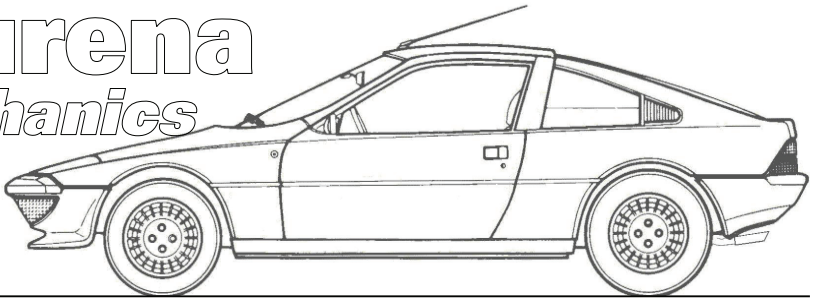


# Murena mechanics

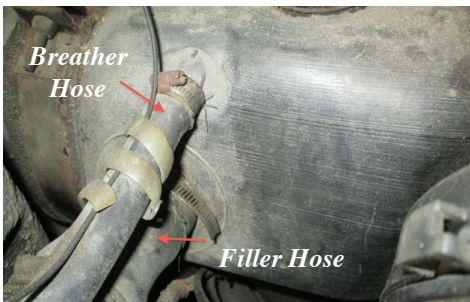
Roy Gillard



## Fuel System

One of the generally less serious design flaws with the Murena, which all owners will have experienced right from the start of ownership, is with the awkward filling of the fuel tank. I say *generally less serious*, and in normal use it is simply more of a nuisance, but there is one situation where it can be serious, so read on.

The Certificate of Conformity states that the tank capacity is 56 litres, as does the sales literature, whilst the workshop manual has '**about** 56 litres!' The hand books however give a figure of 53 litres which is closer to the truth. I emptied my tank completely not long after I got my car, added 10 litres fuel, in 1 litre steps, to set the tank unit, then drove less than ½ mile to the fuel station where I could only get just over another 42 litres in it, according to the fuel station readout; making the tank capacity just over 52 litres in total, which is the same as 'circa 52 litres' stated in the German hand book.



The total tank volume is even greater than the 56 litre figure, but the filler pipe enters the tank over 100 mm down from the top, below the breather hose and therefore it can never be filled completely. The tank will always have a large air space at the top reducing its actual usable capacity.

You also need to take into account the fuel temperature. When you are filling from an underground tank, the fuel is cold and therefore takes up less volume. Once in the tank it will warm up, especially in the Murena where the tank shares space with the engine. Consequently it will increase in volume and if you fill the tank and then straight away park the car for a period, some of the expanded fuel can overflow and leave quite a large puddle underneath.

Now this fuel vaporises and as we know it is the vapour that is really dangerous, so unless there is a strong wind to disperse the vapour you will have a highly combustible pocket of vapour under the car. If you now go to start the engine, the sparking from the starter brushes can ignite this vapour!

Therefore **never** fill the car and then almost immediately park it in a garage or enclosed space. I once parked mine in my garage just after filling (when the car was new and I didn't understand the danger) and fortunately I was still there when the fuel

started to overflow, so I quickly placed an empty glass jar underneath to catch it. It more than half filled that jar!

Accordingly, if you are planning a long journey and want to fill the tank, do it when you are about to set off on the journey. You will be using the fuel up as it also expands, so it will not have a chance to overflow, and things will remain safe. Even better is to carry out the breather modification described later, and there won't be any more expansion overflow.

### **Incorrect gauge setting**

Why did I empty my fuel tank soon after getting the car? Well, when I picked the car up new, it was supposedly low on fuel and I didn't question this as sales people rarely sell you a new car with a full tank of fuel! I was surprised though that as soon as I drove away the yellow low-fuel warning light was flickering on.

Since the car was new to me, I had no idea what that meant in terms of fuel left, and I immediately filled the tank at the first available fuel station. Imagine my surprise when I could only get around 30 litres in it. That meant it still had around 20 litres left in it and therefore had nearly half a tank remaining, **not** as was being indicated, nearly empty.

During the next few weeks this early low-fuel warning annoyed me so much it had to be rectified! I have since found all Murena are like this so have done this modification on all my cars. I removed the sender unit, reduced the float arm bend to almost a right angle, to lower the float to the same point as the bottom of the pick up pipe, drained the tank and then added some fuel, a litre at a time, and kept checking the gauge & light.

I wanted the light to be on permanently with an absolute minimum of 5 litres left, and it could flicker on and off between 10 and 5 litres on the move and going around corners with the fuel moving around, although on a motorway whilst cruising, with the fuel being fairly steady, it might not come on until you have around 5 to 6 litres left. That is still more than sufficient to reach the next fuel station, and it finally stopped the annoying, excessively early, low-fuel warning. To get more accurate readings, use a Spiyda Gauge Wizard.

### **Slow filling**

Other annoying things were the blow-back and cutting out of the pump trigger if you tried to fill at full rate; and having to hold the trigger off the bodywork or it was going to get marked and scratched. The latter I cured by using a flap attached to the filler neck just like Porsche have always had on their early 911 models.



The blow-back just meant having to fill more slowly by only part squeezing the pump trigger. I have had to put up with this ever since, but once you get used to it, it is not that bad. I have known vehicles that have been far worse!

The blow back is due to the filler pipe being almost horizontal and the fuel runs back towards the trigger if you try to fill too fast. It is not helped by the poor tank venting, but that can be improved if you read on.

## Non-vented cap

Since the original cap was a non-locking type, I replaced that with a locking cap as soon as I found one, but even though it was supposed to be for the Bagheera and Murena it turned out to be a vented cap, and when the fuel level was high and you went around a corner the fuel would flow through the lock and dribble down the bodywork.

The original cap stated it was non-vented and as the locking one was from a reputable company, I contacted them and they exchanged it for a non-vented one and that solved that minor problem.

However, since the cap is non-vented that meant there had to be a breather somewhere else, otherwise you would have problems when filling, and in use. When you have a full tank and you are using it up, the air needs to get in to replace the used fuel otherwise a vacuum is created. Now that vacuum can be strong enough that with metal fuel tanks it can collapse the tank and crush the sender unit. I have come across this several times during my years in the trade so I know how powerful it can be.

The original breathing system consists of a hose connected to the tank just above the filler connection and it feeds back to just behind the filler cap. At that point there is a double acting vent valve screwed into the neck of the filler pipe. (*photo below*) The



trouble is with the pump nozzle in and fuel pouring in, the vent system doesn't seem to work particularly well, not helped by the downward angle of the valve.

After some years I found the breather on the Murena did not seem to be working at all and when removing the fuel cap after a long run, you would get a sudden inrush of air to the tank indicating there had been a vacuum build up in the tank. Luckily the Murena tank is a very strong plastic compound so at least it did not collapse, but this was not good and needed investigating and rectifying quickly.

The breather valve being in the neck of the filler pipe close behind the cap but behind the bodywork means access has to be from the engine compartment. You have to remove the coolant header tank to get at it. **It is rated to open for a pressure of 130 millibars (1.9 psi) or a vacuum of 60 millibars (0.9 psi).** It is screwed into the pipe angled downwards with a 5mm clear hose fastened back along the large rubber vent hose that goes between the neck and the fuel tank. I thought that maybe the clear vent hose had been squashed tight but it had not, and the downward angle of the valve meant that the fuel getting in to it over time had made the valve stick.

The factory must have become aware of this venting problem as the last of the Murena, the 'S' models, had a tank breather modification with this valve fitted vertically in the top of the tank near the sender unit, and since this is directly above the large airspace far above the fuel, this is a much better location. A modification notice was issued to the dealers with instructions on what to do to convert any early Murena to the later breather valve position.

This is not too difficult and any DIY owner can do it for themselves. You will have to



move the coolant header tank to get at the valve, but you don't need to disturb the cooling system. Simply dismount the tank, move it to one side with all the hoses still attached, and support it.

You can then disconnect the clear vent hose unscrew the vent valve from the filler neck, keeping the fibre washer and hose for later. You will need a blanking plug to seal the original hole, then you can put the header tank back. Next clean up the old vent valve and check it, ready for the new installation.

You **must** remove the old valve and seal off that hole though, to stop any fuel overflow. CBS have new one way valves, which may



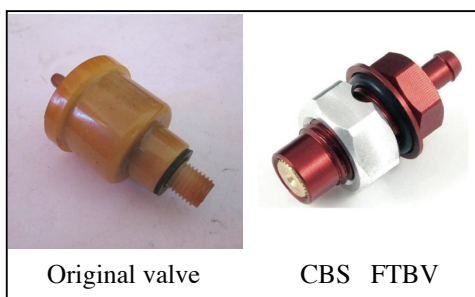
work but since they don't vent in to prevent a vacuum as the fuel is used up, may not.

Next remove all the hoses and electrical connections to the tank gauge sender and

then unscrew the lock ring and carefully remove the sender unit. **These are now unavailable so please check yours carefully as they will deteriorate and fail.**

Lay the sender carefully somewhere where it will not get damaged and mark the place you are going to drill the hole. (If you wish to fit the CBS valve below, see the separate instructions first before you start) Carefully drill an 8 mm hole to fit an original valve in the tank approx. 25 mm from the sender hole as in the photo on left. When nearing the point where the drill will break through, have something to catch the debris rather than let it fall into the tank. Once the hole is drilled, make sure the edges are clear of any burrs and tap the hole.

Tap the hole with an M10 x 1.25 mm tap for an original valve, and the vent valve should be a tight fit as you screw it in. If you also use some sealant, once tight and a hose is fastened on it, it should remain secure. If you wish to use a nut underneath I suggest using some Threadloc to secure it.



You can now refit the tank sender unit, hoses and electrical plug, and the job is done. The tank should now vent much better, but check during the next few long journeys to make sure it now works correctly. If there is any doubt, or vacuum build-up, then I suggest trying to unstick

the old valve. New original valves have not been available for some years, and the CBS valve is only one way.

### **Tank and fuel usage**

The fuel tank is oddly shaped with a much larger cross section and therefore volume in the top section compared to the lower section, therefore the fuel in the lower section will drop faster. The gauge however will drop at a regular rate so in fact a 'half' on the fuel gauge means you actually have less than half left and it should not be considered accurate in terms of the actual volume in the tank.

For example I have seen as much as 340 km on that first 'half', but then I might only get another 200 km before needing to refill, giving 540 km total, which is still a good range for a high speed cruise; but not the 680 km distance suggested by the first 'half' usage. It's not a problem once you are used to it, but anyone new to the car, should be aware the fuel gauge doesn't read true.

### **Tank Sender unit**

Recently a number of owners have requested new fuel tank sender units as theirs have failed. This may be because they are renovating a car that has stood unused for years, and it has been out unprotected from the weather and got extremely wet, or it could simply be a failure of the wiring. So the first job is to check what happens if you earth the gauge wire. The gauge should go to maximum. If it does not, the fault is in the wiring or dash instrumentation.

If however the fault lies in the sender unit, then the first job is to carefully remove hoses and electrical plug and then the sender from the tank. The locking collar is

fairly conventional and requires a special cross piece with a square drive in the middle and two slots at the edges that sit over two of the collar webs. You can then undo it with a wrench. You could make this tool if you really cannot find one.

These tank units have not been available for some years now, so unless you can get a second hand one, you will have to make a new one. The manual specifies resistance at full:  $7\pm 7 \Omega$ , halfway:  $97\pm 15 \Omega$ , and empty:  $280\pm 30 \Omega$ ; but actually the full position was  $40\pm 5 \Omega$  since the fuel never reaches the top and  $325\pm 5 \Omega$  at the bottom.

Note: the top part of the tank unit is always above the max. level and if it gets damp, it will corrode. The worst case I've heard about was a Murena 2.2 in the U.K. which had not been used for years, where the pipe had corroded completely through and the sender dropped into the tank! (*next photo*)



The one on the next page has come out of another car that is being restored and as you

can see the whole of its length is corroded badly and must have been exposed to damp for a long time! Hopefully yours won't be as bad as either of those two.



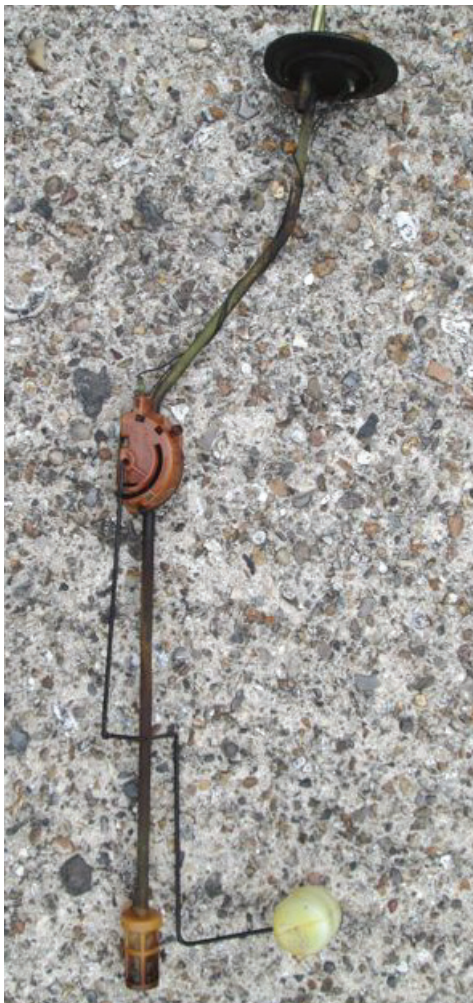
Since the top section of the sender is always above the fuel surface, and therefore exposed to petrol vapours, this will leave the metal work exposed, and any damp atmosphere is going to have some corrosive effect. If the car is used regularly the engine bay heat will dry off any moisture and reduce the chances of corrosion. Again this shows how a car benefits from regular use. After 35 years though, even a good sender unit will probably look like this:



You could protect this area with some fuel resistant paint, but even a little grease or thick oil, might slow any further deterioration whilst the car is unused. If your sender is already beyond restoring, then the alternative will be to use a universal sender adapted to the Murena, and then use the Spiyda Gauge Wizard to match the sender to the dash gauge.

## Fuel Tank Sender

Here are two photos of an original Murena fuel tank sender unit, one taken from each side. The depth from the underside of the fitting flange to just clear of the pickup filter is 530mm. This should give you some idea of what is needed if you wish to make a replacement.

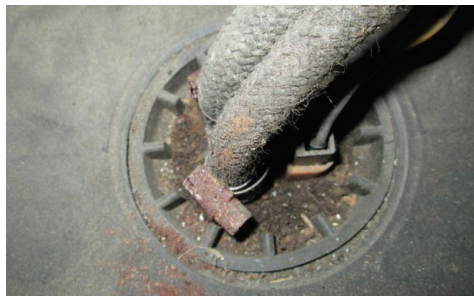


The float arm will never go right to the top as the fuel cannot fill that high, so it will not use the full range of the resistance in that rheostat box roughly half way down.



\* Tool for unscrewing the sender collar.

This locking collar has 12 small webs around the inside. It's not advisable to use a punch or screwdriver to tap on these webs as you can break them off and then have no means to unscrew or tighten the collar.



Ron Murrell, a Murena owner in Australia, suggests a way to improvise a tool is to use a short length of pvc plumbers pipe. You would need one 2½" outside diameter, and cut out 12 slots that correspond with the 12 webs, and then drill a hole for a tommy-bar across the other end to lever it around. Simply position the slotted end over the collar webs and turn the pipe and collar with the tommy-bar.

If you have to buy a universal gauge sender unit to replace your failed original, then you will need to match the resistances at various points to the fuel gauge in the instrument panel. This can now be done by a superb electronic programmable calibration device from Spiyda Ltd. U.K. that is only about the size of a matchbox. Go to <https://spiyda.com> and check out the Gauge Wizard 4. Currently the cost is £44 plus £4 P&P.

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The CBS valve does not have a thread right up to its collar, so you must drill a clearance hole and then use the special nut underneath to secure it. This nut has an airway for the venting, If you prefer there is just sufficient room in the sender flange to fit it in that. An alternative is to use an



in-line vent valve and 'tee' it in to the return pipe/hose.

*Thanks for these tips,  
Ron*