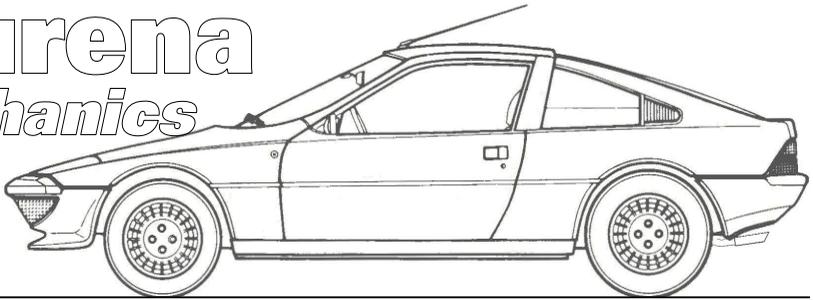


Murena *mechanics*

Roy Gillard



Head lamp pop-up system

Although this was the first car I had ever had with pop up lamps, I generally took the head lamps for granted as you would expect with any new car.

They popped up and lit up as designed... until one night when I was driving rather quickly down a twisty country road, with no roadside lighting, and no other cars around. Without warning, they suddenly dropped down and I couldn't see the road!

I quickly pulled the lighting stalk towards me to bring on the driving lamps (in their 'flash' operation) and held them on, so I could see to bring the car to a safe halt. At the time, there was little I could do roadside but after checking the fuses, relays and some wiring, by luck they came back on and up*, and I completed my journey somewhat more cautiously, but fortunately without further incident.

I decided at that point to try to find out what had happened, to see if I could prevent it happening again or if it did, would there be a way to bring the driving lamps on automatically to provide some lighting with which to see the road.

I got the manuals out to study exactly how the system worked, both electrically and physically, including the emergency cable.

Vacuum Operation

Unlike some cars where they use electrical motors to raise and lower pop up head lamps, the Bagheera and Murena use a vacuum system. This consists of a vacuum reservoir (a chassis cross tube in the case of the Bagheera) connected via a one way valve to the inlet manifold. The depression in the inlet manifold creates a store of low pressure (vacuum) in the reservoir.

Now we tend to think that a vacuum 'sucks' things, but the truth is that it is the normal air pressure being greater than the vacuum, that pushes those things since it is greater than the opposing force of the low pressure. This is important to remember since normal atmospheric air pressure has to have access to the opposite side of any diaphragm for any servo to work. This just might make things clearer too.

As you switch on the head lights you also activate, via a special relay (Bagheera) or diodes on the circuit board (Murena), a solenoid controlled air valve. This directs the vacuum to one side or the other of a double acting servo under the left front, and the servo either pushes the head lamp pods up or pulls them down.

To do this, normal air pressure needs access to the opposite side of the diaphragm so the valve is switching the open ports as well.

The open port when the lights are off is opposite the solenoid. **At no time should a vacuum be present here.** The open port when the lights are switched on, is a small hole near the solenoid.

Valve Explained

I have annotated below two diagrams from the workshop manual which should make it easier to understand how this valve should work and help you diagnose problems.

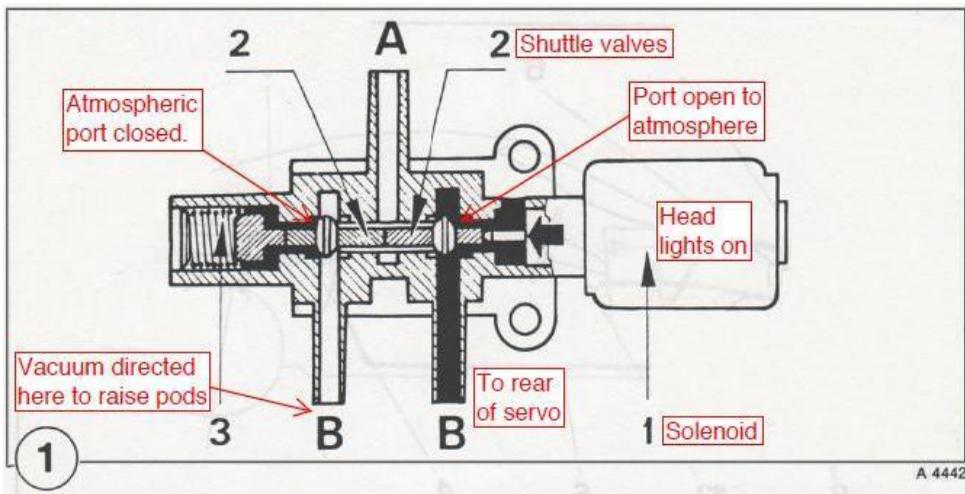
Diagram 1 shows the valve in the activated position when the head lamps are switched on. The solenoid has pushed the shuttle valves (2) to the left and the vacuum (white) is directed to the lower port furthest from the solenoid, as well as shutting off the atmospheric port. At the same time the small hole near the solenoid that allows atmospheric air (black) in, is now directed to the lower port nearest the solenoid.

The lower port nearest the solenoid is connected to the back section of the double acting servo, whilst the lower port furthest from the solenoid is connected to the front section of the servo. With atmospheric

pressure at the back, and a vacuum at the front, the diaphragm is pushed forward and the linkage raises the head lamp pods.

When the head lamps are switched off, the valve reverses the directions so the rear of the servo now has the low pressure and the front section has atmospheric pressure, so the diaphragm is pushed back pulling the pods down again. The inlet for the atmospheric air pressure now is at the opposite end to the solenoid and enters past the star clip and shuttle valve return spring.

The return spring (3) pressure exerted is important. Too much and it will try to stop the valves moving fully left when the pods need to be raised. This can cause the shuttle valve to fail to seal and the vacuum will continue to leak away and the pods will struggle to lift. It will also cause the engine to run weak with consequent power problems and since a weak mixture burns hotter, may contribute to the cracks that are experienced by these cylinder heads. Too little spring pressure and you lose valve return pressure. Therefore the depth of that star washer in the inlet port is important.



Although the workshop manual does not give a dimension for this, taking an average of all the valves I have which are known to work correctly, it appears that it should be around 4-6mm. Some later valves may have a split pin across the port, rather than a star washer, to retain the spring.

Overhauling the valve

If this valve appears to be sticking, and maybe causing the leaking, you can strip it, clean it and check its operation. Take care when removing it from the car as the two plastic mounting flanges can break, and also take care with the four long self tapping screws that hold the assembly together as they can crack the plastic body.

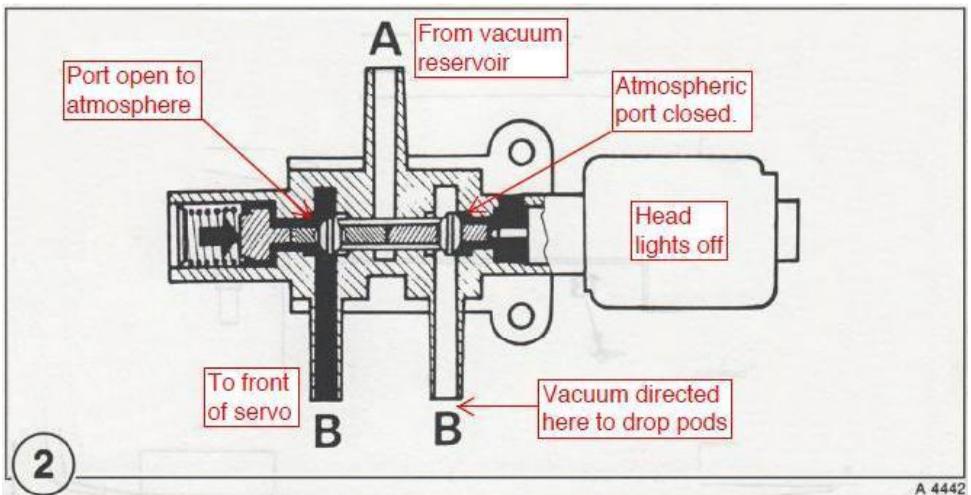
Have a nice clean area where you strip it, to make sure you don't lose any of the small pieces and carefully note how they all fit. The two shuttle valves are the same but only fit one way round, the longer lengths towards each other. Once it is all apart, make sure everything is dry and clean, and there must be no oil here. To lubricate the rubber seals and valves, I use a tiny amount of talcum powder! Blow off any excess.

Different Solenoids†

Be aware there are two slightly different solenoids fitted to these valves. They are easy to distinguish from one another and the first visual clue is on the outside. If there is an aluminium shield around the solenoid, which is fitted to retain the centre actuating pin, then the small diameter pin inside is a plain, tight, push fit into the large diameter pin.

If there is no shield fitted, then the small end of the pin will have an 'E' clip fitted which stops the complete pin exiting the solenoid body as the hole is too small for the 'E' clip to pass through. This is why it does not require the retaining shield.

The alloy retaining shield is held by being trapped between the solenoid and valve body as they are screwed together. This means the solenoid is slightly further back by the thickness of the shield. Therefore the pin has to be slightly longer than the one with the 'E' clip, the difference being the thickness of the shield (1mm). The pin only moves 2mm, so you can see that the difference in pin length is important.



Emergency cable

Only certain Bagheera (usually German spec. models to meet their laws) were fitted with these, but all Murena were fitted with an emergency cable to raise the lamps, but there are a few things you need to understand about this system.

The first thing is that if the vacuum is still trying to pull the lamps down, there is no way you will be able to raise the lamps more than a few inches and as soon as you release the cable they will slam down again. This situation could happen if you switch the lamps on, and they do light up but for some reason the valve is still stuck in the down position. In this situation you have to stop the vacuum going to the servo. (or switch the vacuum temporarily to the other side of the servo to raise them)

Now if the head lamp raise/lower valve has a cover over it (some cars don't have these covers) then without removing it, you don't have much access at the side of the road.

However, the large rubber hose at the top is the vacuum supply connection, and if you remove this and block the end of the hose, you will cut off the vacuum to the valve and servo, and you can then use the emergency cable to pull the pods up. I believe this valve is the other way up on a Bagheera so if it is, the vacuum supply hose will be at the bottom, not the top.

Whilst you could switch the hoses on the output side of the valve temporarily to raise the lamps; if the fault that caused them not to lift, disappeared, they would immediately be pulled down, leaving you without lighting again. So this is not a recommended way to by-pass the fault, even if only temporarily.

One use for the emergency cable is that if you switch the lights on but the pods don't rise properly owing to the system being tight maybe through freezing conditions or a lack of lubrication, you might be able to assist the system by pulling the cable to get them to the top. After the journey you can investigate why they didn't rise properly.

One reason the lamps may only rise part way, could be a leak such that there is insufficient vacuum getting to the servo. Any system vacuum leak needs to be rectified quickly because this means the engine will probably stall a lot, and since it will be running very weak, that can damage the engine. It can't be coincidence that I have never had a vacuum leak on my own car, and have never had a cylinder head crack problem either.

Therefore you must block the hose if you remove it to allow the emergency cable to be used. If the engine is running and you pull that hose off, and the system was original air tight, you will hear the engine revs drop or it may stall, as the mixture suddenly gets weaker.

If the leak is somewhere in the system before the valve, maybe at a joint in the engine compartment, then pulling the hose off the valve may not alter the engine which was already running poorly. Therefore please note, a poor idle or poor running may be nothing to do with the carburettor setting or adjustment. With a vacuum gauge this is something easily checked.

To give you an idea how air tight the system should be, after switching the engine off, the vacuum should remain good enough to raise the lamps several **days** later, without starting the engine.

One simple check if your system is leaking, is to start the engine and feel if air is being sucked in that atmospheric port past the return spring on the raise/lower valve. Simply block the port with your finger. There must **never** be any vacuum here. This is a common fault point. If it is leaking here, the valve will need some work.

Bonnet release/lamps interlock

Please always be aware that if the Murena head lamps are up, **the bonnet will not pass between the pods as the gap is too narrow**, so lower the lamps first.

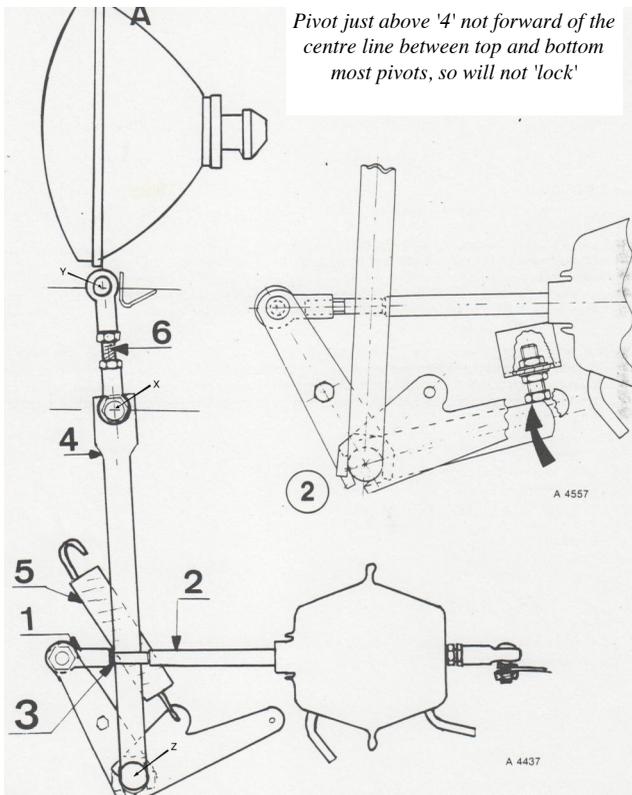
If you need the bonnet up, always do this before raising the pods; and before lowering the bonnet, remember to lower the head lamp pods first. If the interlock cable is still connected, the bonnet release should not work whilst the pods are up, but this is not always working. The interlock consists of a cable attached between the raise/lower lever and a lever in the bonnet catch that inhibits its movement. If it is broken, it would be a good idea to fix it.

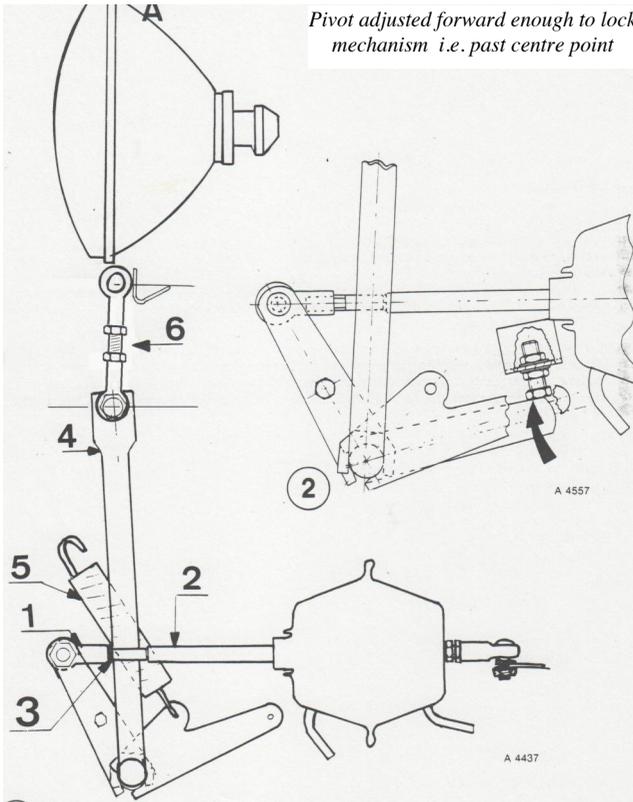
System Linkage

When you raise the lamps, the linkage **must** be adjusted so that when fully up they lock in this position. It is not so important when the vacuum system is working correctly as this would keep the pods up anyway, but when using the emergency cable, if they don't lock, then the vibration whilst driving can cause them to slowly drop down again.

For the linkage to lock in the raised position the pivot at the end of the head lamp bar (which connects both head lamps together) must go 'over-centre' and you can check this quite simply as follows. Empty the system of vacuum first (operate the up and down **without** the engine running) until there is no vacuum left in the system. Now raise the pods manually to the top with the cable and using gentle pressure on the pods, see if you can push them down again.

If they have locked they won't go down. If they do drop down, then they obviously haven't locked and the system needs to be adjusted. If they are locked, to lower them manually you need to reach under the front and push the bar (at 4) backwards slightly to move the end pivot past the centre point,





To reset the linkage there is an adjustable stop underneath near the double acting servo and if the bar is not going far enough forward to let the pivots go over-centre then reset this stop to allow that little extra movement. Once the pivots go over-centre, lock the stop adjustment and then you will need to check the adjustment of the two short links that connect the bar ends to each pod, to make sure that in the raised position the face of the pods are vertical.

After any adjustment of the linkage system, you will need to check/reset the head lamps themselves to your chalk marks so their beam aim will again be correct.

and then gentle pressure on the pods will lower them down.

Linkage adjustment

Before you make any adjustment, assuming your head lamps are already correctly aligned for M.o.T's, then face the car at 90 degrees to a garage door or a wall and with the car around 10 foot away, turn on the lamps to the dip position.

You should see the light pattern on the vertical surface with a horizontal line and a rising angle to the left (U.K.) for each head lamp. (if the rising angle is to the right these lamps are for driving on the right) Mark these lines with chalk so that after you have adjusted the linkage and pods you can reset each head lamp aim to these lines.

Driving lamps automation

The modifications to make the driving lamps come on automatically if the head lamps go off, entails a small alteration to the circuit board and one change in the wiring connections, and this may not be for everyone.

The lamps will still operate exactly as they were originally designed to do, coming on with main beam as supplementary lighting, and they will still operate as flash lamps when the spring loaded head lamp stalk is momentarily pulled towards you. So all is still correct and legal.

However, they will also come on automatically as long as the driving lamps switch is set in the 'On' position, if the head

lamps go off and down. Except in foggy conditions or falling snow, these are too low for normal use on their own, but in an emergency, who cares. Anyone interested in this modification should contact me for further details.

* That original fault I later traced to a faulty lighting stalk assembly, and I have seen the same thing once or twice on other Murena, so it is something to be aware of, especially as it can lead to a flat battery while parked! As this was a standard Talbot switch, I wonder how many other cars suffered this seemingly inexplicable fault?

My car is stored in a garage and is therefore out of sight when not being used. A couple of times I went to use the car only to find the battery completely flat when it had been fine a few days before. A quick check revealed nothing had been left on, so I was puzzled and thought it might be a faulty battery, even though it was fairly new.

However, one day I opened the garage to find not only was the battery flat again, but the head lamps were up. Thinking I had left them on, although that seemed unlikely, I went to switch them off, only to find the stalk switch **was** in the off position!

I then realised there must be a fault that was bringing the head lamps on whilst the car was parked, and draining the battery! Since it was in a garage, I couldn't see this.

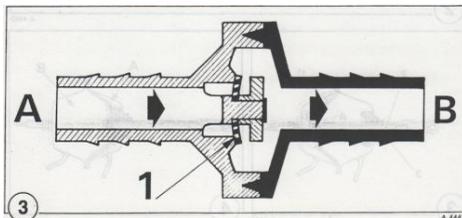
I removed the stalk assembly and carefully stripped it, and found the switch contacts were slightly misplaced and two were close enough for current to trickle across the tiny gap sometimes and activate the lights! I corrected the fault, and have never had that problem again since.

Reservoir and one way valve

The Bagheera craftily used a rear chassis cross tube for its vacuum reservoir, which was fine until one or both of the welded on end caps corroded and leaked! The Murena uses a proper moulded plastic container for its vacuum reservoir. One of these can easily be used on a Bagheera where the cross tube is found to be leaking. Or alternatively similar plastic vacuum reservoirs can be found on many modern diesel vehicles, which they need for their brake servo.

The reservoir is connected to the inlet manifold via a combined tee-piece and one way valve. The one way valve is there to stop the stored vacuum leaking away once the engine is switched off. The tee-piece allows the reservoir to connect to the inlet manifold and the white raise/lower valve at the front.

If you find the one way valve is leaking, it is probably not going to be easy to find an original replacement as it is combined with that tee-piece, but I can provide MB part numbers for a separate valve (*below*) and a tee-piece that will do the job instead.



Port 'A' connects to the tee-piece, and port 'B' connects to the inlet manifold.

Roy Gillard

†thanks to Ron Murrell for help with this.