires the gauge to be earthed both in order to indicate the fuel level and for the night-time illumination, a missing earth will probably vary the reading as the parking lights or panel lights are turned on and off. The later Smiths system uses an external (to the gauge) voltage stabiliser and a much simpler and cheaper gauge that uses the heating effect of the current to bend a bi-metallic strip which moves the pointer. An earth is only required for night-time illumination.

Another difference between the two systems is that the early is 'fast-acting', i.e. it indicates the fuel level immediately you switch on the ignition. The later system is 'slow-acting' or damped and needs several seconds to indicate the true fuel level. The later system does have the benefit of not swinging about as the fuel sloshes around in the tank although that is usually reduced by the tank being baffled. However a drawback of the later system is that on a long bend such as on a motorway the fuel level will vary considerably between a left and a right, and take time to settle again once you have straightened up.

A further difference between Jaeger and Smiths systems is that whilst on both the tank sender is a variable resistance that changes as the fuel level goes up and down, on the early system the resistance is high (about 70 ohms) when the tank is full, and low (close to zero) when the tank is empty. On the later system the resistance is lowest when the tank is full increasing as the tank empties, varying between 20 and 240 ohms according to information from the gauge manufacturer Caerbont.

A third difference is that on the early gauge the wires must be connected to the correct terminals, but on the later gauge can be connected either way round. The early gauge has one terminal marked 'B' - for Battery, the green wire goes on this. This terminal is on the upper right part of the back of the gauge, and usually has two spades, so you can use it as a pick-up point for a fused ignition supply for something else. The other terminal is marked 'T' - for Tank, the green/black wire goes here, and is in the upper left area of the back of the gauge.

A quick test of the early system is to disconnect the green/black sender wire from the back of the gauge, and the gauge should register above F. Earthing the sender terminal should cause the gauge to read Empty or just below. Connecting a 70 ohm resistor to the T terminal (tank wire disconnected) should cause it to read close to Full, and a 35 ohm resistance should cause it to read slightly below half. For further information on the early system see Barney Gaylord's web site, the remainder of this section largely relates to the later system.

From the above it should be obvious that a late sender with an early gauge will not work correctly, nor vice-versa. The correct tanks, senders and gauges are normally available with one exception, and that is for the brief period where the tank still used the screwed sender, but electrically used the later system. This sender is NLA so would normally mean you had to use an early Jaeger gauge, or change the tank to the later type with the locking ring. See here for an alternative to either of those.

Later MGB system in an MGA?: *December 2023:*

Following an article in the MGOC magazine on fuel gauges there have been a couple of follow-up letters and one in the December issue talks about putting the MGB fuel gauge system in an MGA as being cheaper than replacing faulty original components particularly the gauge. It gives a link to the MGA Guru site which has an article on this conversion originally written by Peter Ratcliffe for the Preston and District MG Enthusiasts club.

That contains a link to Classic Bits for the parts but you still have to browse all the products and pick the correct one. The MGB item uses the locking ring not the screws and even though there is an MGB screwed sender for a bi-metal gauge available elsewhere it has a different part number and may not work correctly in the MGA tank. The correct item for the MGA to be used in conjunction with the a bi-metal gauge is also listed but quotes the original part number AHH5114 which is for the magnetic system i.e. using the original gauge. It also quotes Smiths number TB1114-031W and if you Google that you will get loads of hits for BL part number AAU8340 including for the MGA Twin Cam (!) and classic Mini van and estate. Prices for those can vary from £18 to £70 so it pays to shop around. As said in the article and in the Classic Bits detail this sender will only work with the later bi-metal gauges and needs the MGB instrument voltage stabiliser as well. That makes them suitable if you have to replace your MGA Jaeger gauge, but if that is still functioning you need the original AHH5114 sender, which has a completely different physical appearance to the one for bi-metal/thermal gauges.

Looking at the gauges themselves some suppliers (MGOC and Traditional Old Motor Spares/Ron Leacy) show a Jaeger gauge 17H299 FG2530-05 for 1500cc MGAs from chassis 14090 and 1600s as well as Twin-cams which is described as 'bi-metal' whereas Moss Europe gives the same model info but doesn't say it is bi-metal, others indicate that part number is for the twin-cam only. None seem to list the voltage stabiliser for any MGA and all state gauge AHH5189 for other models which needs the earlier sender and no stabiliser. Speaking to Caerbont who manufacture the gauges they say they haven't made the magnetic gauges since the 60s so all new stock at suppliers will be thermal even though they use the same part number FG2530-05, they are going to clarify their web page to include information on the sender and stabiliser. They already show the BF2300-02 gauge for the MGB as 'bi-metal resistance'. FG2530-05 would be suitable to replace the MGB Jaeger gauge used up to October 64, but would need a different sender to that for the MGA, and a voltage stabiliser.

The stabiliser has its own complications as those available today all seem to be electronic and are polarity sensitive with different versions for +ve earth (128484) and -ve earth (BHA4602). The originals were thermal like the gauges and neither are polarity-sensitive.

Confusing!

Diagnosis of the later Smiths system:

Problems with the fuel gauge are frequently caused by the connections at the tank unit (they are exposed to a great deal of dirt and spray from the back wheel) or the tank unit itself failing. Problems can be non- or erratic operation, or being wildly inaccurate at E and/or F. You need the ignition on and a reasonable amount of petrol in the tank (i.e. 1/4 tank minimum) for the following tests. You also need to make sure the connectors and their spades on the tank unit are clean and bright and making good electrical contact. Note that CB cars have a factory earth wire going back to a number-plate mounting bolt whereas rubber bumper cars rely on the sender earthing to the tank and the tank to the body.

Non- or erratic operation:

Briefly connect an earth to the terminal with the green/black wire on the back of the gauge. Does the gauge pointer move smartly towards to 'Full' (remove the earth as soon as you see the pointer moving)?
No - check for voltage on the light-green/green wire of the gauge. Is it present?
No - check the same wire on the stabiliser. Is voltage present?
No - check the green wire on the stabiliser. Is 12v present?
No - check the green circuit back to the second fuse up in the fuse block.
Yes - looks like the stabiliser is faulty, but could be a partial short to earth in the gauge or stabiliser to gauge wire. Remove the light-green/green wire from the gauge, is the voltage on the output of the stabiliser now correct?
Yes, measure the resistance of the gauge and it should be about 61.5 ohms between the terminals, and neither terminal should show a resistance to the case. If the resistance is low or there is circuit to the case the gauge is faulty.
No, remove the light-green/green wire from the output of the stabiliser, is the voltage there now correct?
Yes, light-green/green wire shorting to earth.
No, stabiliser faulty.

			Yes, light-green/green wire from stabiliser to gauge open-circuit.
		Yes, is it steady 12v, 12v switching on and off about once per second, or steady 10v?	
			Steady 12v (incorrect) - check the earthing of the metal can of the stabiliser, if that is OK it looks like the stabiliser is faulty (giving high readings).
			12v switching on and off about once per second or steady 10v (correct) - looks like the gauge is faulty. With the ignition off and at lest one wire removed from the gauge measure the resistance between the gauge terminals, it should be about 61.5 ohms
	Yes - briefly earth the green/black wire at the tank unit. Does the gauge pointer move smartly towards 'Full' (remove the earth as soon as you see the pointer moving)?		
		No - disconnection in green/black wire back towards the gauge, check the bullet connector between the main harness and the rear harness in the mass by the RHD master cylinders.	
		Yes - with the green/black wire on the insulated terminal of the tank unit connect an earth to the base-plate of the tank unit. Does the pointer move?	
			No - looks like the tank unit has failed.
			Yes - bad connection back towards the main earthing point on the back panel of the boot (CB cars) or between sender and tank or tank and body (RB cars).

Even if you see pulsing 12v (or steady 10v) on the green/black when disconnected from the sender showing there is continuity back through the gauge and stabiliser, it could still be high-resistance from a bad connection. When connected the voltage on the green/black wire between the gauge and the sender will show a voltage that is inversely proportional to the amount of fuel in the tank. With a full tank it will show a low voltage, and as the tank empties the voltage rises. With a full tank and original factory stabiliser I have 2.7v on the green/black, but that's while the stabiliser is still outputting steady 12v i.e. for the short period after turning on the ignition, with the engine not yet started. It would be a bit higher with the engine running and the alternator charging. After that the voltage switches on and off and is more difficult to determine, so you need everything connected and have the meter fairly visible before you switch on the ignition. Once it starts switching on and off you would have to leave the ignition off for a few minutes to 'cool down' before turning on will display a steady voltage for several seconds again. The aftermarket stabiliser that outputs 10v all the time is easier - on a full tank I'd expect that to show ten twelfths of 2.7v, i.e. about 2.25v, so not that different, and all the time even with the engine running. Much lower in either case indicates bad connections, which could be bad enough to stop the gauge moving at all, but still show 12v on a voltmeter when the wire is removed from the sender. Both my gauges measure 61.5 ohms +- a tenth or so, with just under half a tank in the roadster I measured 90mA in the circuit and in the V8 with a full tank (bar a few miles) with a nominal 12v I get 140mA. Both cars have the original thermal stabilisers and the currents were measured when the stabilisers were outputting full ignition voltage for the few seconds after switch-on, i.e. before they have started switching 12v on and off about once per second. With an electronic stabiliser outputting about 10v immediately I'd expect to see about 70mA with half a tank and 120mA with a full tank.

Tank Sender: *Updated December 2015*

Schematics
Wiring
Replacement
Later MGB system in an MGA?

Early cars up to October 64 had sender BHA4292 attached to tank ARH176 with six screws, and was for the unstabilised 'magnetic' Jaeger gauge BHA4214E. Note that new stock gauges use the later bi-metal system with a different tank sender and requiring a voltage stabiliser.

A stabilised system was then introduced over a period from chassis number 47112 to 48767 in October 1964 using sender BHA4471E also secured with six screws and operated Smiths bi-metal gauge BHA4381E with the same exposed pointer and external illumination as the Jaeger gauge. However the two systems are not electrically compatible and the matching sender and gauge have to be used or pointer movement will be reversed and wildly inaccurate. Because the tank and sender changed in March 65 sender BHA4471E was only used for a few months and was NLA for decades, available again now.

At chassis number 56742 in March 65 the tank was changed (variously ARH223, NRP2 or NRP1132) and secured sender ARA966 with a locking ring which works correctly with the Smiths gauge.

On rubber bumper cars prior to August 76 the harness earth wire for the sender was deleted which previously went back to a number-plate bolt in the boot (also used for reversing lights and fuel pump) and the spade left unused. The sender then got its earth from its physical mounting to the tank and the tank mounting to the body. That only works for the original

metal-base sender, current stock are plastic so for rubber bumper cars an earth connection needs to be provided from somewhere reliable. However the Workshop Manual North American diagrams for 1972 with seat belt warning onwards no longer show this earth wire so it may have happened to those cars earlier. On the other hand the UK 74 1/2 to 76 diagram still shows it, but going by my 75 it had gone by then. Note that restoration with good paint coverage may prevent the sender from 'seeing' an earth from the body, mine has a PO earth wire from the earth spade on the sender to a body bolt.

The final change (physical only, electrically the same as before) was shortly after the start of the 77 model year in August 76 when the sender was changed to include the pick-up tube, still fitted with the locking ring.

January 2023:

Helping Geoff Taylor reinstate a fuel gauge on his car (a PO had replaced it with a voltmeter!), it would originally have had a Jaeger gauge and the early screwed sender but he didn't get the gauge with the car. Jaeger gauges are hugely expensive even when available so he had obtained a Smiths gauge, but having the early screwed-sender tank needed the NLA sender! The sender on his car had a very different external appearance to any I had seen and didn't exhibit a resistance, so was an unknown quantity and needed to be replaced. Having looked on previous occasions and found nothing this time I found a relatively recently re-manufactured item from Bastuck in Germany for 75 Euros. One inconsistency in the information on this sender is that they say 'MGB AFTER GHN3 47463 (1962-65)'. The chassis number is broadly correct in that it falls into the range given by Clausager for this change of 47112 to 48764 but those chassis numbers all fall within October 1964 and so the date information should read '1964-65'. Subsequently Geoff found this one in the UK from jmccspares which seems almost identical giving the right part number and stating it is for the Smiths gauge. It came in the same box as the Bastuck one so must have originally come from there, but that eBay ad now says 'listing ended' so maybe jmccspares only ever purchased the one.

When Geoff removed the existing sender it turned out to be of a type I had never seen before. Possibly a magnetic proximity system as part of an oscillator circuit so even more different than the Jaeger and Smiths systems are to each other, and maybe why there was a voltmeter on the dash.

As the sender and the gauge changed in 1977 at the same time as the temp gauge and sender on North American spec, and if you get those mismatched the readings are incorrect, and I had wondered whether the same applied to the fuel. This was after reading about someone who had been getting strange reading with a late tank and sender and the earlier gauge, but it turned out his sender was at fault cutting out part-way through the range (as my four failures on two cars had been). A replacement OE (i.e. metal) late sender with output pipe measured 20 to 258 ohms before fitting (Colin Tozer), and an after-market plastic without outlet pipe measured 17.5 ohms to 250 (John Holland), although since then two people have posted that their pre-77 plastic ranges between 6 and 250 ohms. Vee's measures 25 ohms with a full tank and Bee's 22 ohms - both OE metal types. Colin was concerned that his late tank with earlier gauge would read incorrectly, but given those figures this seems unlikely. Info from Caerbont the manufacturer of the gauges is that they operate from 240 ohms empty to 20 ohms full.

November 2019: Colin Parkinson has received a plastic sender from Moss and has measured it at 18 to 185 ohms, so hugely different to the others at the 'empty' end and seemingly (bearing in mind all the above measurements were taken by different people with different meters) as much variation from one sender to another as the earlier metal-base type. This could well result in showing a couple of gallons left when it runs out.

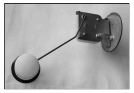
February 2020: As well as the significant variation in readings from plastic senders someone on a forum elsewhere returned a plastic sender to the MGOC saying it was way out, and the response was inevitably "not had any problems on the other 2000 we have sold.... ". Then later on they said they had had a faulty batch!

The thermal system uses voltage to drive a current through a heating element to move the pointer and the ratio of resistance change to pointer movement is very non-linear. The OE sender attempts to compensate for this by varying the shape of the former of the wire-wound resistance, and the number of turns per mm encountered, as the wiper moves across the resistance but as can be seen from non-linear gauge markings it's only a partial success. Even with all that the indication still doesn't match the contents across the range, once mine get below half it is noticeable how quickly they move across towards one quarter, which has given me a moments panic on more than one occasion.

Bizarrely plotting resistance and voltage against gauge calibration marks showed that the voltage was linear with the gauge markings, but the resistances weren't. How can that be, Mr Ohm? The resistance wire used in the gauge to heat a bi-metal strip to move the pointer has a positive temperature coefficient i.e. the hotter it gets the higher its resistance goes, and there is also the changing force needed to bend the bi-metal strip along its range of movement, and the system of levers that causes the pointer to move.

What follows relates to the later Smiths system, for the earlier Jaeger system see here.

The sender consists of a length of fine wire wrapped round a former - one end is connected to the insulated terminal on the 'base plate' of the tank unit and the other end is open circuit. As the fuel level rises and falls a float an arm moves an


earthed 'wiper' contact across the wrapped fine wire, making a variable resistance The wiper contact is connected to the body of the base plate via the float arm and its pivot in the sender structure. The wound former is tapered in shape and the distance between adjacent turns varies along it in an attempt to make the movement of the gauge indication bear some relationship with the quantity of fuel in the tank ... but it's not very good. On my two cars I get infinite MPG for the first 40 miles, 50-odd MPG for the first half of the tank, about 10mpg from half to a quarter, and something a bit closer to the actual mpg for the bottom quarter. The resistance range is from about 20 ohms for 'Full' to about 250 ohms for 'Empty', although there seems to be quite a bit of variation between tank units and changing them has caused significant variation in gauge readings, see the section on calibrating the gauge.


Up to September 76 the sender base-plate has two spade terminals - an insulated one to which the green/black wire goes and a smaller, uninsulated one which should have an earth wire on it, which usually goes to the earthing point at the number plate bolt on the boot rear panel together with things like reversing lights and fuel pump. It is possible for the fuel gauge to work without this earth wire but only via several non-electrical metal-to-metal contacts which can be unreliable. From September 76 senders with the integral outlet pipe did not have the earth tag, so does rely on the mechanical fixings of the tank.

David Jackson wrote to me with a problem he was having with a new Heritage tank ARH176 with the screwed sender for the early Smiths stabilised gauge. When fitting the original sender it seems to foul something internally and does not freely move up and down from Empty to Full. This sender float moves in a different arc to both the Jaeger and the later locking-ring senders, as shown here. He has had to fit the earlier Jaeger sender, but the unstabilised system works in reverse to the stabilised system i.e. Empty is low resistance and Full is high resistance, whereas for the stabilised system Empty is high resistance and Full is low resistance. The upshot is that his gauge was working in reverse. However he found this Spiyda module that as well as allowing calibration of E and F, also reverses the operation to correct the indication on the gauge.

For details of tanks, senders and gauges see here.

Sender wiring: *December 2020*


CB cars have the 2-wire tail for the sender splitting away from the rear harness in the boot by the off-side light cluster, going out through a hole by the bumper iron, then travelling forwards clipped to the edge of the tank to the sender. It might seem a bit odd to run the sender wires right to the back then forward to the sender, but as the earth wire has to come back to the rear panel it's as broad as it is long. Note that the Leyland diagram for North American 1972 models with seat-belt warning show the sender earthing to the tank and not via an earth wire.


RB cars have the tail leaving the rear harness by the fuel pump and going above the axle back towards the sender. Prior to 1977 and the change in sender the RHD wiring diagrams show this as being two wires as before - the gauge wire and an earth. However on my 1975 V8 and an American pal's 76 there is only one sleeved wire coming from the harness, which the Parts Catalogue seems to confirm as the rear harness did change part number on all models for rubber bumpers, and without the earth wire it makes sense for the tail to split off sooner rather than go all the way to the back then have to come forwards again. The difference between us is that whereas his earth spade on the sender is unused mine has a local earth wire on it - so almost certainly a PO bodge, perhaps if a replacement tank was too well painted and undersealed and failed to pick up an earth. In which case perhaps that earth is failing and causing the erratic readings after refuelling that I have noticed recently.

1977 and later have a combined pickup pipe and sender with just one connection for the gauge wire, no provision for an earth wire i.e. the earth is picked up by the sender body from the tank and the car body through mechanical fixings. This means that when fitting a plastic-bodied sender an earth wire has to be provided or the fuel gauge will not work.

Replacing the sender:


The sender can be replaced with up to about a 1/4 tank of petrol in the tank if you raise the right-hand rear corner of the car. Early cars had the sender screwed into the tank with a thin cork gasket, from about 1964 it is held in place with a locking ring that locates under three lugs on the tank and uses a thicker rubber gasket. The locking ring consists of three tapered sections that locate under the lugs and as the locking ring is rotated in a clockwise direction the tapers cause the tank unit to be pressed in towards the tank making a seal. To remove the tank unit rotate the locking ring in an anti-clockwise direction, having come across a picture of the factory tool after many years I made my own. But by alternately tapping on the thin end of a couple of the tapered sections of the locking ring with a hammer and drift you can achieve the same effect. The use of steel tools is usually quite safe unless the area is wet with petrol.

Check the new tank unit by connecting it up to the green/black and earth wires and checking the movement of the gauge pointer as you move the float up and down on the tank unit. And before **paying** for it make sure it makes a smooth and quiet transition from Full to Empty and back again. If the movement is at all 'scratchy' reject it as a sharp edge on the wiper is probably catching on the turns of the resistance wire and will break them in a relatively short time.

Install the new tank unit by putting a new rubber sealing ring against the tank, then the sender unit on top of the seal, and finally the locking ring on top of the sender unit, rotating it in a clockwise direction to tighten it.

A new tank or tank unit will often throw the gauge 'accuracy' out, check the 'empty' indication and readjust as soon as possible (personal experience!)

January 2015:


It seems that the original senders with the metal base and installed using the locking ring (ARA966, 11H5062) are no longer available and suppliers only have the later 'ceramic resistor' type which have a plastic base (AHU1027 for up to August 76, ADU3218 after that with the integral pick-up pipe) in the UK at last as Moss.com show both types. The plastic type come with three terminals, the additional one being for a 'low fuel level' warning which the MGB does not have. If the wiring is not connected to the correct terminals the gauge will not work properly, so test the sender through it's full range and check the gauge responds accordingly before installing it. Note that whereas the original pre-77 senders have an under-sized spade for the earth wire, these replacements seem to have standard-sized spades for all three, so the wiring connector will need to be replaced or an adapter made up. However 77 and later cars do not have an earth wire to the sender i.e. there is only one wire from the harness, so you will need to provide an earth wire as the sender won't be able to pick up an earth from the tank. Senders from Moss at least are shown as being provided with this earth wire, other vendors may not include it.

Herb Adler's experiences with tank senders.

Voltage Stabiliser: *Updated July 2013*

Schematics
Where is it?
Is my stabiliser working?

The purpose of the instrument voltage stabiliser is to supply a 'constant' (but see here) voltage to the instruments so that the only variation in readings comes from the senders, and not from changes in supply voltage, which can vary between 12v and 15v.

Note that MGBs up to October 64 with 18G and GA 3-bearing engines and Jaeger instruments did not have a stabiliser as the fuel gauge used a different method of compensation for supply voltage variations, see Barney Gaylord's MGA site.

Also note that the tachometer is fed with the standard system voltage not the stabilised voltage, schematics that show the tach feed coming off the stabiliser are simply using the stabiliser as a tee-ing point for the fused ignition supply. The diagrams do show that the North American electric oil gauge used from the start of Mk2 production was fed from the stabiliser, but only for the first year after which it was also fed with full system voltage. This is almost certainly an error in the drawing as the gauge and sender did not change after one year, and the electric sender is of a type used on other makes and models which has its own method of stabilisation as well as indicating pressure. In any event the electric gauge reverted to mechanical with a capillary tube for the 1971 model year on.

Further note that when buying a stabiliser today they will almost certainly be electronic and not the original thermal unit, and as such are polarity sensitive. The thermal units are not polarity sensitive and were use on both positive earth and negative earth cars, more info here.

'Stabiliser', when applied to the original component, seems an inappropriate term. With the original stabiliser when first turning on the ignition you will see system voltage i.e. nominally 12v on both the 'B' and 'I' terminals for several seconds, then the 'I' terminal will start switching between system voltage and 0v once or twice per second - the relative lengths of the 'on' and 'off' periods changing as the system voltage changes. As the system voltage rises the 'on' period gets shorter, and as the system voltage falls it gets longer, the length of the 'off' period is relatively constant. The effect is that over time the average voltage to the gauges is kept at about 10v and they give a stable reading determined solely by the sender resistance, and not by changing system voltage. Since the gauges are thermal instruments (the current flowing through a coil heats up a bi-metallic strip which bends and moves a pointer) they are slow to move large distances and so the relatively short on and off periods don't allow the pointer to move very much at all. But if you watch a gauge carefully, when it is showing about 1/2 a tank or normal engine temperature, with the ignition on but the engine off, you can sometimes see the very small movements up and down as the stabiliser switches on and off.

The stabiliser consists of a bi-metallic strip with its fixed end connected to the I(instruments) terminal i.e. to the gauge(s), and its moving end breaks and makes contact with the B(attery) terminal i.e. the 12v supply. A heating element is wound round the bi-metal strip and connected between it and earth i.e. the case. With the bi-metal strip cold the contact is closed, so system voltage is passed to the gauges **and** flows through the heating element to earth. The heating element causes the bi-metal strip to bend, which opens the contact, which disconnects system voltage from the gauges. It also disconnects system voltage from the heating element, so the bi-metal strip cools, closes the contact again, which reconnects system voltage to the gauge(s) and the heating element, and the cycle is repeated all the time the ignition is on. With high system voltages the heating current is higher, which causes the bi-metal strip to bend faster, and open the contact sooner. However it cools at a relatively constant rate, so the contact takes about the same time to close again regardless of system voltage, which is how high system voltages result in shorter 'on' times than low system voltages. A kind of pulse-width modulation, if you want to get technical.

You may wonder about the effects of ambient temperature changes on the bimetal strip in the stabiliser, and indeed the gauges, as they could be fitted to cars operating in temperatures from well below freezing to above 45C/115F. Some have said the ambient changes are much less than the changes due to the heating coil, but even if they were only 10% of the

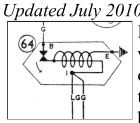
change, a range of 55C/100F in ambient would need the heating coil to be operating at ten times that i.e. 550C/1000F which is ridiculous. Instead the stabiliser and gauges are designed to ignore ambient temperature changes, as described here.

The stabiliser has two terminals - B(attery) and I(Instruments), and its 'can' needs to be properly earthed (usually screwed to the firewall behind the dash on the RHS of RHD cars for example) for it to work correctly. Because the original factory stabiliser has moving parts inside it also needs to be mounted the right way up, as indicated by the 'TOP' and arrow markings on various versions. The green wire goes to the B terminal and the light-green/green to the I terminal. The stabiliser changed from Mk1 to Mk2 cars, it looks like Mk1 cars had a stabiliser (12H 7819) with two male spades on each terminal, so it is possible to get the wiring the wrong way round. Mk2 stabilisers (BHA 4602) have male spades on the 'B' terminal and female on the 'I', so it should not be possible to connect the wiring incorrectly. Because each terminal has two spades the unused male spade on the 'B' terminal can be used as a source for a fused ignition supply to an accessory if required. Don't use the 'I' terminal. On original Mk2 stabilisers there is also a threaded adjuster stud for calibration, but remember that with two or more electric gauges altering this will affect all the gauges. If only one gauge is reading incorrectly, because of a replaced fuel tank sender for example, you should recalibrate the gauge, not alter the voltage stabiliser. The position of the stabiliser moved from low down on the firewall behind the dash in front of the (RHD) driver on earlier cars (e.g. Mk1), to hidden away right at the top above the wiper motor, and much more difficult to get at on my 73 roadster. It moved back down again on my 75 V8, and now the indicator and hazard flashers were hidden away. Later on both flasher units may have moved to that position and the stabiliser hidden away again!

January 2020:

As far as the 'TOP' marking goes, I was surprised at just how much difference the orientation of the original stabiliser makes to the fuel gauge reading (should make no difference with the electronic replacement).

Updated July 2010:



Incidentally the drawing in the Leyland Workshop Manual is misleading, as shown it couldn't possibly work! The contacts by the B terminal should be shown closed, as this is how they are when first turning on the ignition, to pass current through the winding to heat the bi-metal strip and pass voltage through to the gauges, as shown in this amended drawing. It is only when this has heated up and the moving contact bends away from the fixed contact that voltage is disconnected from the heating coil and the gauges.

Some (Many? All?) suppliers only have electronic stabilisers available, and these are often polarity sensitive e.g. Moss 128484 for positive earth cars, and BHA4602 for negative earth, so you have to get the correct type. However Moss state the earlier one is for 62 to 67, which is incorrect, MGBs didn't get the stabilised system until 1964. Ironically if you installed an electronic stabiliser to the early cars it probably wouldn't make any difference, but if you connected an original the fuel gauge would go up and down about once per second! Incidentally Moss are naughty as they have retained the original part numbers even though it is not an original component. These stabilisers don't have the adjuster stud. Brown and Gammons (Mk1, Mk2 on showing the correct spades in each case) have also used the original part numbers and also implies the early ones were used from the beginning. Their Mk2 stabiliser at least has the 'TOP' markings, which implies it is the original thermal device. But from what I can see they don't have the adjuster studs, so almost certainly electronic as well (and equally naughty). Googling I can't find any pictures that show the adjuster stud, so maybe they are all electronic these days (you can certainly see the printed circuit tracks in many images). Many of those are labelled 'NEG' or 'POS' indicating they are polarity sensitive, so you must get the correct polarity, as well as one with the correct spades for your wiring. The Moss and B&G items don't show polarity, but the early one will be positive earth and the later negative, so unless they are polarity independent the early one wouldn't work on an early car that had been converted to negative earth.

Some people are tempted to replace the original stabiliser with an electronic one, thinking it must be better. In fact they are not so good, as they output 10v as soon as the ignition is switched on, whereas the factory stabiliser outputs full battery voltage for several seconds, resulting in a faster gauge rise time.

There are also claims that the thermal stabiliser output varies 'a lot' with changing ambient temperature but that's not correct. The gauge also being bi-metal/thermal would also be affected by ambient temperature, and whilst the bi-metal stabiliser would cancel it out when fitting an electronic stabiliser that would no longer be the case and the gauge on its own would vary 'a lot'. But it's more sophisticated than that. Both stabiliser and gauge have a U-shaped bi-metal strip with only one leg of the U being wound with heating wire. With the U being mounted at the end of one leg and the end of the other leg performing the switching (stabiliser) and pointer movement (gauge) it follows that both legs will bend by the same amount at varying temperatures so neither the switching not the pointer movement are affected. It's only when the heating winding adds additional heat to it's leg of the U that one leg will bend more than the other.

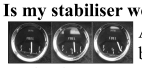
Herb Adler describes how he made his own electronic version.

Where is it?

On my 73 it is high up on the firewall, behind where the wiper rack comes out of the motor and as such rather inaccessible. On later models (such as my 75 V8) it is on a tab on the lower edge of the bulkhead below the wiper motor and much easier to get at. However it seems that on 77 and later it moved back up to the earlier position even though the tab is still there and unused. A pal's 78 has it on that tab but it

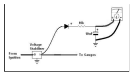
looks like a replacement unit secured with a nut and screw so probably replaced and fitted there for convenience! LHD cars have it on the other side of the car by the instruments.

Is my stabiliser working?



A quick way to check is to see what your fuel gauge registers about 30 secs after turning on the ignition but not starting the engine, and comparing that with what it registers when the engine is running - you do need to have some space in the tank i.e. the gauge not registering Full. There **should** be no difference, but if your stabiliser is not regulating the voltage it will read significantly higher when the engine is running ... always assuming your charging system is working correctly of course!

You can use a voltmeter for a simple go/no go test of the stabiliser i.e. is it putting out a constant 12v? Or no voltage? Both of which indicate faults. But if your OEM stabiliser is pulsing (as it should) but outputting a higher or lower average than it should and hence causing the gauges to read higher or lower than they should, things are a bit more tricky.

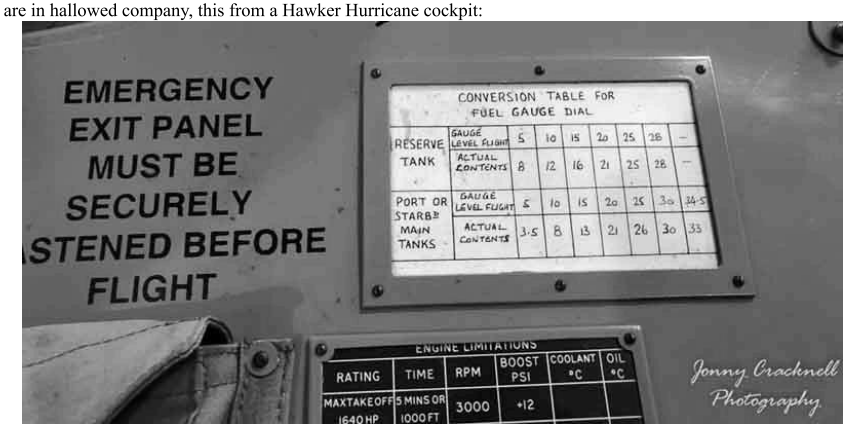


If the 'ons' and 'offs' are short enough (they can vary quite a bit between stabilisers) you can gauge an analogue meter by eye, but a digital meter will probably be flicking about all over the place. But you can make a test-rig, as shown here. With this you will get a slow rise in voltage on the meter, towards battery voltage, until the stabiliser starts pulsing, then it should stabilise (oddly enough ...) at about 10v.

Note: *January 2023* The above relates to the original thermal stabiliser, electronic ones should put out a steady 10v on the 'I' terminal as soon as you turn on the ignition and do so whether the gauge and sender are connected to the circuit or not. When they **are** connected it may drop by a couple of tenths or so.

Calibrating the gauge:

We are in hallowed company, this from a Hawker Hurricane cockpit:



Whilst it is possible to bend the upper and lower stops on the sender to get a bit more travel (but run the risk of running off the end of the winding at either or both ends), or bend the float arm (which only moves the available travel up or down the range of the gauge to leave an even bigger 'dead area' at one end or the other), the real problem is when the resistance doesn't go low enough at F or high enough at E to get full travel of the gauge needle, so the only real solution is to alter the gauge to compensate for this. Getting at the gauge is also a lot easier (except for 77 and later) than getting at the sender, can be done at any time i.e. with a full tank, and you won't get leaks afterwards! The back of the gauge should have two holes, one by each terminal post (they may be covered by cork plugs), each containing a slotted plate. These slotted plates slide more than twist - they are not like screw adjusters as the slots may imply. Sliding them towards their adjacent terminal post moves the pointer towards the ends of the scale, away from it moves the pointer towards the middle of the scale. Sliding the plate by the terminal at the 'F' end of the gauge will adjust the 'Full' reading, the other adjusts the 'Empty' reading. However it is important to do 'Empty' last as is the more important one to have accurate, and changing one adjuster does have a noticeable effect at the other end of the scale as well. 'Full' is easy, but for the 'Empty' adjustment I ran the tank right out whilst carrying a spare gallon. I put the spare gallon in the tank and only **then** adjusted to E, to give me a gallon 'reserve'. Make sure you use an implement that is a good fit in the slotted plates, they can be stiff, the plate is only thin, and a poorly fitting screwdriver is likely to 'round out' the slot if you try to move it with a twist movement rather than a slide. This doesn't matter a great deal, but the bigger you make the hole the less you will be able to slide it from side to side before hitting the sides of the access hole in the case. There has been a suggestion that slackening the terminal post screws make the adjustment easier, you will see from the photos that this is not the case, the slotted plate is retained by rivets, the terminal posts are mounted elsewhere on the insulated back-plate.

1977 and later: *February 2020*

For some reason the factory put the temp gauge where the fuel gauge had always been and the fuel gauge in the centre of the binnacle above the steering column. One could possibly understand it if there was still a dual gauge, but not when they are both electric. Or to put the temp gauge out of direct line of vision as drivers of RB cars tended to be paranoid. Any road up, short of dropping the steering column which isn't a trivial exercise and could upset the UJ alignment, the next best thing may be to remove the tach and go in through that hole to release the fuel gauge.

Update May 2007: Gary Alpern contacted me to say while he was calibrating his gauge he noticed that the pointer moved another 1/8" or so when he tapped the glass, and wondered whether anything could be done to eliminate this. I doubt it, and I think it is a 'feature' of the design - the bimetal and spring strips are connected together by nothing more than what is basically a 'hook and eye' hinge. I think the normal vibration of driving the car will continually 'tap' the gauge, however during calibration you may want to tap it after each tweak of the slotted plates. 'Tapping the gauge' is a long-standing and honourable part of living with machinery of this technology, as anyone who has seen 1940's, 50's and 60's films will know :o)

Update September 2007: I debunked my long-held theory that the thermal stabiliser was needed with the thermal gauge to eliminate fluctuations caused by ambient temperature variation, click here to see why. However the thermal stabiliser **does** result in a faster initial movement of the gauge from rest than would be the case with an electronic stabiliser, as full system voltage is available to the gauge for the first few seconds after switching on the ignition with the thermal stabiliser, whereas with the electronic it is limited to 10v from the beginning.

Gauge identification:

Updated December 2008 For fuel gauge and sender identification click on this thumbnail.

Dual gauge:

Oil section
Temp section
Fixings

Information on internal and external gauge seals can be found here.

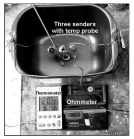
Electric Temperature Gauge: *Added November 2008*

Schematic 

The electric temperature gauge is similar to the fuel gauge, but using a sender on the cylinder head instead of the tank of course. Diagnosis and calibration is the same, substituting green/blue for the wire from the gauge to the sender. There is no earth/ground wire for the temp sender as it is screwed directly into the head.

Fixings

The early 180 degree gauges (both numeric and 'C-N-H') were capillary and dualled with the oil pressure, the later 'narrow angle' gauges were independent, electrically operated, and all 'C-N-H'. These gauges use a 'thermistor' (negative temperature coefficient resistor) sender in the cylinder head in which the resistance reduces as the temperature increases, so driving more current through the gauge to give a higher reading.



There are quite a few senders with different thread sizes and electrical characteristics, denoted by differently coloured insulators containing the spade connection. I have measured three senders that fit the heads (5/8" 18 thread) used on engines for the MGB and MGC as follows:

°C	°F	Resistance			'C-N-H' indication
		Red	White	Black	
0	32	1605	1848	2283	
10	50	997	1055	1420	
20	68	640	650	928	
30	86	440	410	594	'C' (Cold)
40	104	303	264	392	
50	113	208	174	263	
60	140	150	122	184	
70	158	108	82.5	129	

80	176	87.0	68.0	100	
85	185	70.0	54.0	82.0	'N' (Normal), about the temperature of a typical thermostat
90	194	58.0	43.8	69.0	
100+	212+	47.0	35.1	58.3	'H' (Hot)

Note that there were at least three gauges and three senders (part numbers, may be just two colours red and black) used. The red and white senders give fairly similar readings over most of the range (white starting off higher at low temps, but changing over at about 20C to be lower and hence give higher readings), but black gives lower gauge readings for a given temperature than the other two. For example at 82C (one of the standard stat temps) a red sender may put the gauge in the middle of the 'N', but the black sender would be just below N. Conversely a red sender would show Hot at 90 degrees, whereas for a black sender it would have to be 100 degrees, and that ten degree difference is pretty constant through the range. Also note that like the fuel gauge it is possible to adjust the gauge to some extent.

Also note that there are other colours, green possibly being for early Minis which did not have an instrument voltage stabiliser, and the temp sender like the fuel gauge sender operated in reverse and so would have a positive temperature coefficient i.e. increasing resistance with temperature.

From the Leyland Parts Catalogue and Clausager the senders and gauges changed as follows (only North American spec cars got the first three variants, all models had the final variant):

Chassis numbers	Gauge	Sender	Notes
138410-258000	BHA 4686	BMK 1644 GTR104	Red insulator Start of MkII to 71 model year 18GF 101 to 18GK
258001-368081	BHA 5090	BMK 1644 GTR104	Red insulator Remainder of chrome bumper 18V584/585 to 18V 801/802
368082-410000	BHA 5090	88G 580	Red insulator? A couple of suppliers say it is black for all rubber bumpers, but the gauge didn't change between 1972 and 1976. However one source says the factory put a lower resistance sender in RB models to prevent owners panicking about the gauge reading! 75 and 76 model years 18v 836/837 to 18V 801/802
410001 on	AAU 3030 (BT 2231/01)	13H 5602 or 13H 9715 or GTR101	Black insulator 77 model year on 18V 847 (UK) and 883/884 (North America) on

Note: The 'BT 2231/01' number for the last gauge is almost certainly the Smiths identification number and is given in the Leyland Parts Catalogue. Unfortunately there is no equivalent number given for the previous two gauges. This number can be found on the earlier 'needle down' gauges as shown in this example of a fuel gauge (on the rear part of the face, tucked up behind the front part of the face, circled) and more easily on the later 'needle up' gauges behind the lower part of the dial. Note the pairs of dots by the C, H and in the middle of the last gauge, these are on all the electric gauges and are used for factory calibration.

As you can see the only correlation between a sender change and a gauge change is for the 77 model year onwards, which is when UK and other non-North American spec cars got the electric gauge. One source gives the date of change as 71/72 i.e. when the gauge **did** change and the other (Roadster Factory) gives it as 74 i.e. the same as the Leyland Parts Catalogue when the gauge **didn't** change. Apart from the Leyland Parts Catalogue the online catalogues of Roadster factory, Moss and Victoria British only indicate two different types of sender - Roadster Factory changing at 74 as previously indicated, the other two changing for the 77 year. *September 2015:* Further research revealed multiple online parts sources showing pictures of BMK 1644 with the red insulator for 68 to 74 or 75, and 13H 6602 with the black insulator for 1975 on. This gives possible change dates of variously 71/72, 74, 75, and 77. However if there is the potential for a mis-match between gauge and sender, September 76 for the 77 model year (as indicated by the Parts Catalogue) is the most likely date for the change, as the fascias and the gauges changed on all cars at that point.

There has been another suggestion that perhaps the sender changed at the same time as the thermostat, to keep the needle centred on the gauge, but that doesn't tie in either as the thermostats changed shortly after September 64 then back again in March 69, which doesn't tie in with **any** of the gauge or sender changes from any source. Neither does it make logical sense when higher and lower stats were available for colder and hotter countries respectively, the gauge is only a general indication, and anywhere from just below the C to just below the H is part of the 'Normal' range depending on ambient temperature and usage.

Yet another possibility that has occurred to me is that the gauges have basically the same electrical/movement characteristics but the black sender was fitted as that has higher resistance across the range compared to the red, so would give lower gauge readings helping to avoid owner paranoia!

Electric Oil Gauge: *Added November 2008*

Schematic
Fixings

The electric oil gauge is similar to the fuel gauge, but the connections shown in the Workshop Manual are a little confused. For the first year of Mk2 production for North America the schematics show it was wired the same as the fuel and temp gauges i.e. from the stabiliser, to the gauge, to the sender. After that full system voltage was applied to the gauge as it was the oil sender itself that contained the stabiliser. As there seems to only have been one sender for the electric oil gauge for both wiring arrangements I'm assuming that the wiring for 67 was in error. The gauge reverted to mechanical with a capillary pipe for the 1972 model year for the remainder of production.

October 2020:

With the oil sender instead of a continuously varying resistance with changing oil pressure as is the case for changing fuel level and temperature for the other two gauges, the earth/ground signal from the oil sender switches on and off much like the voltage from the voltage stabiliser for the other two gauges. However the duty cycle i.e. the time it is on compared to the time it is off, varies with **pressure** as well as with system voltage. As it has no connection with the system voltage other than through the gauge it must sense this somehow and vary it accordingly, unfortunately I haven't had one to investigate internally, although my 1989 Toyota Celica had the same system (same physical appearance of the sender) so I was able to determine what the output from that looked like, at least. The sender is attached to a bracket mounting it to the now-unused rear mounting point for the dynamo.

Radiator grille (not 'grill' ...)

CB RB

CB:

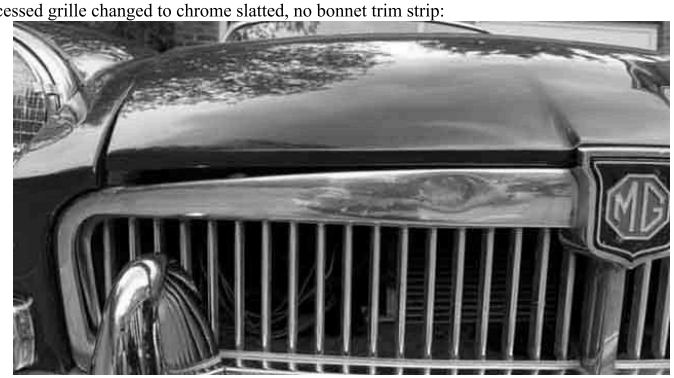
Originally chrome-plated surround with 36 individual stainless steel vertical slats, the slats changing in late 64 to one-piece pressed in anodised aluminium with 39 vertical bars (the two outer ones invisible behind the surround). A central vertical bar carried the MG octagon in red and silver against a black shield.

In 1970 the whole grille changed to a recessed or 'fish-mouth' grille with 37 vertical bars all in black, the MG octagon in the centre in silver and red. A thin stainless steel moulding was attached grille itself, and another to the opening down the sides of the wings and underneath, and across the leading edge of the bonnet. Not liked, it only lasted until 1973, many have been changed to the earlier slatted grille sometimes leaving the strip on the bonnet (the other parts of the surround could be removed with no remedial work needed). However there has been something of a renaissance of this type due to their rarity.

In 1964 for the remainder of chrome-bumper production there was a return to a version of the original grille but with two honeycomb panels replacing the slats. Originally these panels were 'handed' as the diagonals in one direction were raised, angled one way on the left-hand panel and the other way on the right-hand. Repos have both panels the same when it was realised either panel would fit either side! A number of these have been replaced with slatted grilles as well.

Alignment to the bonnet:

Pete Curtis - recessed grille changed to chrome slatted, no bonnet trim strip:



Two more with the same mod and the same poor alignment, this one with the trim strip: *(This and the remaining photos from MG Experience)*

This without:

The owner of this car (alloy bonnet) then went to a lot of trouble to cut slots in the leading edge:

To increase the curvature and rivet a reinforcing strip behind the flange to correct the problem:

Alignment to wing: *March 2021*

When preparing Bee for her repaint in 1991 I noticed that the grille was only slightly recessed from the wing on the nearside whereas it was significantly recessed on the offside but only at the bottom. The grille seemed to be aligned with the apron and bonnet, so it must be the wing. I can't push the whole wing back as that would compromise the door shut lines, but maybe I could push the lower part of the wing beside the grille back. I removed the bolt from the inner wing to the wing, and could push it back quite easily, but that put the holes way out of line. So I cut the hole for inner wing to outer wing bolt into a slot (lower arrow) on the offside, so the lower part of the outer wing can be pushed back to align with the grille like the nearside. The leading edge of the inner wing has been dressed back to lie against the outer wing (upper arrow). Compare with the nearside:

The offside wing is a still a bit forwards of the bonnet and the grille, but at least the grille is recessed by the same amount top to bottom both sides. Before this the lower part of the grille on the offside was recessed by a good inch:

August 2022: Complaints on the MGOC forum of replacement grilles being too wide for the gap between the wings. The problem seems to be the 'U'-channel that forms the grill surround has not been fully formed and the outer flange sticks out sideways fouling the wings, instead of pointing straight back. The flange sticks out at an angle instead of pointing straight back. Ventilation pipe crimps were used here to force the flange to 'lie down' at the corners: (*John Keane*)

Bee's has the 'U' fully-formed with the flange at right-angles to the front face and parallel with the sides of the aperture giving a clearance to the wing, even at the top corners. This also shows the honeycomb with the raised diagonals going from upper left to lower right:

Incidentally Bee's was as shiny as John's 30 years ago.

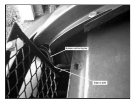
RB:

Rubber bumper cars have a simple black mesh panel behind the opening in the bumper merely as a stone-guard. These can be fiddly to remove and you have to manoeuvre them just so, as well as have sufficient clearance between the back of the rubber bumper and the front of the wings. Although the wing drain channels stop about 1" short of the very front of the wing the grille is about 1/2" too wide to be lifted up immediately in front of the end of the drain channels, which would make things that bit easier without reducing the effectiveness of the grille. But as it is the grill has to be angled even further forwards and lifted up through the gap between the back of the rubber bumper and the very front face of the wings. Click on the thumbnails for a larger image.

First remove the two large screws from the bottom brackets and the three small screws going through the slam-panel to the plastic sockets in the top brackets then slide the whole grille forwards, keeping it vertical, just enough for the top brackets to clear the front edge of the slam-panel.

Next tilt the grille by pushing its bottom edge back as far as it will go, this should allow you to tilt it even more by bringing the top edge further forward to clear the end of the wing drain channels and the very front edge of the wings themselves.

Now you should be able to lift the whole grille up, keeping it square and tilted, with the outer edges of the grill passing through the small gap between the back of the bumper and the front face of the wing. If your gap between bumper and wing is too small to allow this, slacken the nuts securing the bumper to the chassis legs which should allow it to angle forwards increasing the gap.



This image shows the vertical edges of the grille and the reinforcing bar for the upper part of the rubber bumper. This bar sits in a channel across the top edge of the bumper, then bends back for a short distance and then downwards. There should be about 1" clearance between the edges of the grille and these bars i.e. they should not interfere with removal at all.

Screens

Sealants: Always uses non-setting where it specifies 'rubber gaskets' or similar, not the adhesive types that are used on modern cars and state 'curing' or 'structural bonding'. My painter gave me some Indasa Windscreen Sealant but when I tried to get more I drew a blank. Painter said to try Tiger Seal or 'PU Panel Bond Sealer' but browsing those they seem to be hardening adhesives and my painter confirms that. So Google 'non-setting windscreen sealant' and get loads of fora suggesting 3M 08509. Browsing that the 3M site confirms it is non-setting, and I find an eBay page offering 'last one remaining' for £2 whereas most vendors are asking £20 or so. Order that, confirmed, then get an email from the vendor saying it is an eBay error, they couldn't even post it out for that, so I get a refund. More Googling before I order the £20 stuff and I find some Wayside Screen Seal non-drying for £6.50 plus £2.49 P&P.

Roadster Screen:

Glass Replacement: Whilst travelling to the 2004 Lincolnshire Wander mine developed a crack running down from the top edge right in front of the driver as a result of a stone chip. As this is an MOT failure item I had to deal with it, although fortunately the next MOT was many months away, giving me plenty of time.

Although covered by insurance without affecting No Claims bonus my first thought was to repair it myself for two reasons: One was simply for the interest and experience, but the other was the thought of some spotty youth from a windscreen replacement company making a bodge of my pride and joy given the special nature of the roadster screen, particularly removing the frame from the body and replacing it. However the benefit of having it done professionally is that any mistake on their part, including cracking from unequal stresses shortly after fitting, would be their responsibility to resolve. Spoke to Roger Parker at the MGOC who said often they won't remove and refit the screen, but require the removed screen to be delivered to their premises. That would get rid of one of my concerns (damaging the paintwork during removal or replacement) but still leaves me with the problem that if the screen cracks after refitting it is open to argument as to whether it was incorrect fitting of the glass to the frame that was the problem or incorrect fitting of the screen to the car. Seems to me that the only choices are doing it all myself, or letting them do it all, the half-way house being the worst of both worlds. I spoke to the company that would do the job and was satisfied with their knowledge of all the steps and pitfalls of doing an MGB roadster screen, including removing the screen from the car, so opted to let them do the whole job.

Nevertheless I wanted to do any preparatory work myself so set about seeing just what was involved in removing the screen with the minimum of other dismantling. I had removed the screen back in 1990 preparatory to a full rebuild, but as part of that I had removed all trim and the dashboard which makes the job considerably easier. I didn't want to have to remove the dashboard again unless I really had to. Consulted Lyndsay Porters (Guide to Purchase and DIY Restoration of the MGB' (republished as 'The MGB Restoration Manual') which says it is possible but is a right fiddle. Porter covers the whole job in considerable detail with many photos, so I'll just limit these notes to anything extra I can add.

- First I removed the side trim panels in the footwells, and this gave clear sight of the two bolts each side. The lower of these is easily accessible, but the upper one is tucked right up and immediately behind the dash.
- I found I could just get a 3/8" drive ratchet and 9/16" socket on to the bolt on the passenger side. However I had to use the very narrow gap between the lower edge of the dash and the reinforcing bar going across the cockpit and even with a very fine ratchet I could only move the bolt just one click at a time, which was going to take ages. So I opted to remove the glovebox, which didn't take many minutes, and go in through there. I completely removed the door and fibre-board 'box' although just removing the screws holding the box to the dash plus another securing it to the reinforcing bar behind the dash and pushing the box back would probably have been enough.
- On the drivers side I couldn't get the socket and ratchet on the top bolt with or without a wobble-extension because of the overdrive switch. Removing this and the fuel gauge, again only a few minutes work, allowed me to go in through the fuel gauge hole. Be careful rapping the handle of the ratchet on the edge of the holes doesn't chip the wrinkle-finish paint, either wrap the handle in tape or cover the edge of the hole.

- Between the two bolts each side there is Pozidrive screw. This holds in a packing piece, and should be left in-situ when removing the screen as if removed it may allow the packing piece, through which the securing bolts pass, to slip out of position. However it is advisable to **slacken** these, particularly to allow fine adjustment of the position of the screen on refitting.
- It is usually said (including in Porter) that the two bolts holding the centre of the lower frame rail to the dash top cannot be fully removed until the side bolts have been removed and the screen partly lifted up. Likewise and much more important to remember, these bolts must be started and partly screwed in before the screen is lowered into its final position. Forgetting this and lowering the screen right down, then having to lift it up again, may result in an imperfect seal between the rubber seal on the bottom of the frame and the body. Whilst for removal this was certainly true in my case, the bolts were much longer than they needed to be and it is the excessive length that contributes to this 'feature'.

So far so good, but then when I rang the fitters to arrange a date they said they had the screen but were unhappy with the seals and asked me to order them, which I did. By the time they had arrived I had tried loosening the screws in the top of the screen frame and found four I could not shift. Rang the fitters again to arrange a date, and they said they would order a set of screws.

Screen Removal: When the day came I rang beforehand and was told they had the screws so took the car round. Fortunately they were happy to let me hang around and assist in getting the screen out. One of the two centre-bolts was cross-threaded and stuck, turning the 'captive' nut in its cage. So we removed the centre bar, then pulling up on the frame left the bottom bracket attached to the dash top, having pulled the rivets out that were securing it to the bottom frame member.

While they were dismantling the frame I pondered what to do about this nut. Cutting the head off would still leave the thread stuck in the captive nut, although possibly that could be drilled and tapped, if the cage would hold the nut tight enough. Then one of the fitters came up with a stout slotted metal strip that just wedged under the bolt head, and the friction that created between the top of the nut and the bottom of the dash-top, together with the cage, was just enough to allow us to remove the bolt, which was a bit of luck. The end of the bolt was a bit chewed where it had been cross-threaded, but as I wanted to shorten them anyway I cut it off, ground a point back on (the point is needed to centralise the captive but loose nut under the bolt so the threads can start), and cleaned up the threads with a hacksaw blade. Shortened and pointed the other bolt to match and confirmed that both would screw into both nuts. The cross-threaded nut was a bit stiff, but with a bit of grease and working the bolt back and fore and gradually in like a tap (should have brought my taps from home) got it to the point where I could screw them in with my fingers.

Update October 2010:

David Council wrote to the MGs email group saying it looked like one of his uprights bolts was going to shear, and did anyone have any suggestions. The problem is that the bolt goes through a plain hole in the thick spacer first and if it shears with the stub still in that hole you can't get the screen out, as the thick spacer and the frame leg can't be removed as one. However there is a cover panel secured by rivets that can be seen at the top of the A-post with the door open, and with that removed you can get at the back side of the threads, to apply releasing fluid or perhaps heat and avoid shearing the bolt. However his workshop sheared the bolt! It was the passenger side so removal of the glovebox allowed him to get a drill on it (the drivers side would probably mean removal of the dashboard), but he got nowhere. So he removed that cover panel, and was able to wedge the thick spacer and the frame leg apart just enough to get a small hacksaw blade in and cut through the stub of the bolt and remove the screen. Ordinarily you would then have the problem of removing the stub from the threaded frame leg, but in David's case he was replacing the screen anyway so that wasn't an issue, he just has to replace the bolt. Opinions vary on this - SH506101 (3/8" x 1 1/4" coarse thread) or SH506091 (3/8" x 1 1/8" coarse thread), available from the usual suspects. The longer bolt **may** allow you to grind a point on the end to aid location, but check it is long enough i.e. doesn't reduce the number of threads engaged with the frame leg first!

Frame dismantling: They managed to remove one side piece and the top piece from the frame which was enough to get the old glass and rubber seal out only snapping one frame screw in the process although we discovered one was missing from the bottom anyway. I said "Never mind we can replace that" then they admitted they hadn't got the screws. I was not best pleased (and by then suspected they hadn't obtained the seals either) but by now there was nothing I could do about it. Still we could move one from the top to the bottom then I could replace the two (one missing and one sheared) at the top with the screen back on the car at a later date.

Reassembly: I watched while they prepared the new glass and rubber seal, and we were all puzzled as to why the cut-outs in the seal for the frame screws seemed to be more on the sides of the screen than the top and bottom, when there should have been an equal amount either side of the corner. Then I held a frame side piece up to the side of the glass ... and discovered the glass was 2" too deep! They turned over the glass and looked at the label ... and it was for a GT! I was even more displeased. They started ringing round and said they couldn't get another one until 4pm, so there was nothing more for me to do but go home. The fitting place is buried in the depths of an industrial estate and despite them saying Bee would be in the building which would be locked and alarmed and her keys in the safe, I had nightmare visions of some scrotes choosing that night to either break in or fire-bomb the place.

Next morning I went back to find the proper screen had arrived, and they were fighting with the new frame to body seal. These are a nightmare, both getting them into the bottom rail as the new rubber tends to be sticky, and the lip of the seal which rests on the body panel at the base of the screen is turned right back on itself, making it extremely difficult to get it to lie in the correct place when refitting to the car. But that was nothing compared to the struggle getting the new glass and its new seal into the frame, and the frame reassembled.

Because one corner was still screwed together the glass could only be put into those two pieces slightly offset, then slid into position. Despite most of a container of washing-up liquid (and the prospect of the thing flying across the workshop as it slid out of peoples fingers) it just wasn't going. **Top Tip:** The washing-up liquid was actually drying on the rubber too quickly to be of much use. So I nipped home and got my tub of smooth Swarfega (they only had the gritty kind) and suddenly things started going together. Relatively. The new frame seal seemed to be a couple of millimetres less deep (into the frame) than the old seal, and the new glass was also a slightly different shape at the bottom corners. It was not looking good for a tidy and secure finished job.

Getting the frame back together was a real struggle. Again the problem was the non-dismantled corner, trying to get the glass into this corner and then adding the top and other side was pushing the frame into a parallelogram, where the two top (and bottom) corners had unequal angles to each other. The glass also seemed to be going further into one side frame than the other, barely being in the seal on the 'loose' side. We had several goes positioning the glass in the bottom rail slightly to one side or the other before we got it more or less equally into the two side frames. They tried a rope-cramp round the ends of the screen which pulled the sides together but still left it canted over. Then I suggested looping the rope diagonally round the screen so as to pull the two 'long' corners together. Bingo! We could now get a 'square' frame, but still not pull the sides together close enough to get the screw in. From that point it was just a matter of getting 'muscles' Scott to pull the sides together as hard as he could, whilst the main fitter kept the tension on the rope, and I got the screws in. That alone was about three hours effort from three people.

Glass Variation: *Updated April 2019:*

The Parts Catalogues only give one glass (AHH8227) and glazing seal (AHH7172) throughout production, but Clausager indicates the glass and glazing seal may have changed in 1977 for thinner glass. Moss Europe (and some others) indicate that the glass changed for the 1972 year, and specifically states that 'early' glass (AHH8227) will not fit 'later' frames, which need HZA5415. They also state "Original style corners" are the common rounded corners, while "modified style" has slightly recessed corners to minimise breakage. Brown & Gammons (and others) does not make that distinction and only refers to OE, Repro, tinted and clear. But all are variations of HZA5415 so the implication from both Moss and B&G is that later glass will fit earlier frames. The only reference to 1972 that Clausager makes is that tinted glass became available on non-North American GTs. Moss and B&G only list one glazing seal for all years. All potentially confusing, and when you factor in refurbished screens complete which may have been fitted at some point, of unknown parentage, buying replacement glass could become a real nightmare - unless you specify HZA5415, which hopefully will fit any frame.

Current-stock glass to fit later screens like my 1973 does seem to be different shape in the lower corners from the original glass, said to accommodate differences in the frame uprights. There are four different uprights for RHD cars (three for other markets) listed prior to 1977. For 1977 and later uprights are not separately listed, only complete frames and top and bottom rails. There are three different complete frames listed for RHD cars prior to 1977 (two for other markets) and only one frame for all markets for 1977 and later. The effect of the later glass with the cut-outs in the lower corners is that the edge of the glass can be seen from outside, as shown in these pictures of my roadster - firstly just by looking through the glass, and secondly by pulling the seal back, the edge of the glass is arrowed in both cases. I was concerned that with so little overlap between rubber seal and glass it might leak, but hasn't in over 10 years.

July 2019:

Cropped up again on one of the fora, and this time I've tried to find examples of the different uprights. None of the various types are available from the usual suspects for a direct comparison, which makes it a bit difficult. So I browsed pictures of late-model (post 76 going by the registrations) MGBs and did find a couple with quite good pictures of the screens, which do appear to be different at the bottom of the uprights. Then did more Googling for frames for sale, and found one with same difference ... if you see what I mean. The ad for this didn't specify the year it came off, but the pictures definitely show the same difference, as in the attached. If the channel is similarly narrower it means that if you have the later frame - which could be on an earlier car - you must get the correct glass. Of course, it's possible that only the later glass is currently available, which is why I have it in Bee.

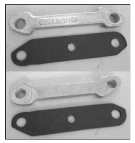
Body Seal:

New body seals are a nightmare. When supplied the lip that rests on the panel at the base of the screen has to project forwards and upwards from the rest of the seal, but as supplied this lip is tucked right under the seal, you can see the 'as supplied' and 'fitted' profiles on the left. When fitting the screen to the body this lip has to be pulled out from under the frame, and sealant applied, at some point. You would need a couple of dozen pairs of hands, which there isn't room for round the car, or maybe half-a-dozen octopi. By contrast an old seal sticks out at the correct angle and even though it isn't delivering much downward pressure, unlike a new seal initially, with sealant it still doesn't leak. Unless the old seal is damaged I would recommend reusing it, as I had done when removing the screen for painting some years ago. That was a single-handed job to remove and refit and the bolt holes all came to hand easily. I suggested to the fitters that they reuse the old seal, which would have saved them the struggle of pulling out the old and fitting the new, but they insisted on using the new.

Porter seems to indicate not fitting the seal until the frame has been reassembled, but then that means either levering it all in to the channel with a suitable implement (which John Twist shows here), or trying to slide-feed it in through one of the screw holes

in the bottom channel, which involves an angle and sharp corners. The former is very long-winded and the latter very difficult with both new and old rubbers. We opted to slide it into the bottom rail with the frame dismantled as that makes it a straight pull even so it is hard enough. **Top Tip:** Pulling the rubber in tends to stretch it, meaning it may shrink a bit over time. As there is not much overlap by the side rail 'feet' over the ends of the body seal make sure you keep pulling and pushing the seal in towards the centre from both ends before offering up the side rails and cutting the ends (of a new seal) to suit. Even then, cut them a bit long, when you screw the frame together it will tend to compress the seal slightly, making it even less likely to shrink enough to expose the ends. Then the glass and glazing seal is fitted (join in the centre of the top), the ends of the body seal pulled out of the channel to expose the screw holes, the side rails fitted, and the ends of the seal pressed back into the channel with a blunt screwdriver - angle the seal so that one side of the 'T' lies in the channel, then push the other side into the channel. This should lock both sides of the 'T' in the channel. Give it a bit of a tug to make sure.

Reinstallation: After a short break the bottom bracket was pop-riveted back onto the bottom rail, and I refitted the centre bar, leaving it loose at this stage. It had been a bit pitted so overnight I had taken it home and cleaned it up with fine wet and dry and wire-wool and clear-coated it. **It is critical to ensure the packing pieces and shims in the body sockets are selected to ensure there is no side to side movement of the frame legs in the sockets. If there is, then when you tighten the bolts it will tend to bend the legs in towards each other which can crack the glass. This is particularly important when replacing the whole frame, rather than just the glass.** The shims go on the 'inside' and the packing pieces on the 'outside', i.e. the bolts go through the body panel, then the shims (qty. to suit), the packing pieces and into the frame legs.



It should also be noted that whilst new packing pieces and shims are available from the usual suspects, they have been manufactured incorrectly. The part number is embossed in raised lettering on one side, on a further raised plinth. This must be ground off before fitting or again it can bend the legs, or come loose over time as the lettering is squashed down. They are also missing the central tapped hole for the securing screw. When this was queried with the supplier they said they had a note in their system saying the lettering must be ground off (but didn't mention it on purchase), and that their drawing showed the central hole, but they "didn't know why it wasn't there". Another suppliers photo shows exactly the same part, so it is not isolated to one supplier, as they probably all use the same manufacturer. Another feature of the shims is their ability to centralise the screen across the car, in relation to the quarter-lights, as part of preventing splits in the door skins, aka 'The Crack of Doom'. However this does require the quarter-lights (and hence doors) to be fitted.

Because the lip of the new bottom seal is so tightly curled under the fitter decided he would add the sealant when the screen was partly on the body, rather than apply it to the seal off the body then have the very sticky job of trying to pull the seal into position which would probably remove quite a bit of the sealant in the process. Initially he thought that he would be able to do this from the back, but there was simply not enough room with the screen pushed down far enough for the lip of the seal to be in position. Put sealant under the base of the side rail 'feet', slip on the feet seals, and put more sealant under these in the grooves.

Note that when fitted the body seal lies on top of the feet seals leaving a small triangular gap as the seal makes the transition from the foot seal to the body. This should automatically ooze sealant, and hence be filled with it, as the screen is bolted into position. At least that was how mine was originally, but after the second screen replacement I discovered the body seal appears to have been trimmed round the foot seal so there is no triangular gap. We slotted the screen into the body, pushed it down all bar about 1/2", pulled the tucked-under seal out with a hook, then he got the nozzle of his sealant gun under the seal lifting it up, pulling the gun along sideways, all the while holding the gun clear of the paintwork. He had taped cloths round the body of the gun so it wouldn't scratch the paint if it came into contact, but I don't think it did anyway. An alternative suggestion has since been to use many strips of duct tape to pull the lip of the seal back, being stuck onto the glass, at the expense of having to clean goo off seal and glass.

We then pushed the frame right down, causing loads of sealant to ooze out as expected (and some out the back onto the dash top). I checked the position of the holes in the frame legs through the holes in the body but they were miles out. It took quite a bit of downwards and fore and aft pressure from the two fitters just to get the bottom two holes visible, and I got the bolts in. Another breather.

However the upper holes are much more difficult to see with the dashboard in-situ, especially on the drivers side, and just manual pushing and pulling wasn't going to get them lined up. Fortunately just a few weeks earlier I had seen pictures where someone had used a G-clamp to press the frame down far enough and mentioned this to the fitter. They have a similar clamp to hold the modern bonded glass systems in position while it sets, and this was enough to get the passenger side top bolt in position. On the drivers side we had to resort to that clamp plus 'muscles' Scott, but eventually we were there. With slack bolts to allow final positioning I wasn't very happy with the side-to-side alignment with the doors as it seemed to be much closer to one 1/4-light than the other whereas before it had been almost equal to both. The 1/4-lights themselves are adjustable in the door frame so I resigned myself to some final fettling at home, but by the time I had got the fore-and-aft position to my liking, and the four bolts tightened, the 1/4-light gaps miraculously fell into position. We took a step back and looked at the glazing seal, to find that too and the glass had seated properly and evenly all the way round, much better than we had expected.

Whilst the fitters cleaned off the excess sealant I tackled the two centre bolts. As I mentioned before one of the reasons that people say that these bolts have to be completely removed last and partially fitted first is that they are too long and also need to be at right-angles to the dash-top to start to screw in. The captive nuts are loose in their cages and can be angled, slid fore and aft, and raised or lowered so that if the bolt is short enough it will screw in at an angle to the dash top with the screen fully in position, and once it has started and gone in far enough it straightens up to lie vertical to the dash top for final tightening. I removed the two fresh-air vents (although I could actually feel the cages and nuts from through the glove-box hole) and screwed a 7/16" bolt in from the **bottom** a couple of turns, which allowed me to angle, slide and lift the nut into the correct position.

However whilst I found I could get an 'ordinary' bolt in, I couldn't get either of the proper chrome-plated bolts in either side. It took me a while to realise the point I had reground onto the end of the bolts after shortening them was fouling the end of the bolt I had screwed up from underneath before any of its threads could engage. The point is there to push the captive (but loose) nut into position so the threads can start, without this or any other way of positioning the nut it would be pure hit and miss. Because I was positioning the nut with another bolt from underneath I didn't need that so ground most of the point off, and bingo got both bolts in. However I think I cut the bolts a bit too short as I couldn't get them in with both the chrome plain washer and the split lock-washer fitted, so omitted the lock-washer. But I had always felt the lock washer looked 'clumsy' so was happy to leave it out. Time will tell if it shakes loose in which case I shall try Loctite or something. I tightened the centre bar not going mad, just enough to make it 'ping' when plucked. It only occurred to me then that the function of this bar is probably to stop the header rail tending to pull the top frame rail up off the glass when the top is fastened down, there is considerable upwards pressure on this from Bernoulli Effect at speed.

Finishing-off: After final positioning of the screen and tightening down the centre bolts there was a bit more excess sealant to clean off, then putting back the fresh-air vents, glovebox, fuel gauge, overdrive switch and trim panels. **I can't emphasise strongly enough how important it is to get the alignment of the screen to the 1/4-lights correct**. Get too tight an engagement between the two and you will almost certainly get the 'Crack of Doom' in your doorskins. Too loose an engagement and they will leak, but that is minor in comparison.

Lastly the windscreen stickers went back on. I had managed to recover all but three. One of the missing being a small paper sticker from the one and only 'MG World' show at the NEC (the second year it was 'MG and Triumph World' and then it died altogether) from the very early days of my ownership, so early I didn't record the date, and the sticker itself had faded to nothing. The other two were from Gaydon, the first being from the inaugural Arden Heritage run to Gaydon the day after its opening in, May 1993, the other from a run from Gaydon to Donington to celebrate the Centenary of the motor car in September 1996. Both these were fluorescent paper and stuck to the outside of the screen, and not only had they faded to white but the rain and washing had removed all the paper and just left a disc of adhesive! But I'm sorry to lose them just the same.

Frame positioning: This involves primarily door positioning, then screen positioning for fore and aft and tilt relative to the quarter-light, and finally quarter-light positioning to the screen upright seal.

Frame replacement: Kevin Barrel wrote to the Yahoo MGB list with a problem he was having fitting a replacement frame that already had the glass installed. He said:

> "I'm now into my 2nd windshield (windscreen) replacement for my 71B, I cracked the 1st because of stupidity. Luckily I found a used one, in frame, in pretty good condition. I was told it was off a 74B. So I clean it up, got the bottom rail seal installed in about 30 minutes and the cracked one out of the car in another 30 minutes, all the time thinking this is all going too well. That feeling of euphoria quickly subsided as I attempted to put the replacement in the car. Doesn't fit! The distance between the pillar legs of the assembled frame is at least 1/4in (6mm) wider than the one that came out. They don't appear to be bent. I know about the shims, and they are there, but this frame is so wide it doesn't even fit inside the notches in the fenders (wings). I see different frame rails listed in Moss (I'm guessing that's because of mirror, visor mounting etc.) but I see only one **size** windshield so I'm very perplexed. Since I have good glass in a frame that doesn't fit, and bad glass in a frame that does fit, I'm debating about pulling the glass and fitting it into the original frame. I've read about all the grief there is in fitting the glass in the frame. The glazing rubber from the original windshield looks to be in good shape so would reuse that hoping it will help and I might even practice with the cracked window ----- but this assembled frame size thing is a real conundrum for me and will I end up with the same problem when I'm done? Any thoughts, comments, suggestions?"

He received a number of suggestions about possible causes and solutions, and in the end posted the following:

> "I used the original frame F1 and glass from F2. I would highly recommend anybody doing this to dry fit (no glass) the frame together and actually install it in the car. If the frame itself can't be assembled and installed without contortion (distortion) it's not going to get any easier with the glass. I had a fair amount of hand-fitting before the frame would assemble without undo effort lining up mounting holes. When I installed it in the car, (no glass) I could see the bottom rail deflect (bow) outward when the pillars where torqued down tight to the car body. There was no perceivable movement of the frame when trying to push the frame laterally between the shim packs. Rather than mess with the shim packs for a few thousandths I found that snugging all the flat head screws holding the frame together and not torquing them down super tight allowed just enough float to eliminate that deflection. I deburred the inside channel of all the frame pieces so there was no additional resistance when the seal was installed. There was a fair amount of flash around all the rivets for the visor, mirror mounting, etc. Using the recommended hand cleaner lubricant (my preferred cleaner is DL) and the recommended extreme patience the glass installed surprising easy, at least in comparison to what I had read online. And, during the whole process if something doesn't seem or feel right, it's not. Take it apart and start over.
>
> "Why didn't Frame 2-with glass fit in the car? The bottom rail and it's mounting looked to be the culprit. There looked to be a difference with the amount of bow between the two extrusions and the location of mounting holes in the rail and the L brackets. The dimensions and geometry of all the bits doesn't have to vary much before the error accumulation bites you in the butt. I suspect F2 had it's glass replaced sometime during it's life and they couldn't get it into the car and if it was, they cut the XXXX out of the car to make it fit."

Kevin didn't see the replacement frame in the car, so it's fair warning when buying an assembly such as this - don't assume it will go straight in!

Quarter-light seals: I had taken the opportunity when buying the screen seals to get new 1/4-light seals for the side rails of the screen as I felt these had been cut a little too short in the past, and a new header rail seal as it had been damaged by the Navigator's clip and that was where water usually came in. The old side rubbers pulled straight out of their channels, which were in fair condition, and with a bit of tweaking of the channels and using a pair of long-nosed pliers to **pull** them down into position rather than pushing, the new ones went in without any lubrication.

This is how the Parts Catalogues imply they were originally fitted, but suppliers now show a 'support' BHH2670 in addition to the 'retainer' (channel) AHH6409 and seal 27H4300. This needs you to fit the seal to the retainer and drill holes through both **before** fitting it to the car, then slide the support into the seal, then screw through all three into the screen upright. Moss US describes how to do this, but they say the drilled hole in the rubber 'heals up' and you will need a bigger drill to leave a visible hole, then use screws instead of rivets as originally. I just can't see the point of going to all that trouble as my new ones have shown no tendency to move in 30 years.

It was then a matter of cutting the bottom angles bit-by-bit so that they lie flat and filled the gaps when the doors are fully shut, and the tops to match the header rail when fastened. Note that some distortion of the rubber from the chrome piece on the leading edge of the door capping rail occurs during closing, but everything drops neatly into place when fully closed. However the new rubbers are fatter than the old ones which have been compressed over many years, vibration and heat/cold cycles, and the surface is not so hard, shiny and slippery as the old rubbers. These combine to prevent the 1/4-light frames from dropping into their natural position and are pressing them outwards. My concern is that this could be yet another factor in the 'Crack of Doom'. A thin smear of Swarfega acts as a lubricant allowing the frame to take up its natural position but dries out after a couple of days. I'll see how things go over the next few weeks but may have to reposition the screen forwards a little to relieve the pressure (I did). With the old rubbers the frames only just touched them, which actually allowed a little rain past them if running in rain with the hood down. But with the hood up and the Bernouli Effect on the hood pulling the screen frame back, the seals were pressed onto the frames and didn't leak. Design or serendipity, I wonder?

Update October 2004: Torrential rain and a howling gale on the way back from the MGOC Autumn Gold run (ditto while on the Lincolnshire Wander in 2005). Absolutely nothing came past the header rail seal or the glazing seal between glass and frame, the only disappointment is that a trickle seems to be coming past the square seal between the bottom of the frame side-members and the body each side. Shouldn't be too difficult to fix by lifting the frame a bit and applying more sealant, probably my fault for not putting enough on.

Update May 2006: Having heard that new bottom seals retain their tight curve for some years I decided not to remove the screen, but instead just slackened everything off and managed to slide the whole screen forwards a fraction so that the 1/4-light frames weren't so tight a fit to the screen frame side seals. Had three days of rain on the Dales Trail later in the month, but despite that only a little came in between the bottom corners of the screen frame and the body. What was a bummer was finding the new screen cracked in the bottom left-hand corner after we had got home. We did hear a sharp impact just after running into some infernal top-dressing over the Pennines even though we had already dropped back from the car in front, but I can't believe we spent the rest of the weekend and Monday in the car and didn't notice it. I consoled myself with the fact it could only travel a few inches before it reached the side of the glass from the bottom, but then a few hours later I noticed a second crack coming off the first at a right angle and this time heading right up and across in front of the Navigator! I can't face changing it again just yet, I'll wait and see if it becomes an MOT failure. Subsequently it did get worse, with first one then a second subsidiary crack coming off the main crack at right-angles across the navigators view hence a potential MOT failure. I can't say the fitters were pleased to see me again. The process was very much as before, although I'd say the re-installation at least (I wasn't there for the reassembly) did go easier, and I was able to get the correct clearance to the 1/4-light frames right first time. One slight concern is that the bottom rail seems to be higher on the uprights than before, as if the glass were not quite to deep as it should be. This left gaps in the corners between the bottom rail and uprights particularly on the drivers side. Putting Comma StopLeak screen sealer in at the front came out the back indicating a major leak source. I pressed the black sealant into the gap, then used StopLeak, which no longer came through. In overnight rain on the Memorial Run in September none dripped through on the drivers side, although some did on the passenger side, so I did the same thing there although the gap was smaller and the StopLeak didn't run through to the inside. Since then rain has to be heavy and persistent for any to come through at all, and drips 'harmlessly' down the door cards and not on the occupants.

2016: That just left two sources round the passenger's drop-glass - one at the top and one at the rear vertical edge being blown despite internal air pressure from the fresh-air vents being open or heater set to Interior or Demist, which gets onto the Navigator's shoulder. This one was solved by carefully shaping a length of clothes-hanger wire that slots up inside the double skin of the hood material and hooks over the hood frame at the bottom, which presses the rear vertical edge of the hood firmly against the glass. The one at the top, even though there is only a very small gap between the glass and the flap that hangs down inside, remains for the time being and is subject to further pondering.

Parts Changes: *March 2014* The Leyland Parts Catalogue indicates the screen assembly changed in December 72, but also indicates the two types are compatible. However the top rail changed in September 69 when the rear-view mirror moved from the vertical bar to the top mounting, so they certainly weren't identical. It changed again for rubber bumper roadsters, and in September 76 i.e. four types for the UK plus two different types for North America and Sweden. However Clausager also has a change to North American windscreen assemblies in Feb 69, saying change points for non-North American cars is not known. As far as I know all are interchangeable as far as installation of a complete assembly to the body goes, although the component parts i.e. top, bottom and side rails almost certainly will need to be compatible with each other. What will vary is the positioning of the interior mirror - originally on the centre bar, then as part of the centre-bar top mounting and the provision of sun-visors - with Mk2 cars for North America, Sweden a year later, but not until the 77 year for the UK. The MGOC and Moss web sites indicate

these changes were in 1969 (for the 1970 model year) and 1974 (presumably 1974 1/2) respectively. The same body and screen upright seals were used throughout.

Again according to the Parts Catalogue part numbers there was only one glass throughout production, although Clausager mentions a change for the 77 year which may have been related to the use of thinner glass and compatible seal. There definitely are 'early' and 'late' glasses, the 'late' having cut-outs at the bottom corners, whether this is the change that Clausager refers to I don't know. These do fit the earlier frames, but some say early glass may not fit the later frames. MGOC and Moss have clear and tinted glasses available but tinted aren't indicated in the Parts Catalogue. MGOC talks about 'up to 1969', '1970 to 1975', and '1976 on' for glasses but doesn't explain the differences. Moss talks about 'up to 72' and '72 and later' glass, the difference being the cut-outs. However whilst this ties up with one of the frame changes in the Parts Catalogue, my 73 roadster didn't originally have the cut-outs in the glass, and the Moss glass change doesn't tie in with their frame changes.

I wrote the above in response to a question from John Wynne Davies, and subsequently he happened to mention that his screen has press-studs at the base of the screen uprights and asked what they were for - which is the tonneau cover.

GT Screens

GT Screen replacement - pro advice
GT Screens replacement - DIY experience
HRW

June 2024: Geoff's MGB came without front screen trim and he wanted to do something about it. Forewarned from me about how tricky they are to fit he experimented with a stick-on bright strip on the straight bits with the MGB corners. Not happy with that he bought a set of trims (from MGBHive who I refuse to use as I have had poor products and service from them), and just about managed to fit the uprights by pushing them in (which can be done with 'old' rubber and lubrication), which was where I came in. As soon as I started trying to fit them it seemed like they were too wide, with one side in the slot in the surround (which was plenty deep enough) my ball-end tool was just too fat to fit in the other side to lift the lip over while I pushed (or pulled) on the handle. Being 'old' rubber so stiff and slippy rather than sticky, and cleaning out the slots and lubricating with Swarfega Original, I was just able to push half the shorter top strip in. Which left the rest of the strip to do! Even having got that far the ball-end tool just would not move so I had resort to my previous method of using long-nose pliers. Even that didn't work like it had on my trim where once I had got the right angle I could push the pliers along doing several inches in one sweep as the other edge kept coming out. So Geoff had to follow on immediately behind me, pushing on the edge that I'd just got in with a wide flat-blade screwdriver to keep the other side in its slot. Even then the pliers didn't run along, I had to use them as a lever to lift the lip over bit by bit. Eventually - probably 3 hours - we had the top strip in! But not without some damage to the lip in a couple of places. Not only was that enough for the afternoon - I was physically exhausted and had to sit down, but I couldn't see how we were going to get the longer bottom strip in that way so we pondered options:

1. Leave it as it is i.e. top strip but no bottom strip
2. Pull it all out and leave it as it came to him
3. Go back to the stick-on plastic trim for just the bottom
4. Or cut it into three sections, each of which we *should* be able to push into position one at a time and hang the joins!

We opted for No.4 and Geoff cut it into three. Got the middle bit in OK as that is fairly straight, but gave up with the ends as they wouldn't stay in and seemed to be the wrong shape, and used the stick-on. That was OK except that at the outer ends it didn't want to stay stuck down butting-up to the corner pieces, so he bought some joiner pieces that are used on the rear trim and we covered the join between the corners and the stick-on pretty-well. That left the joins to the centre section and the stick-on, and two more joiner pieces went in over those with a bit of a struggle. Never again. Not only that but the bottom strip looked such a hotch-potch that eventually Geoff decided to take it out anyway!

February 2021: Someone on the MGOC forum asked if he could have a roadster screen in his GT as it is smaller. Well, yes, but there would be a 3" gap at the top (or the bottom) if that were the case! Even if it fitted width-wise. Nothing like that, but he says his fitters 'noticed' that the new one was smaller than the old, laid one over the top of the other and it was, but he didn't know by how much. He says he has poked under seals (locking and trim-strips in-situ) and not found the edges of the glass, which means it can't be that much smaller, which begs the question of how a professional fitter would even notice, less alone lay one over the other to compare them. So that's something else to check for when I (imminently, now the weather is getting better) change Vee's glass. But with the trim and filler strips removed so I can expose the edges, and I'll be taking measurements at various places to compare before removing the old glass - just in case!

Originally front screen glass was AHH8228 (clear) or BHH308 (tinted - V8 and options, other markets and models). Glazing seal AHH7404, filler strip AHH7815, bright trim AHH7426 (top), AHH7425 (bottom), AHH7439 (right), AHH7440 (left), AHH7423 (top corners) and AHH7424 (bottom corners). Apart from the glass and left and right finishers at the time of writing suppliers are listing those numbers. For the finishers whereas right and left pieces were shown separately today all bar Leacy show AHH7439 for both sides, and when I came to refit mine they had not been marked but showed no apparent difference. Glass is a bit more complicated.

The original part numbers are listed by many suppliers at around £70, however Moss has an 'OE' clear version priced at £236 and heated clear at £269. For tinted they have basic at £84, OE at £426, and BHH308TT tint plus shade band at £68 (oddly cheaper than single tint), and the type that has always been fitted to Vee. Leacy list basic tinted at £78, tinted and heated at £279, and tinted with top tint at £65 (again cheaper than single tint). Rimmers have basic tinted and what is described as 'clear with top

tint BHH308TT' which has to be incorrect, and although MS&C list BHH308TT 'Top Tint' one would have to confirm that it is tinted with top tint, and not clear with a shade band. The other suppliers do not seem to offer tinted with shade band or 'top tint', and only 'tinted' is mentioned in the original sales and parts catalogues, nothing about a shade band. Replying to an enquiry as to what was originally fitted to the V8 I mentioned Vee had always had the shade band and someone responded that he found it 'distracting'. Someone else said it wasn't distracting be he was aware of it, at 5' 10". I've been 5' 11 3/4" for quite a long time and it's nowhere near my eye-line. However I've never replaced the seat foams, and in a GT with new foams my head was brushing the Webasto and the steering wheel was brushing my thighs - most uncomfortable. The relationship of leg length to upper body length for any given height is also a personal factor, and if one's eye line is near the start of the tint I can imagine it being very near the screen frame in a roadster.

September 2019:

Vee's screen cracks again. Just started my return from Devon and more coastal path when I come up behind a huge wagon with a very tall flat back which went much lower to the ground than normal. I was almost immediately aware that the low-pressure area behind the wagon was 'vacuuming' up dirt and stones from the road surface, which of course I was driving into. Immediately after a roundabout so only low speed, and I dropped back several hundred yards straight away and stayed there until we reached an overtaking lane. Get home with no further ado, but a couple of days later get in the car to find a crack several inches long on my side - bloody annoying! This will be the fourth replacement, and having fitted them myself after the repaint I'd rather do that again than have the aggro of leaving it in Birmingham for at least half a day while I hang around killing time, which has been the case previously. It depends on the relative costs of the insurance excess and buying a screen - the former being £75, and on that basis the glass is actually slightly cheaper. But shipping complicates matters, most suppliers saying 'collection only'. Moss quotes P&P at an additional £35 plus VAT, and Brown & Gammons saying special packaging and a carriage quote is needed but not specifying it up front. My nearest supplier (Leacy) listing it at £65 and the cheapest but out of stock, the nearest showing a price is MS&C in Stourport some 30 miles away ... but they don't have it in stock and were quite arsey when I enquired about it. Rimmers showing a future availability date. Other possibilities are local repair companies doing supply only (no). No rush ...

September 2020: Still waiting. Something made me look into Pilkingtons to find they are a presence only a few miles away, and they sent me a price list. Hope you are sitting down ... for Vee i.e. green tint plus green shade band it would be £290 - excluding VAT! Full price list as follows:

Eurocode	Description	Price
2230ABZBL - Bronze with a blue top tint	MG B, C, GT 65-81	£306.40
2230ACL - Clear	MG B, C, GT 65-81	£324.79
2230ACLBL - Clear with a blue top tint	MG B, C, GT 65-81	£289.59
2230ACLGN - Clear with a green top tint	MG B, C, GT 65-81	£285.15
2230AGN - Green	MG B, C, GT 65-81	£276.28
2230AGNBL - Green with a blue top tint	MG B, C, GT 65-81	£285.87
2230AGNGN - Green with a green top tint	MG B, C, GT 65-81	£290.10
HT0256 GNH - Green and heated	MG B, C, GT 65-81	£501.33

How can 'clear' possibly be up to £50 more expensive than any of the tinted ones except the heated? I think I'll wait ...

November 2020: Rimmers have pushed their date forwards a couple of times now, but I try Googling BHH308TT again and as well as the usual places a new one pops up - Ivor M Davis with a 'Contact us' button under the description, so that is what I do, asking if they have one available. They reply saying they deal with the trade only, but not whether they have one or not. So I write back asking if they perhaps would deal with Leacy's, and again asking if they have one. They write back saying yes they will deal with Leacy ... but still not saying if they have one! So I ring Leacy and ask if they would be able to supply one that way and Sally says she will check the situation and call me back. Which she does, saying that they still cannot get any from their usual supplier, but Ivor Davis does have the one and they can get that, albeit at double the price shown on their own web page i.e. the last one they had in stock. But as that's still half the price of Pilkingtons I go for it. Means waiting until the end of the month, but it's been cracked for over a year now so no problem. I just hope I'm doing the right thing, maybe it would have been better to go the insurance route and I probably would another time.

GT Screen replacement - Pro advice: Had my GT front screen replaced due to stone damage and the fitter expressed relief that the rubber and trim were OK as it was much easier to work with than new rubbers. A couple of months later I had to go back as a result of someone trying to break in, and he groaned when he saw the mangled rubber and trim. The new rubber has a smaller recess for the trim than the old so it is more difficult to get the trim to stay in, and the rubber is very soft and sticky which means that every millimetre has to be lifted over the trim. On the old harder, slippier rubber it is possible to slide the trim in for quite a way before having to resort to lifting it. It took him three times longer with the new rubber, very little of which was taken up by removing the old rubber and fitting the new to the body. Many years later I had the 'opportunity' to fit them myself as part of Vee's restoration.

From the fitter:

When removing the trim strips make sure you know exactly which piece goes where, and which way up. They will come off looking like corkscrews, don't try to straighten them or you won't get them back in again.

Remove the rubber beading that is concealed by the trim strips. Press the top of the windscreen out from the inside using hand pressure. Lift out the old glass. Leave the rubber in the car, remove all dirt and old sealant.

When fitting the new glass get one bottom corner in firmly, then work your way along the bottom and part way up the sides lifting the rubber so that it rests on the edge of the glass, not overlapping yet. Only when you have done the bottom and part of the sides should you use hand pressure on the face of the glass to press it into the groove.

Now do the same with the top half, and when the rubber is resting on the edge of the glass all the way round, use hand-pressure again to press it into place.

Inject sealant under the edge of the rubber. If fitting glass to an undisturbed rubber then you only need to put sealant between glass and rubber on the outer face. If fitting new rubber as well, or if the old rubber was removed and being refitted, you will need to put it on both the glass and painted metal edges of the outer face.

Then fit the rubber beading (this was the only bit where he used a specialist tool, but it isn't essential).

Now to refit the trim. With all the trim, fit the paint side into the rubber first and use an implement to lift the rubber lip over the trim strip. That way if the implement slips, it goes onto the glass not the paint.

Fit the corner pieces first, then the sides, bottom and top.

When fitting the sides, top and bottom, look at the twist (if refitting old trim) and start with whichever end allows you to fit the paint side under the rubber lip first so you have to press the glass side down against the twist.

Took him one hour to replace the glass using the old rubber and trim, about three hours the second time with new rubber.

GT Screens DIY Replacement

Seals
Front Glass
Rear Glass
Trim

January 2021: A thread on GT screens on the MGOC forum asked if the corners had to be ground. I'd not heard that before but I know roadster screens did get cut-outs at the corners, and the screen uprights changed which could mean that an early glass would not fit a later frame, but hadn't come across that problem with GTs in the three that Vee has needed previously. An on-line video was mentioned, then subsequently someone else thought it was by John Twist, so I Googled and eventually found it but it's Moss Motors. Two things though - the first is that the glass they are trying to fit has marks round the edge that look like it has already been installed somewhere, and although it does seem to be too wide at the bottom of the left-hand upright (at least), he seems to be belt-sanding the top edge. I'd have no faith in his assistant either. But having bought yet another screen for Vee and waiting for Covid and weather to allow replacement with a pal I'm now extremely nervous!

March 2021: Building up to replace Vee's screen (again ...) I took off the trim and locking strip to see if I could measure the existing glass and compare the new, so try and gauge if I was likely to get the problem below, in which case I'd have to think again! Tricky with multiple curves and sloping sides, but I selected two points near the bottom of the uprights just before it started curving round to the lower edge, and allowed the tape measure to take its own route across the glass - 1260mm. Unpacked the new glass which has been kept in a bedroom since November for safe keeping ... and it seems to be the same - whew!

Seals:

This is quite a struggle by itself as the rear one appears to be a couple of inches too long to fit in the hole! This excess also seems to impact on the fitting of the trim later on. You have to fit the top corners first - which needs the sides to be fitted to hold them up - then the top edge. Then the sides need to be eased off, pushed upwards to compress the rubber and refitted, then work down the sides and along the bottom, continually pushing the rubber to compress it, going back and fore along the bottom and up the sides, to reduce the amount of 'surplus', until finally it's all fitted onto the flange. No sealant used at this stage. The front seal wasn't quite so difficult, however whereas with the rear seal once it was in stayed in, the front seal kept coming off the top body flange while inserting the glass, and needed holding in place with masking tape. That led to the opposite problem of the original lower trim strip being about 1/2" too long for the space available, so I suspect that trim could have been a couple of inches longer to push itself into the lower corners and make room for the trim.

May 2022: David Brown writes on the MGOC forum that Moss apparently retooled the upper corners and shows them fitting the trim as it should. He doesn't say when he bought it, mine were from Brown & Gammons five years ago.

An extra on the rear seals was to punch holes for the HRW wires, using a hole punch tool. With the original HRW the wires are glued up the edges of the glass and a few inches along the top each side, and the glass has been cut back to


accommodate the wire when the glass is fitted. They exit the seal through holes near the hinges. Check the top edge of the glass and measure the distance between the ends of this cut back area, i.e. where the glass has gone back to full height again. Mark that distance in the middle of your seal, and punch the holes slightly further apart than that, so the wires come off the glass and go through the seal while they are still in the cut-back area of the glass. Think carefully where the holes need to go - i.e. from the bottom of the slot the glass fits into, through to the inside!

Front glass:

August 2017 June 2024
March 2021:


Much easier than last time, I'd got some additional tools and we worked out some different techniques. As before dust sheets laid across the bonnet with the ends tucked into the closed doors, wipers removed. The first time I'd taken a screen out so a bit of trepidation there. The trim and locking strip removed for reuse in about 10 minutes. I wanted to reuse the rubber and also measure the glass width to compare the sizes of old and new following a YouTube video showing some are too big! Peeling the edges of the seal back to get a tape measure to the edges of the glass was a bit harder than I expected, but using some plastic body filler spreaders pushed in past the edges held the seal back just fine. When it came to removing the old glass we used the same technique to wedge the side and top back close to one top corner, then thumping with the palm of the hand on the back of that corner, it started to come out very easily. Worked our way across the top and down the side, another crack appeared from the existing one which was hardly surprising, and it was out in 10 minutes. Carefully cleaned out the small amounts of sealant I'd used last time as I didn't want that packing into the bottom of the slot as the new glass was inserted.

As before daubed Swarfega Original in the slot and started with one bottom corner and part-way up the side, in tandem with working along the bottom. More palm-thumping on the other lower corner pushed the glass across until we could get that corner in, using the plastic spreaders. **DON'T** use metal tools against the edge of the glass or it could chip which will be a weak spot and start a crack in the future. Worked up the second side, then got both top corners part-way in i.e. with the rubber sitting on the edge of the glass, and started working towards the middle, pushing the rubber up from inside to lie on the edge of the glass with a plastic trim tool with a rounded end. That was getting harder and harder to make progress and we ground to a halt with more than half left to do, so had a rethink. We let the top corners come out away from the seal as that was pressing the glass against the face of the seal, making things harder and harder as we worked towards the middle. The next thought was to uses a thin-ish, broad, non-metal object to push the rubber up from inside instead of the plastic trim tool as that was only getting us 1/4" at a time when it worked at all. I keep all sorts of off-cuts 'just in case' and had some pieces of hardboard about 2" x 3" and the shorter end proved ideal, lifting the seal up to sit on the edge of the glass. We fully expected it to keep breaking but it didn't, a plastic piece of similar size and thickness would be preferable. The crucial thing is to work outwards from the middle to the corners, then in the corners we used the plastic scrapers to lift the seal onto the edge of the glass at the side and top ... and it was in! About an hour and a half, and most of the half hour would have been saved had we adopted the 'hardboard and middle out' technique straight away.

I hadn't been planning to fit the locking strip right away as that's something I could do by myself, but pal said go for it so more Swarfega in that slot and the loop-tool ran the strip in easy as pie. I could see it was stretching a bit as it was going in and tried to push it back periodically, so wasn't surprised to see about 3" surplus at the end. Even if it shrinks back over time it'll be under the trim so no big deal. By now what had been the occasional spit of rain for about half an hour was getting worse, so we stopped there and pal went home.

After lunch the sun came out and became a beautiful spring afternoon, so couldn't stop myself starting the trim.

August 2017: A lot longer to get the front in than the rear. Thick cloth sheets laid across the bonnet and the panel at the base of the screen to protect them, with the ends trapped in the doors to hold it in position. Started with one bottom corner, and nothing else is anywhere near. But by persevering up one side and across the bottom, using plastic levers this time, we can start working across the top. Because the bottom isn't fully in the lip is miles away from the edge of the glass, but with pal variously pushing the lip up from inside the car and me levering from outside, we work along towards the final side. By now the seal there has detached itself from the body. It did that before, and we decided to remove the partly fitted glass and start again, but having done three sides we weren't going to do that again so struggled refitting the seal with the glass in the way. And by variously pushing the glass across to the already fitted side, pushing the seal from the inside, and more levering, it finally went in. Again with the glass in, and before the locking-strip, inject non-setting sealant under the seal on the glass side and the paint side by running the nozzle along lifting the seal up as it goes.


The front locking strip is the original, it's hard and crusty, and has a slightly different profile to the new, all of which make it much harder to get started, it keeps lying on its side in the main slot instead of its side flanges going into the side slots. Pal has brought along the purpose-made tool (pictured) with a wire loop which is a bit too small for the strip which was why we hadn't used it previously. But opening it out a bit, and with plenty of Swarfega, it suddenly starts going in easily, as usual the proper tool making life easier. You can get three different sizes of this tool from some suppliers, but the only difference seems to be in the width of the loop, and there is no sizing info so you don't know which one to get! A pro would have all three, but for occasional use like this you can get away with just one, either squeezing it smaller or levering it wider as we did. When replacing the cracked front screen I bought a kit where the locking-strip tool has a roller and is a single size, which worked well.

The plastic levers used for the glass were too thick, as were the peg halves. So it was a case of seeing what we could find in the tool-box, and towards the end I had been getting better results using a pair of long-nose pliers. So next day I had another go on my own, as well as having another look at a YouTube of fitting a front screen we had found the previous day. Jumping in stages through the prep and the seal, glass and locking-strip fitting at one point the fitter mentioned that sharp edges can cut the seal, but you can sand them down with emery. And sure enough the edges of the old trim I was refitting were sharp, serrated where they had been levered under the lip before, and with some crusty corrosion. However when viewing the video again I realised he was taking about the glass, and not the trim, so I was lucky to spot it. But some fine wet and dry smoothed it off considerably, after that it went in quite much easier - with the correct technique, of which more later. No discussion on that or another useless video of fitting trim to a rear screen of what tool is best, but from freeze-framing the first it looked like it was round bar with the business end curved over, and a ball-shaped end. Googling "windscreen fitting tools" came up with this at £12.99, although they also have a longer version which is almost half the price! However I think the shorter the better being easier to manipulate. There are similar hooked tools with a sharp end, which might help getting the ball-end tool started, but would cause more damage if they slipped. But back to the long-nose pliers, at the ideal angle instead of having to lever the lip out a couple of mm at a time, I found I could push them along and ease the lip out and over in one smooth movement, several inches at a time, and ended up doing the second rear section, and the front second side and top and bottom, in not much more than a couple of hours. Care is definitely needed with pointed tools, at one point my pliers slipped and stabbed into the base of my thumb. Initially it looked like a couple of stitches might be needed, but plasters sufficed (with a thick glove for the rest!), and at least it avoided what could have been significant damage to paint. Bodies heal by themselves, paint doesn't! With both halves of the rear trim in place the ends were overlapping, which would affect how the finisher would sit, but by wedging a paint-scraper between the two ends, and levering, the two halves ended up end to end, and the finishers went in just fine.

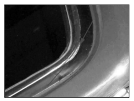
Rear glass:

With a pal helping the glass went in quite easily using mainly halves of sprung clothes-pegs to lift the seal over the edge of the glass, and Swarfega 'original' (smooth) as a lubricant. We did try cord, but it pulled away from the corners so we persevered with pegs for the rest. With the glass in, and before the locking-strip, you can inject non-setting sealant under the seal on the glass side and the paint side by running the nozzle along lifting the seal up as it goes. New locking strip for the rear as the original had vanished, and that pressed in quite easily using more Swarfega, both done in not much more than an hour. However because the rear seal had to be squashed up to fit in the hole it created a problem with the trim in the upper corners.

Trim:

Always slot in the paint-side first, so you are working on the glass side lifting the lip of the seal over the edge of the trim, to reduce the risk of anything slipping and damaging the paint. Not an easy task, the edges are so sharp it's very easy to cut the lip of the seal, which on new seals are very soft. On the plus side they are very pliable which should make it easier to winkle the lip out from under the edge of the trim. If reusing trim check the edges and smooth them off with fine abrasive paper if needed.

We really struggled fitting just one half of the rear trim - especially going round the upper corner as it is a tight turn, and it took an hour. fitting the second half in it looked like the ends would be overlapping with no space for the filler piece, and they needed tapping 'deeper' into the seal up the sides of the glass.



Because the rear seal has to be squashed up to get it onto the hatch flange, it is pressed into the top corners very tightly, so much so that it describes a tighter radius than the trim, and you end up with a gap between the outer edge of the trim and the lip on the seal. Someone on one of the fora recently mentioned a problem in this area, I couldn't imagine what he meant, and no one else responded, so - apologising for the potential insult - I wondered whether he had the trim upside down! But now I can see what he probably meant. It can be reduced by pushing the seal towards the trim to reduce the gap once the trim is fully fitted, but doesn't completely eliminate it, and it just moves back again. *December 2019:* Johnj on the MGOC forum found the same thing, and it occurred to me that perhaps a fillet could be inserted in the body channel in the glazing seal to push the seal out a bit, although that might need the trim and locking-strip to be removed. In the event John said that he was able to lift the edge of the glazing seal with the trim still fitted and insert about an inch of surplus locking-strip, which has taken up almost all of the gap.

May 2022: David Brown writes on the MGOC forum that Moss apparently retooled the upper corners and shows it fitting the trim as it should. He doesn't say when he bought it, mine were from Brown & Gammons five years ago.

After that, and one side piece at the front (the corners fitted first are easy), we had been going at it a good five hours so called it a day. We couldn't really see how we were going to cope with the long strips at the front, and wondered whether I would have to resort to taking it to a fitter, which can't be done until after the MOT. Particularly the long front sections didn't want to lie flat against the seal, but I found it very easy to carefully work along them bending a bit at a time until they did lie flat, although the top one still needs a couple of strips of masking tape to hold them against the seal until you can get a few inches in. Also when starting the very end tends to pop back out, but keeping an eye on it and going back to it, once 2 or 3 inches are in it should stay put.

With the lower strip at the front as I got to the end I realised it was almost 1/2" too long - where has that come from? By pushing the bottom corners round a bit, and pushing the strip along to one end as far as it would go reduced it a little, but didn't eliminate it - it's like it is the opposite effect to the upper corners at the rear and the front seal could do with being a couple of inches longer. I suppose I could have stretched it, but was concerned that it would simply shrink back and pop the trim out. In the end I could see no option but to cut a little off the end while 90% fitted, with a thick protecting pad under the trim and above the body, seal and glass, then file the edges smooth.

For the repeat performance at the front it was sunny and warm which isn't ideal for the Swarfega lubrication as it dries out pretty quickly, so I only applied it section by section. Corners first, went in easily. I'd bought the ball-end tool specifically for this job, and it really does make things easy. Next the sides, slotted the end in at an angle a few inches up from the bottom and pushed it down to give me a start. Then slotted the paint side in, and worked the ball-end tool into the seal slot. This is easiest done about an inch away from where the trim is yet to go in, working down to that point, then swinging the tool round 180 degrees and pushing it back the other way to start feeding the trim in. Keep pressure on where it's just been slotted in, push the tool up, and Bob's your Mother's Brother. For the last bit over the ends of the corner trim I used the plastic spreaders again. Top strip next, slot one end in and push to the corner piece as before. Twist gently to take out any cork-screwing so that it lies close to the final position, then as before, pushing across from the first side, then moving round to the other side and pulling the tool to finish off. Not quite central, so before fitting the last couple of inches I used a block of wood and a mallet to tap it across bit by bit into position. The bottom strip was a bit trickier as there was more of a twist and also a lateral displacement which meant it moved away from the seal as it went across the screen, but the same process had the same result. I was wondering about the length as last time I had to cut a small amount off the end as it overlapped the corner piece, but it was fine so I think that confirms it was down to the different seal used that time as this time the seal is the same.

Seats

The squab is the padded and covered seat back, what you sit on is the base or cushion.

Clausager describes many changes of cover, but there were also some significant changes in the frames. 1969 models gained reclining seat backs with a chrome lever on the inside edge of the seat back, and a tilt catch with a black knob on the outside of the seat. Prior to that the backs could be tilted forwards but could be locked in position by a bolted bracket. Other changes at that time were for twin-pole headrests on North American models. 1970 North American models had a single-pole D-shaped head restraint, which became optional and then standard for other markets, with fittings commonised with other BL models. Clausager also writes "The seat frames were altered to cater for modified seat belt mounting points" which is odd as the belts are independent of the seats, but it was possibly necessary for a change to the tunnel belt that allowed single-handed fastening.

October 2020:

Neil Clark on the MGOC forum reported a problem whereby his passenger seat was at the wrong angle, both the seat base and the back. It turned out that he had an MGC seat that side, MGCs having part of the floor raised to accommodate the torsion-bar front suspension system, and there are other differences. He obtained a Mk1 MGB base, and then had to search for an Mk1 MGB seat back, when he could perhaps have got away with fitting spacers on the front bolts.

Seat Removal & Refitting: *July 2013*

They can be a bit of a fiddle, but recently on a bulletin board someone wrote that they couldn't gain access to the rear runner bolts 'with his smallest socket as the instructions in the manual were wrong'. They subsequently wrote that they had found a better way on an Australian RV8 web site, but never came back with that method or a link to it despite being asked. Both my Leyland Workshop and Haynes manuals basically say "Release the seat catch and push the seat fully back to gain access to the front screws. Remove the screws and push the seat fully forward; remove the rear screws and lift the seat and seat runners from the car". I can't see much there to be 'wrong'.

On both my cars sliding the seats fully forwards exposes the rear bolts more than enough to get a socket on a long extension on them, but only once the front bolts have been removed which allows the front of the seat to move across clear of the tunnel. However with the seat fully back the front bolts are covered by the front of the seat frame just enough to prevent a 3/8" wobble extension and socket, or a 1/4" straight extension and socket, or the ratchet on a socket directly from locating on the hex head, so a ratchet ring driver needs to be used. These are worth their weight in gold in the common sizes of 7/16", 1/2" and 9/16", and if you don't have one you will be fiddling with an open ended or a fixed ring for some minutes! But there is another ploy and that is to remove the stop-block at the back of the outboard floor runner, which allows the seat to slide back enough to get a socket wrench on the front bolts.

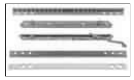
However there are a couple of things to look out for. The first is the seat-belt buckle, that it isn't preventing the seat from sliding fully forwards, or the seat back ditto - this should be obvious. Less obvious is if the front of the seat is hitting the tunnel as it tapers outwards, before the end-stop is reached, and both these may prevent the rear bolt heads from being exposed. For that reason it is probably best to do as the manuals suggest and remove the front ones first, as that will then allow the front of the seat to swing across a bit as it is pushed forwards, and so clear the tunnel to move fully forwards. Earlier seats and runners could be different, the Mk1 tunnel is narrower, and with non-standard seats you are on your own.

For the runner to floor bolts/screws the Leyland Parts Catalogue specifies SH604101 which translates to GHF102 in modern parlance, and are 1/4" UNF x 1 1/4" fully threaded set-screws. However the MGOC supplied GHF117 to Albert Trayner which are only 3/4" and he couldn't get them to catch the threads. Other suppliers say SH604081/GHF101 which are 1" but would probably be fine. In fact they may be preferable especially at the front where you have to use an open-ended spanner if you don't have a 7/16" ratchet-ring. Note that the spacers sit in holes in the carpet, they do not sit on top of the carpet like the slats do, which would need a longer screw.

The next thing to watch out for when lifting the seat out, and replacing it, is that the tunnel-side floor rail doesn't fall off the seat rail and ding your paintwork, the sill-side runner is retained by the adjuster mechanism. The easiest thing to do is take the loose runner off before lifting the seat out, and only refit it after the seat has been lifted back in, as described here.

Refitting: People seem to get equally exercised about refitting them, saying to put the rear bolts up through the floor first to locate the runners on the threads, before removing first one then the other. If you have the correct slats and large spacers, and if the spacers are in holes in the carpets as they should be and not sitting on top of it, then **refitting** shouldn't be any problem at all, as the holes in the floor pan should be clearly visible through the runners and large spacers. Maybe a little more difficult with new carpet. The spacers should be held in position by the carpet, so it's just a case of positioning the carpet over the holes, inserting the spacers and fine-positioning them and the carpet, placing the wood slats over the spacers, then dropping the seat in. If you are struggling then a spare bolt (or two) with the head cut off and screwed in a couple of turns from above makes more sense than screwing up from underneath, or simply a cross-head screwdriver to wiggle the carpet, spacer and wood slat into position. The front floor-pan nuts are concealed in the crossmember, so you would only be able to use headless bolts or screwdriver from above anyway. If you get the easy rear ones in first (i.e. the reverse of removal as the manuals suggest), but not fully tightened, then with the seat pushed fully back on the runners the front holes must be at the correct fore and aft distance for the floor pan bolt holes, and it is just a matter of pivoting the front of the seat and runners sideways a bit to locate first the hole in the spacer, then the hole in the floor pan, and removing the stop-block as above will make that easier.

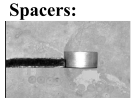
Slats & Spacers: *September 2016:*



When I restored Bee in 1990/91 as part of completely replacing the interior I also replaced the wooden slats and spacers under the seat runners. The former were rotten but the latter were missing altogether, as I recall. I was perplexed to find the holes in the slats were nowhere near where they needed to be to fit the runners, so had to cut new ones. With considerable care, as the large spacer fits in the holes, which doesn't leave much wood left between there and the sides. Looking at seat components for something else I came across the attached from Moss (also available from other suppliers ...), which includes slats with two sets of holes cut, exactly as I had to do. When I bought mine they must have been for something else, or just plain wrong, as they extend forwards more than an inch beyond the end of the floor runners.

August 2018: As well as some people with longer legs having to position the runners further back on the floor, some have found it necessary to remove the adjustment mechanism altogether and bolt the seat frame directly to the floor to gain a bit more headroom. Some of these have fallen foul of their MOT tester because there is no adjustment on the seat. The regulation gives reason for failure as "fore and aft adjustment mechanism not working as intended" see DVSA MOT manual section 6.2.5 Driver's seat Defect para b i. If the intention IS that there should be no adjustment, by the seat being bolted directly to the floor, then it is working as intended. The DVSA have apparently said that this failure for a fixed seat gives grounds for appeal, if 'discussion' at the station fails.

Spacers:



Alloy discs, which go between the rails and floor at each mounting point. Some say their spacers are the same size as their slats, whereas mine are nearly twice as thick. For that reason I chose to cut holes for the spacers in the carpet, and leave the slats sitting on top of the carpet. The bulk of the weight is taken by the spacers, but the slats on top of the carpet spread some of the load and support the runners. With different thicknesses like mine if you put both on top of the carpet the slats wouldn't be doing anything at all, and the runner could sag in the middle. If they are the same thickness, and both placed on top, then as the carpet compresses it could loosen the bolts. But if holes are cut for the spacers then as you tighten the bolts and the runners try to tighten down the slats onto the carpet by the same amount the runners are likely to bow and jam the seat. To get round that some have slits in the carpet so runner, slat and spacer are all on the floor, and a flap of carpet sits on top of the runners. I don't know what original carpets had, but Prestige show holes (image NLA) which look large enough for my spacers.

Mounting Points

There have been a couple of questions recently about measuring up new floor pans for the seat rail mounting points. I'd expect Heritage panels to come with the holes and captive nuts already attached, after-market panels certainly don't or at least not always. The following measurements were obtained from my two cars, both sides, which although showed they slight variations from panel to panel there was a consensus.

The distance between the hole centres for the two rails, i.e. across the width of the car is 12 5/8".

The fore and aft distance between the two holes for each rail should of course be governed by your rails!

The front holes are above the fixed cross-member, about 1" behind the centre-line of the jacking point in two raised pads. These pads are in a flat area between the front and rear flutes, which coincides with the cross-member underneath to give a flat surface for welding. For what ever reason the pads seem to be neither central to the flat area, nor central to the seat mounting points, the holes are displaced rearwards. If you use 1" behind the centre-line of the jacking point you should be OK, there is plenty of fore and aft adjustment of the seat after all!

The distance from the holes to the inner sill panel is 2 5/8" this should be enough to give a small clearance for sill carpets and not rub. It is important this spacing isn't too great or it moves the seat closer to the tunnel which causes two problems: 1) The seat can't be moved as far forward as it will foul the tunnel, and this also has an impact on accessing the rear bolts. 2) Depending in what type of belts you have the seat back may foul the buckle, which will also limit how far the seat can be moved forwards as well as how far the seat-back can be tilted forwards.

The distance from the holes to the tunnel is about 4 1/4" at the rear and 3" at the front, the reduced front measurement being due to the widening tunnel at this point. This occurs on both cars but may be different on 3-synch to my 4-synch cars.

August 2009: There are often questions about what to do about the front holes/nuts when replacing the floor or part of it. I had the same question after welding in a part floor and failing to mark, drill and weld the fronts before welding the floor in! I opted to weld the nut to a 1" strip of metal the width of the nut, cut a slot in the floor slightly more than the thickness of the nut plus strip, then with a bolt in the nut I was able to fiddle the nut through the slot, turn the strip at 90 degrees to the slot, and weld. But after reading other suggestions of a long bolt that goes right through the floor and crossmember (distorting the pan/crossmember if overtightened), or welding a drilled and tapped plate to the **top** of the floor pan (OK if it replaces the alloy spacer, but doesn't give enough thickness in my view), and how drilling holes in the **rear** crossmember to allow insertion of a socket to make installation of the gearbox mounting rubbers easier, it suddenly occurred to me that surely the easiest method is to drill such a hole in the front crossmember, plugging it afterwards with a rubber bung (never mentioned in the case of the rear crossmember) to prevent water ingress and corrosion, although that box-section is hardly water-tight anyway, and drainage and air circulation might be beneficial.

Head Restraints

Twin-pole head rests were provided on North American models in 1969. For 1970 these changed to single-pole D-shaped restraints, which were subsequently made optional and then standard for other markets, and the fittings were commonised with other BL models.

In Bee's seats there is a friction arrangement inside the frame which is supposed to keep the restraint at the desired position. It consists of what looks like a coil spring made out of swarf, in a tube going across behind where the headrest tube goes down, held in place with a wire tie. There is also a spring-clip that locates in a slot in one side of the restraint tube, which hooks under the bottom of the hole in the frame, which only allows you to pull the headrest up so far. Be aware that this has very sharp corners, particularly the part that sticks out of the slot in the tube. Some recovering instructions say to cut a hole in the back of the cover so you can release this if you need to pull the restraint out altogether, which you wouldn't want to do if planning on refitting. But you should be able to peel the cover up from the bottom turning it inside out as you go, with the restraint fully extended, and expose it that way. I had great problems getting the restraints moving in the tubes when I first recovered Bee's seats, to the point on the passenger side that I had to use a hydraulic bottle jack sitting on the floor, with a piece of timber wedged underneath the headrest, and jack it out.

November 2017:

Vee's are quite different in that there is a plastic rod with a steel bar inside. The head restraint has to be withdrawn before this can be removed, but that was easier in this case, it just needed a hammer and wood drift to tap the clip at the end of the restraint tube up inside the seat frame tube, then it could be pulled out. It is easier to lift the seat out and back in with head restraints removed - if you can. However to do that in a GT means the seat-back has to be reclined, or for non-recliners the whole seat has to be tilted back after the four seat bolts have been removed.

Covers and Foams

Three different designs of seat foams were used over the years. The first foams used until 1968 had pronounced humps at the front and sides of the base foam AHH7037 RH/AHH7038 LH. 1968-72 seem to have shallower humps AHH9970 RH/AHH9971 LH. 1973-80 only have side bolsters with flat fronts BHH922 RH/BHH923 LH. The same seat back (squab) foam is used for both sides - 1962 to 68 AHH7036, 1969 only AHH9681, 1970 to 73 AHH9969 and 1973 to 80 BHH1398. Seat covers varied at those times plus others with cosmetic changes, and mixing eras of foam and cover particularly the early and late bases may not give good results.

Note that there have been many complaints of replacement seat foams being too 'high', with people resorting to slicing bits off the bottom or drilling holes. I've sat in a GT with them and the wheel was practically brushing my thighs and my head was brushing the roof - most uncomfortable. A pal sat in an RV8 at launch and was looking straight at the top screen frame whereas in his MGB he was comfortably below it. That may mean that RV8s used the 'new' foams, or it could mean that MGBs were like that when new and have all 'aged'.

When planning to replace seat foams and/or covers pay particular attention to the shape of the foams and the covers. Despite reading three sets of instructions, including Lyndsay Porters otherwise excellent 'Guide to Purchase and DIY Restoration of the MGB' and the set that came with the covers, I only discovered that the base foams and covers are handed **after** I had glued on the first set while restoring Bee in 1990/91.

November 2023:

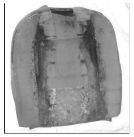
Years ago I read about 'hog rings' being used to secure covers to the frame, always from Americans and had no idea what they are. Both mine and others I have recovered have the edges of the base cover secured to the frame with clips BHA4339 on all four sides, but pal's 78 has small metal rings going through holes in the covers and clamped round the wire of the diaphragm. As he said, they are called 'hog rings' because they are a pig to fit (and to remove), and will use the spring-clips instead as that part of his covers is black. The benefit of the rings, particularly with light-coloured covers, is that they are invisible with the seat installed whereas the clips are visible from certain angles. My seat base frames, foams and covers are all tapered on the inside edge - the front is narrower than the back. Once glued on I did not want to risk damaging my new covers by ripping them off again. Fortunately the difference is not great, and although one can see the mistake if one looks for it, at least it does not stick out

like a sore thumb. I've looked at early and late seat **frames** at Stoneleigh and they all seem to have the same taper, but the early covers seem to be square.

December 2014: This started out as a few tips I discovered along the way when recovering Bee's seats for the second time that aren't in the supplied instructions. As you see there are quite a few!

November 2017: Recovering Vee's is very similar, any differences have been added to the appropriate paragraph. Things like it suddenly struck me that it's easier to leave the loose runner in the car, than try and lift the seat out and replace it still attached, and have to tie it, tape it or hold it in position to prevent it dropping out at the wrong moment. The out-board runner is fine as the adjuster holds it in position. With the bolts removed, fold the seat back forwards then tip the whole seat backwards and you can disengage the runner sideways i.e. without having to slide it out along it's length. Remove the seat still folded, which is probably easiest on the GT at least. Likewise on refitting the seat put the floor runner by the slat, put the folded seat in the cabin, tip it back (if not already done so e.g. GT), and slot the floor runner onto the seat runner. With the seat flat on the floor pull both runners to the rear to expose the fixing holes, insert the bolts leaving them short of tight so the front can move from side to side top help you locate the front holes with the bolts. Slide the seat back on its runners and do the fronts as normal, then forwards again and finally tighten the rears.

I recovered Bee's seats in 1991 but was disappointed with the quality of the new covers, noticeably flimsy compared to the OEM grey 'deck-chair' covers that she came to me with. Some 25 years later they have gone into holes in various places on the back and wearing thin on the seat. OK, quite a long time, but only 55k miles, whereas what look like OE covers on Vee that were definitely not new and have now done 100k and 20 years with me, and maybe 200k and 40 years overall, are in far better condition. Given the disappointing quality of the previous set I spent some time before deciding which ones to buy this time. Of the people that were able to supply samples only one had the original pattern of fabric and vinyl, but I (and others) have had too many problems with them so won't use them any more. Other than that I was able to see some ready-made covers at Motaclan/Leacy, which looked good to me, so were the ones I settled for, again opting for the black GT cloth over the roadster vinyl for summer comfort. Comparing old and new the old fabric seems to have a woven appearance and quite thin surface texture, and is backed by a very thin layer of foam, whereas the new have a much thicker brushed outer covering with more texture, and a much thicker layer of foam backing. Conveniently the base covers are marked 'right' and 'left' although the included instructions still don't mention the difference, but I'm not likely to get that wrong again! **Vee:** I used the same supplier again.



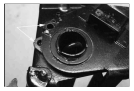
My new 7/16" ratchet ring spanner made removal of the front bolts a doddle - with those out first the seat can be pushed further forwards than normal to expose the rear bolts to a socket. The drivers seat came out easily, but one rear bolt on the passenger side was turning but wouldn't come out. Oddly this had a 10mm head, in the end I used my drill-driver to spin the bolt while I pulled up hard on the seat and it came free ... with a tinkle as what was obviously a free nut under the floor fell onto the ground! I don't remember, but previously I must have used an under-sized bolt and additional nut for some reason. Stripping starts with removing back from seat. There are nuts on the inside of the frame where the back pivots on the base, as well as the bolt being screwed into the base bracket, and 'penny' washers between the two brackets. Took no more than an hour (each seat, although I didn't start the passenger side until the drivers was completed), and that was with carefully peeling back the old covers from the foam where they had been glued to see if I could save the foams again. Ended up usable, as was the card backing. **Vee:** Unlike Bee's composite foam backs Vee's are one-piece, and in near-perfect condition as is the card backing.

Recently someone somewhere was asking if anyone knew of the availability of pivot covers, as his were broken and they were unavailable from the usual sources. Then while looking for something else on eBay I came across them, recognised them from somewhere else but couldn't remember where. Until I happened to get both cars out and there it was, large as life, on the V8. It attaches with a screw, which goes into a spire clip, and needs a hole in the base bracket, which Bee doesn't have. So sometime between 73 and 75 this cover came in, and Clausager gives it as September 73 at car number 329770, but no reference to them in either of the Parts Catalogues or at any of the usual supplies as far as I can see. They are handed, and need a bit of thought and persuasion to refit. Slide the slotted part over the seat base bracket, then pushing the covers and foams out of the way they can be swung back and down into position. Make sure the spire-clip is in the correct position over the bracket hole first.

As far as removing the head restraints goes Bee's drivers side only slots in loosely, as I used to remove that altogether to fit the tonneau cover that came with the car as that had no pocket (the passenger side was OK as that folded right forwards to be under the cover, the drivers side can only go so far because of the steering wheel). No longer an issue as I have replaced the cover with one with pockets. As previously I couldn't shift the passenger headrest, but was able to peel the cover up and remove the backboard to expose the bottom of the tube, then used a hammer and drift to drive it out. Neither headrest has it's upper 'stop' fitted, but I do still have one of the originals from 25 years ago! With both headrests out the friction device can be removed, which consists of nothing more than what looks like 'coiled swarf'. Only a short piece and some broken bits on the drivers side, more complete but still damaged on the passengers. I shan't be putting those back in as they jam the headrests altogether. However they do need to be raised to act as head restraints, so I may put spacer tubes over the existing tubes to hold them at the right height, as only we two are ever in the car and always in the same seats. **Vee:** Vee's won't shift so again I pull the cover inside-out up and off the back to expose the friction mechanism. which is quite different to Bee's. Tapping the bottom of the restraint tube with a hammer and wood drift gets them out.

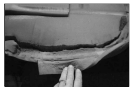
Whilst new-stock back foams are probably OK the base foams are too high and/or too dense. I've sat in a GT with those and the wheel was brushing my thighs and my head was against the sun-roof surround. In the event I reckon both will last another set of

covers, saving getting-on for £100. The hessian is like Swiss cheese, so order some off the internet, it prevents the edges of the webbing in particular from cutting into the foam. The backboards are still usable, and the webbing still has plenty of tension after a dozen years or so. **Vee:** Seat foams, webbing and hessian also in very good condition, but for the cost - £2.49 per square metre, I order new hessian to use a double-layer as I did with Bee. Except for the covers it's all in surprisingly good condition. Given the amount of what looked like decomposing foam dust that had been gathering on the carpet under the seats, I expected them to be in very poor condition. Quite possibly recovered with new foams, card and hessian before my time, but the only thing that looks like it could be a date code on the foams has what would be an '04' year number, and I've had her since 1995!



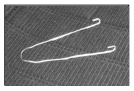
Something I've been wanting to do for 25 years was have a look at Bee's drivers reclining mechanism. When refitting the seats after the previous recovering a metal pin fell out, which looked like it had been welded somewhere. After that, I found that if I leaned back hard to get something out of a trouser pocket the seat would shoot backwards - so that pin was probably something to do with the recliner. I kept it, but it's got mislaid somewhere along the way. Examining the frame carefully there is another welded pin that guides the recliner handle mechanism - at least it should be welded, this was quite loose which allowed additional movement of the handle mechanism. I wonder if that is the problem and the other pin is a red-herring. Then where the seat back pivots during reclining I could see a hole with some weld around it where something had obviously broken away - that must be it. There is a plate underneath that with another hole, and when the two holes are co-located with a pin it locks the teeth of the reclining mechanism together until the reclining handle is operated. Without that pin the seat back is 'free' (against considerable spring pressure it is true) to move without use of the reclining handle and disengage the teeth of the reclining mechanism, which allows the seat to shoot backwards. I find a bolt with a plain shank that just fits the holes, cut it to length, and weld it in place, as well as welding up the loose guide pin. I could put the seat back in the car and lean back hard to test it, but that's a bit of a faff, so I wedge the corner under the full length ramps, which have the weight of Bee on them, and push hard on the back, and it shows no signs of moving. I'll leave it at that, if it still collapses I wouldn't really know how to fix it, so I'll just live with it and not lean back hard!

The irony is that when I had fitted the new cover I could clearly see my repair to the pivot, so could have reattached the original pin - if I had known where it came from at the time - when it fell out all those years ago!



The back foams on the drivers side have torn a bit where they rest against the outer frame uprights, so I lace three strips of gaffer tape round the outer uprights and behind the rear uprights to give it a bit more support. The backboard goes back on with two screws and large washers at the bottom, and a few pieces of gaffer tape to the frame sides and top. Sprayed glue round the frame and corresponding parts of the foam. There is a rectangle of vinyl that I have left glued to the top of the back foam around the headrest hole, so I position that over the hole in the frame. Another 'supposed to' is to glue polyethylene over the shoulders of the foam to help the cover slide down. I did that last time, but never liked the crinkling sound it made ever after. Other instructions say to put a plastic bag over the foam, then rip it out after pulling the cover fully down. That is preferable, but I decided to glue a strip of cling film over the shoulders and down the sides, which allowed the cover to slide fully on quite easily, and doesn't make a noise when using the seat. **Vee:** No such problems with the foams, and the back-boards are in good condition, but I'll probably do the same.

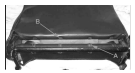
After a trial fit I pulled it back up again to fit the half-moon cards (provided with this set, unlike the previous where I had to make my own) into the pockets at the bottom of the sides. It's worth spending a little time teasing the stitched edges inside the pockets onto the inside face of the card, so the cards are fully seated in the pockets and the outside face of the vinyl has a nice flat appearance. Glue them in place as they can get dislodged while fitting the cover to the seat and the stitching ends up on the wrong side again, although this needs doing before the cover is fitted to the seat. All work so far has been done with the back re-attached to the base as that holds the back upright while pulling the cover down. **Vee:** Vee's half-moon cards are not ideal, one is OK, but the other had been glued into the pocket which pulled some layers off on removal, leaving it a bit thin and floppy. However the previous set came with new cards so hopefully these have as well.



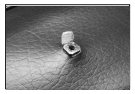
Next the ears need to be screwed to the brackets on the seat back, as this helps to keep the cover tugged fully down when you come to clip the vinyl to the bottom of the seat back. Easiest done with the back removed from the base. Finding the existing hole for in the brackets is tricky. You could cut the head off a self-tapper, screw it into the bracket point outwards, then tap the outside face of the ears with a hammer so that the point of the self-tapper pierces the car and the vinyl, then remove the self-tapper and fit the screw and cup-washer. I opted to make a 'puller' out of bent coat hanger wire, which hooked over the straight edge of the card in the ears, held in position with a bar wedged across the frame to keep the ears tugged down, then drilled through from the outside. You only need to be approximately in the right area as the bracket is plenty big enough. I did this the last time, and there were already two holes there then so whoever had fitted the covers that Bee came to me with had obviously done the same thing. There are now four holes, but that doesn't matter as they can't be seen of course.

As pulled on the cover will take the shortest route across the seat back above the face of the central section of the foam between the side bolsters, but it needs to be glued down with the vertical stitching on the cover positioned in the angle between the central foam section and the side bolsters. The outer corners of the bolsters need to be as near to the join between the cloth face and the vinyl sides of the cover as they can be, but left to their own devices they will be a couple of inches away under the cloth face. Push down on the face of the cover while simultaneously pushing the edge of the foam towards the join, and the stitching will reach down to the angle

between the central and side bolster sections of the foam more easily. After practising that with no glue, spray adhesive into the angle between the foam back and side bolsters, and onto the vertical stitching on the back of the cover that needs to fit into that angle. A couple of applications is probably best as both surfaces are absorbent, then repeat the manipulation of the foam towards the join between cover face and sides, before pressing the vertical stitching down into the angle between foam back and side bolster, while trying not to stick yourself to either part. With both sides done press down with the forearms up the line of stitching until the glue takes.



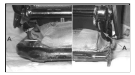
Apply adhesive to the inside of lower back of the cover and the 'angle iron' that this piece attaches to with the flat clips. Wrap the vinyl round the angle iron, leaving a triangle folded back at each side where it is attached to the vinyl sides, pushing the horizontal edge behind the foam, and fit the flat clips. This is easiest done before tackling the vinyl strip at the bottom of the face of the seat cover, that goes round the large tube, attached with four round clips. Note that the clips you took off the tube will probably be larger than the ones taken off the base frame having opened up a bit, so if you haven't kept these separate pick the four biggest to refit to the tube. These have to be lifted over the tube, simply pushing them on will probably tear the vinyl from the 'teeth' on the clip that hold it in place.



Finally tap with a hammer on the vinyl where it lies against the edges of the square bar for the reclining handle, to cut out a neat square of vinyl, and replace the handle.

For years the Navigator has been complaining about a rattle somewhere behind her, and whilst I could just about hear it myself when she was in the car I couldn't when I was on my own. The toolbox lives in the boot immediately behind the bulkhead her side, but despite removing that and everything else it was still there. But when manoeuvring her seat back on the bench during recovering (but not mine) I heard a rattle, which on investigation turned out to be the recliner folded torsion-bar spring inside the large tube at the bottom of the seat back. I stuffed some strips of hessian in there, time will tell if that has done the trick (it didn't).

The base is relatively easy. I had a metre of hessian and the width was enough for a double thickness on both seats. Apply glue to the foam and one side of one sheet first, then stick that down, then more glue on the top of that piece and the second piece, and stick that down.



The instructions say to make identical marks on the base foam and cover at the front, but I found with these base foams with the raised sides and flat front it only goes on in the correct place. If you have the humped front foams and apply glue to the hump you probably will need to mark foam and cover first to get it aligned. What is very important in all cases where the seat back can tilt forwards is to get the **rear** of the foam, where it goes under the seat back, in the correct position. It is tapered in that area between the pivot brackets because part of the back frame drops down either side of the foam and cover there. Get it off-centre, and the back frame will come down onto your new cover and foam, crushing it, and perhaps eventually ripping it. Re-attach the back to the base with just a couple of turns of each bolt, drop the foam on the base and position it between the relevant parts of the back frame. I used pieces of tape on the base rear tube to mark the position. Check that the angles between the central flat parts and the side bolsters of the seat foam line up with the vertical stitching on the back cover and adjust if necessary. With the seat back removed again glue the foam and hessian to the front and side rails of the base using your marks. Trial-fit the cover to check all is well, apply glue to the central section of both foam and cover, and fit the cover pulling it down at the front and the rear before pressing the central section down to bond. The stitching should lie in the angle between the flat part and the side bolsters, which should mean it will line up with the vertical stitching on the seat back.

The instructions talk about cutting the vinyl sides by the pivot brackets, but they also need to be cut either side of the uprights at the front that go down to the runners. Cut at the front down the inner side of these uprights, and again on the sides in line with the rear edge, and fold the vinyl back on itself, then you can neatly glue and clip the front and sides to the frame. At the pivot brackets cut in line with the front edge of the bracket and tuck the rear part of the vinyl behind the brackets. I applied glue to the sides of the foam at its narrower section behind this bracket to keep the cover from getting trapped under the metalwork of the seat back as it is folded back. Tuck the spare vinyl between the webbing and hessian.

Also necessary is to cut the rear vinyl strip in line with the end of the bar that is welded to the rear tube, that the tipping seat back latches behind. If you try to wrap the vinyl round that it won't lie flat and can't be clipped there anyway. That allows the vinyl to be neatly glued and clipped to the main tube, with the surplus again being tucked between the webbing and hessian.

And that is basically it. Reattach the back to the base, with penny washers between the two brackets and the smaller washers under the bolt heads. As soon as the bolt thread starts coming out of the inner bracket, position the lock-nut on the inner face so that as you screw the bolt into the bracket it screws into the nut at the same time, much easier than trying to fit the nut afterwards. Tighten the bolt just short of nipping the small washer up, then hold the bolt while you tighten the lock-nut.

Finally refit to the car, ~~fitting the lower runners to the upper first~~. The adjuster should hold the sill-side runner in safely, ~~but you will need a tie of some kind round the tunnel side runner and frame member to stop that sliding off while lifting the seat into the car, removing it once the bolts are in but before tightening them~~. **Vee:** As mentioned above by removing the loose runner while the seat is still in the car, and not reattaching it until the seat is back in, avoids it dropping off when lifting it in or our, or having to tie/tape/hold it. It's also easier to leave the head

restraints off until the seat is back in the car in a GT. However I then discovered that it wouldn't go in with the seat back upright as the roof was too close, nor with the seat-back tipped forwards as the screen was in the way! Fortunately, with reclining seats, they can be fitted with the seat-back reclined. If you chose to leave them out on non-reclining seats you will probably have to tip the whole seat backwards before inserting any bolts.

But after using Vee for a couple of days, I'm finding that with the new covers the belts are slipping off the shoulders of the seats when getting in and out, instead of staying there and being easy to grab hold of to fasten before driving off. They wouldn't stay there at all on Bee so I made some retainers/guides some time ago, so make another pair for Vee.

Seat Webbing/Diaphragm

Both my cars have webbing. Clausager writes that originally Pirelli webbing straps were used to support the base foam, then a diaphragm from April 63, and a new diaphragm from December 64. I've not found (but may have missed) any further references to webbing and diaphragms. The Parts Catalogue lists webbing BHH580 throughout production, but some suppliers show the diaphragm used up until 1969 (when the frame changed significantly) or 1970, 71 or 72, and webbing used thereafter. On the face of it the diaphragm ought to be preferable as it is seems less likely to lose its support over time, which is what happens to webbing, but I had those on another car and the wire moulded into the rubber ripped out. Also Sven Hinrichsen writes (scroll down about half-way) that on his the wire was so thin that it bent simply under the tension of being attached to the frame, not even being sat on, and he had to retrieve the much thicker wires from his old diaphragms (which had ripped out of the rubber) to reuse.

Updated July 2022: Webbing uses two more hooks than the diaphragm - four down each side plus two front and two more at the back. The diaphragm only uses two each side plus two in the front corners, and again two at the front and two at the back. Early frames don't have the holes aft of the seat back mounting point and are also missing one each side further forwards, which would have to be drilled to use the webbing. Later frames seem to have holes for both types which means you can use whichever you prefer.

I changed the webbing on both seats when I restored the roadster in 1990/91 and the drivers side again about 10 years later. A few years later sitting in the passenger side I realised that side needed doing as well. The webbing hadn't broken as before, but had lost its tension. As such it came off relatively easily, but I remember some difficulty in fitting new webbing on both previous occasions, getting enough leverage to stretch the webbing enough to get the 2nd hooks into the frame, and doing it on my own. Previously I had used a length of timber and some rope, levering the timber against the frame with one hand, to pull on the rope looped through the main wire frame of the webbing, using one foot to hold the seat steady on the ground, and the spare hand to press the clip into the frame. It was a bit of a fiddle tying and untying the rope each time and getting the right length of loop, this time I decided to try something different, and it was much easier.

Remove the seat from the car by undoing the front bolts first (with a 7/16" ratchet ring). This then allows the seat to be moved right forward so you can use a socket ratchet on the rear bolts, which is much quicker. If you undo the rears first you will probably have to use a spanner on all four. When lifting the seat out of the car watch the tunnel-side 'fixed' rail doesn't fall off and hit your bodywork, it is now only hanging on the sliding lip. As recounted here with the bolts out tip the whole seat back and detach the inner floor runner, and don't replace it until the seat is back in the car. The outer rail should be held securely by the seat-locking mechanism. Remove all the spring clips holding the seat cover onto the frame and peel the cover back as normal, and remove the old webbing. Don't chuck it yet, one of the hooks on the new webbing was missing when I received it, and another pinged off somewhere, the old ones were fine as replacements.

December 2014:

Subsequently on webbing I used a pair of channel lock pliers to pull the wire that goes through the hooks towards the frame, then another pair of pliers to manoeuvre the hook out of (or back in to) the frame. Do the front edge first then the rear (which has no wire through the hooks) can by unhooked by hand. Much easier than the diaphragm or the previous rope and lever method with webbing.

Take this opportunity to clean and grease the sliding parts of the rails, making sure they are straight and flat. Also replace the wooden slats and alloy spacers if they are missing or (in the case of the slats) rotten. If the seat lock wasn't working properly, now is the time to tweak that as well.

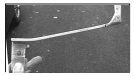
Refitting the seat is the reverse of removal, ~~again watching the inner rail doesn't fall off~~ not attaching the inner floor runner to the seat runner until the seat is back in the car, and tipped right back. I've not found it difficult to locate the bolts (rears first as they are easier to see) by wiggling things round until they line up, but some recommend putting bolts up through the rear holes first (you can't get at the fronts) as locating pins. With the back bolts in just short of tight, and the seat pushed right back on the runners, you only have to wiggle the front of the seat from side to side a bit to locate the first front hole, then the second should be in the correct position.

Windstop

Observations on a commercially available product

I've never been a fan of WindStops or 'hair nets' as 'wind in the hair' has always been part of the enjoyment for me - as long as I'm wearing a hat to stop my hair from flaying the skin off my face (when I had more hair, and longer) - but the Navigator finally nagged me into doing something about it as she finds the buffeting at 60 or so for long distances wearing, and the alternative is hood up which is no good at all. Having seen them advertised for £170 or so for the solid plastic ones - and where do you put them when you aren't 'wearing' them? - or up to £250 for fabric ones (which still have a solid frame) I thought I could do better myself.

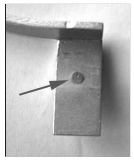
But first I wanted to see how effective they were. I bent a couple of brackets from aluminium curtain track to slot in the tonneau bar sockets and wired a piece of old plywood to them. Couldn't see behind me using the interior mirror of course, but it was good enough for testing on a quiet road. I was surprised how effective it was. At 40mph there was no buffeting at all, whereas you can feel it start from as low as 10 or 15mph without, and at 70 mph there was still hardly any, so the solid ones certainly are effective. But I had in mind a fabric one that I could fold up and tuck away when it was not in use.



A neighbour had given me some aluminium sheet many years ago - her husband had been in the car industry in design even further back and this was some 3/16" thick stuff he had used for chassis and body frames, it was the ideal thickness for a snug fit in the tonneau sockets. I cut and shaped a pair of brackets that plugged in the sockets and more-or-less followed the line of the folded hood frame behind the seats nearly to the horizontal line of the tonneau cover over the folded hood. These ended in a vertical post about 10 1/2" high that was going to be the support for the fabric. I say 'vertical' but they are inclined in towards the centre of the car to follow the line of the screen side rails when viewed from the rear as the adjacent pics.

I drilled holes at the top and the bottom of these posts to thread 'shock cord' like bungee or those spider things used to secure suitcases to roof-racks, but much thinner at about 3/16" diameter - about £3 for 3 metres. These were going to run across the car to support the top and bottom of the fabric. A length of poly tubing to go over the vertical posts to act as a smooth support for the sides of the fabric to stop fretting and wearing through of the fabric - about £1 The bungee runs vertically through these tubes to avoid having any knots at the top and hence clearly visible.

Black veiling material seemed close to what I had in mind, although the holes were a little bigger than I would have wanted and the threads 'holding them together' a little thinner, but for £1 for enough for four single thicknesses, two double, or one quadruple it was cheap enough. Before cutting the material I did test runs with one, two and four thicknesses held on to the frame and bungee with clothes pegs to check effectiveness. As I suspected even four thicknesses was not as effective as the solid board, but was beginning to affect visibility. So I decided to opt for a double thickness with clear polythene in the middle.



After the test I noticed that the brackets had tended to work their way out of the sockets a little. I didn't think it would come out altogether but neither did I want to risk it, so I drilled and tapped the tongues of my brackets for a cheese-headed screw, which I then ground off at an angle. This would enable the tongue to slide in without difficulty, then the high edge of the screw head would engage in a convenient hole that was already in the socket. To remove the bracket from the socket one has to pull against bungee tension to disengage the screw head from the hole before the tongue can come out of the socket, which isn't going to happen while on the road.

I had trouble finding some polythene that was clear for distant objects (most 'clear' stuff is fine when wrapped around something but opaque when looking down the road through it) but eventually found a large bag that had originally contained a folding garden chair - £0. Rolled the top and bottom edges of this around a length of dowel to form a tube to thread the bungee through, stuck down with double-sided tape. The same neighbour who had given me the aluminium was very interested in how I was planning to use some of it, and used her machine to sew up a double-thickness of the material so that it slotted over the verticals and I could thread the bungee through from side to side to make the finished article.

So for a fiver and some time I had something the Navigator declared herself well pleased with during our recent visit to the New Forest, but there are a couple of areas for improvement. Both concern the polythene which is very thin and was chosen for its visibility: Because it is so thin the buffeting that it is now stopping reaching us is causing it to flap which is quite noisy, it also bows out under the air pressure and this can result in reflections from the sun which reduce the area I can see through, so the hunt is on for a stiffer but equally transparent substitute (hood rear window material perhaps?) for MkII. I might also extend the screen to the tonneau cover to reduce the draft behind the seats ... or is that going to far?

Update: Put a couple of thin metal rods vertically between the top and bottom bungies about 1/3rd the way in from the ends. This keeps the bungee at the correct distance apart and supports the front of the screen, both of which reduce the bowing, flapping and reflections.

In very blustery conditions on the A14 passing Cambridge the bracket my side broke where the horizontal strut is turned upwards, but at least the remaining half still sheltered the Navigator. I tried welding it but it wasn't going to work so I fabricated a new one out of the large amount of aluminium sheet I still have from when I originally made it. If I get another breakage I'll get another pair of tonneau sticks and modify those.

Must be something about May. On the way down to the Tamar Valley Run the Navigators side broke this time. I was able to jury-rig another support out of a jack handle and some wire, but wasn't going to fiddle about with aluminium any more as it obviously can't take the stresses. I'd thought about modifying tonneau sticks, but it was going to be some time before I could pick up another pair at a spares show and needed it before then, and didn't want to chop up the pair that came with Bee. So I toddled off to B&Q to see what they had and was surprised to see quite an array of alloy and steel bar and tubing both round and square, and got a length of bar and two of tubing of different sizes, all in steel.

The part of the old strut that goes into the tonneau sticks socket and horizontally rearwards seems strong enough, it is the angle where the horizontal section turns upwards that has broken each time. So I shortened the horizontal section by about half and with a bit of swaging fitted it into a length of the larger diameter tubing, cut to just before the turn upwards.

I was going to use the bar for the turn from the horizontal and the vertical section and it had to be small enough to go through the netting and plastic tubing along with the bungee, which made it too small to fit into the tubing used so far. But with more swaging I used the smaller tubing as an intermediate, and the three were welded together.

I bent the bar to the appropriate angle, cut it to length, welded a couple of brackets for the bungee where it turned across the car, fitted it and the plastic tubing and netting, and job done. A couple of quid and a few hours fun in the garage, with plenty more bar and tubing left over for when the other side breaks again.

Which it did June 2008 on the Bridgend Vales and Valleys Run. Another couple of hours using the passenger side as a pattern and the drivers side should now be OK. However the internal plastic membrane needs a bit of attention as the corners have come unglued and are wrinkling up, but I'm pretty amazed both it and the material have lasted as long as they have given the battering it gets on long journeys.

No further problems yet but whilst the mesh fabric is holding-up the plastic inner sheet is getting a bit ratty and opaque. Idly Googled 'windstop fabric' one day and this link to a document explaining how to repair an MGF/TF windstop comes top of the list. Not a lot of use to me in itself, but it includes a link to Ikea for some apparently suitable fabric (FLYN LILL) at only £1.36 a roll! Not dead handy to me, and not available online, but worth a look the next time I'm passing.

Bought a roll of the Ikea FLYN LILL fabric towards the end of last year, so now it's time to do something with it. The MGF frame is solid tubing with a slot and filler strip, so it is relatively easy to clamp a single thickness of material in the frame. I want to be able to fold mine up as before, i.e. keep the side struts and the top and bottom bungee so have to have a double-thickness folded over the top bungee and sewn together below the bottom one. I made a hardboard template to fold the fabric round, cutting to have a couple of inches of spare in each half at the bottom and several inches at the sides. Pin at intervals along the bottom, then slide the hardboard out and start stitching, just the 44" between the bottom of the uprights, and use a line of household glue along the stitching for strength. Slid it onto the assembled struts and bungee, attach to the car, and trim the ends to be a couple of inches long following the angle of the uprights.

The big question was how to attach the sides, short of more stitching and glue, which would be a 'no going back' operation. I thought of sliding some split tubing down over the uprights trapping the material, and browsing B&Q found a length of white plastic plumbing pipe intended for 'push together' fittings (Speedfit), which looked about the right internal diameter. I slit this lengthways with a sharp knife, ran a screwdriver blade up and down the slit a couple of times to open it up slightly, and slid it down over the strut trapping the fabric. All went well until annoyingly the edge of the slit on the second tube caught in the fabric and tore it slightly. Cut a slight 'V' in the bottom of the slit to remove the corners and it slid on just fine this time. Oh well, it's double-thickness so not easily noticeable, and is worth running with to see if the overall thing is OK, plenty more on the roll to make another if needed. Trim off the excess from the bottom of the split tubing and we are ready to

roll. I've kept the wire struts positioned along the fabric but had to angle them slightly as the pocket in this version ended up not quite so deep.

On a quick test-drive it prevents the buffeting as before, but as it is fabric with holes some air does get through so there is a slight feeling of diffused breeze around the back of the head which wasn't there with Mk1. However that also means there is no noisy flapping of the material, so as such there should much less strain on the material and struts than before. This material has smaller holes closer together, so is more opaque than the previous version. I've only tried it on a dull day, i.e. things less visible anyway, so we shall have to see how it goes. I may paint the tubing (tricky being plastic?) and struts black to match the material, hood frame, tonneau cover etc. in the same area.

Happened to find some plastic primer I had bought in error some time ago thinking it was normal metal primer, also had some satin black, so relatively easy to paint the removed tubes. With them back on very pleased with the result, but then realised the framework between the bottom of the windstop and the tonneau sockets was still silver, so painted those satin black as well - even more pleased with the result!

That left the rear visibility. I had an old blind-spot mirror kicking around, and what looks like a convenient space above the existing mirror to position it, where the higher position as well as the convex construction would allow me to see 'behind' the windstop. The big question was how to mount it? Eventually I settled for a strip of black plastic (cut from the side of an offcut of square-section guttering downpipe ...) as wide as the additional mirror, cut and shaped (with a heat-gun) to clip onto the back of the existing mirror, with the new mirror stuck to that.

However the blind-spot mirror being quite a bit smaller than the standard interior mirror meant that I had to focus more intently on it to see behind - not a good thing to take ones eyes off what is going on in the arc in front of you for too long. So yet another blast from the past is the stick-on mirror I used while teaching my children to drive some 20 years ago. Made another bracket to clip the mirror-part of that onto the back of the existing, and that's much better. Even though it is only immediately above it can still see over the top of the wind-stop, and it can stay in place when the top is raised.

May 2022:

A couple of years ago small holes started developing in the fabric above the wire supports (but not below), which early this year developed into a short tear one side and a full length tear the other. The original roll of fabric had more than enough for two and of course I had kept it. The width is exactly right for doubling over the bungies, so removed the existing fabric (the support structure just slides out once the end tubes are slid off) and cut the new piece to length. The original join at the bottom had been loosely stitched and glued and was as good as new so I will do the same thing again.

Getting the top to bottom spacing is important, it really needs a former such as a square of card, and I 'just happened to have' two pieces of card from some new bedsheets that the Navigator asked if I had a use for a few weeks ago, and of course I said 'yes'. Compared that with the height of the old cover ... and it was perfect! So sat down and stitched the length which took less than an hour using a simple running-stitch. Glueing needed a bit of thought, I didn't want to lay it on anything and have the fabric stick to whatever it was, so I pegged one end to the top of a clothes airer, let the length hand down with the seam just off the side of the airer, and ran a bead of UHU down the stitched seam on the 'open' side. Half-way down turned it over to do the other end, then pinched the seam lightly between finger and thumb to stick them and the thread together.

Fitted the support structure minus cover to the car and it was sagging a it so tighened up the bungie. By that time the cover was dry so was ready to go back on, but I wondered if I could protect against more holes wearing through. Tried insulation tape over the top of the wire supports but it had bits sticking out which I thought would probably be as bad. Heat-shrink tubing would probably protect against roughness on the loops, but they would need opening out and closing them up again may damage it. So I settled for rubbing fine wet-and-dry over the loops to smooth off any roughness. I started to fit the new cover then realised that the wire supports had the cut ends of the loops against the back of the cover, which in use will have the cover pressed against them, which may well have contributed to the holes. So took the cover off again and turned the wires round. Fitted it to the car, tucked the ends of the cover round the main vertical support and slid the tubing back down, both sides, job done for another dozen years or so. That fabric has not available for a long time, but Klippfly in blue may do the job.

Observations on a commercially available product *by Michael Beswick, June 2012*

> Here are my observations on the MGOC windstop (made I think by Newton Commercial in Suffolk). I won't comment on the price, but if I think of increased comfort per mile it gets better!
>
> Fitting is more difficult than the instructions show!!! It rather presupposes there are speakers in the side trim that can be removed, as there can't be a B on the planet where the hood nuts are still captive. Alternatively the hood folding plate has to be fitted direct to the (metal) side and the trim fitted afterwards. (In truth the same problem would apply to adjusting the hood). As always with the hood fitting the position of the raised hood it critical to get to the screws. Re-fitting is simply the usual nightmare of everything moving about and needing 6 hands and 2 people!
>
> It does just fit with the new high backed seats with headrests, (although my seat is not fully far back), the windstop just touching the head rest.

The knurled nuts just foul the folded frame when the hood is down - not a problem - but a bit more so when putting the hood up, as jiggling is needed or preferably a person at each side.

The hood needs to be eased past it when being put down or the hoops catch and force the windstop backwards. My hood is not glued to the "rear" hoop so it can be lifted up out of the way to allow access to the hoops.

The bottom tube of the windstop is threaded to take the "knurled nut headed bolt". Mine was a bit rusty so I added Vaseline, but the quality of the "threading" will determine the life of the kit!