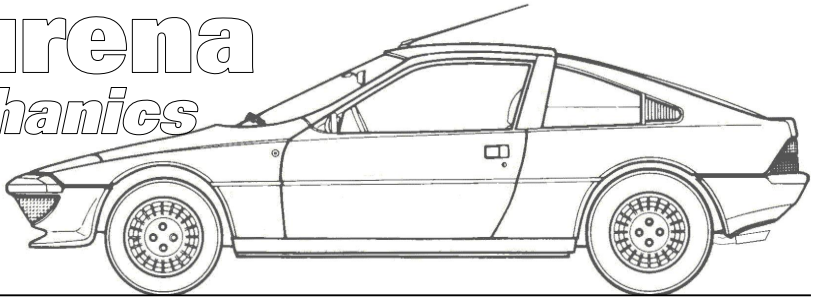
Murena mechanics



Roy Gillard

Maintenance & Cooling

The Murena engine, in that mid-location, is all enclosed and probably gets less cooling airflow than most conventional front engined cars. If the car is stood either in heavy traffic or simply left to idle for any length of time, like all engines, it will heat up and can overheat if the cooling system is not in the best condition, or the cooling fan doesn't cut in for any reason.

When writing this, we'd been experiencing one of our rare, occasional, really hot weather periods here in the U.K. They tend to be short unlike other European countries but can be just as harmful. No doubt you have seen a few cars sitting on the side of the road, bonnets raised and steam rising from their engine compartments.

This can be due to something having broken - a belt or a split hose, or a water pump failure, but often these and other things could be spotted and rectified long before they caused this road side distress if only we took a little more care and inspected the car more often. We tend to take things for granted until a disaster occurs. Maintenance is often ignored and we pay for that as a result.

Regular weekly maintenance should be to check the lights and tyres as well as fluid levels. However, today I doubt many car owners even do regular weekly checks any more! The car has become generally so reliable that I suspect most owners ignore things until they go wrong... and then they complain, when it is really their own fault.

Similarly a car service should not be just changing the oil, filters and topping up fluids. You should be looking carefully at all things to see if you can spot potential problems. You look for signs e.g. a hose that's getting weak; a coolant level that has dropped in a sealed system, which should **never** happen; an unusual noise and/or something loose and rubbing something else because a fastening has broken; which are all signs of a probable failure soon.

Spotting small rusty metal filings may indicate a metal part is wearing away and will probably fail. These are the things mechanics are taught to do, which DIY owners sometimes completely miss. I'm not saying all mechanics do this visual check correctly either, but it is one of the items of a maintenance that can be just as important as the actual things changed.

The one big difference between a standard front engined car and these mid-engined cars is that the radiator and cooling fan are quite a distance away leading to a drop in temperature between engine and radiator and some lag in the cooling process.

Thermostat rating

The Murena when new and sold in France was fitted with an 81° or 83° thermostat, which was probably fine for their warmer climate. However, in the U.K. in our colder weather, the system was often not warm enough to provide a good internal heater.

So when I bought my 2.2 back in 1983, I fitted an 88° thermostat, and this improved the internal heating without causing any engine problems. If you do the same, the engine is now slightly closer to its upper temperature limit, and you must pay attention to your cooling system and the temperature gauge because if it starts to creep above the normal fan cut-in level **without** the fan cutting in, you need to stop quickly, and find out why. Owing to that lag in the system it takes longer to react and bring the temp. down again, and by the time it has, the damage may already be done.

As I have said before, and repeat now, if the cooling system is in good condition and working properly, it can cope with almost anything, just like any other car. I have driven mine in France in 35° with a radiator partly blocked by a piece of clear film which had blown in there, yet it still coped although the fan was running all the time, alerting me to the fact that something was not right. I have also been stuck in London stop-start traffic on a very hot day (about 30°) for nearly two hours, and again it coped with no problems. And all this with an 88° thermostat, and without any over-ride switch, which I didn't fit till sometime later... but I watch my gauges like a hawk!

Type of use

Now the cars are much older, if you only take yours on the road in the finer weather, and don't require a hot heater, you may want to consider using the lower temperature thermostat permanently, if you are not already. Since the chassis is galvanised, you can use the car all year round, so you could possibly swap to the lower rating just for the hotter weather, but if you wish to save the hassle of changing it twice a year, and leave the higher rating in all year, then you **must** pay careful attention to the cooling system. Even with a lower temperature thermostat, you cannot afford to let your attention drop much as the radiator fan switches are known to be unreliable. One minute they are cutting in and out fine, and the next, just when you are not paying attention, they will fail to cut in and the engine can overheat!

Over-ride control

If you have fitted an over-ride switch, which I seriously recommend everyone does, then you should use it whenever you see the traffic ahead is going to cause a lengthy hold up, or switch off once stopped. In other words, don't even let the system build up temperature in the first place. Switch it on and keep it cool from the start. If you can see the traffic is such that the fan will be required, why wait and allow it to get hotter in the first place.

Leave the switch to do its job when the traffic or conditions mean that the hold ups are small and intermittent, maybe lots of traffic lights in a built up area, where the fan may only be required for a minute or so and then movement and natural airflow takes over again.

Poor cylinder heads

These engines are known to crack the cylinder heads if you overheat them, and with these being costly items and difficult to get replacements, you do not want to

overheat them. And since the radiator switches are known to be less than ideal, you need to allow for the fact that they may not work at some time. But having an over-ride is only a saviour if you watch your gauges and react accordingly! You should never leave the engine idling for long periods especially if you are not watching the gauges, so warn the garage of this when having an M.o.T. too. Always **switch off**.

One final point here is that if the fan switch does not cut it at 95°, then you must stop as soon as possible and check the coolant level because if you have a leak, the reason the switch may not have worked could be there is no coolant near the switch to activate it, Even if you switch on an over-ride switch the fan won't save you if there is no coolant in the system!

Radiator fan switching

The radiator switches on the Murena were also fitted on many other cars (in fact the Espace 1 uses the same one) and they were always known to be unreliable - it is not just our Matra that suffered from this problem. I have seen these fail on many cars and TVR where I worked was another good example. We were always having to replace them.

Consequently all the manufacturers changed their systems. Today the engine computers use the engine temperature sensors to collect temperature data and then it is the computer that switches the radiator fan(s) on via a relay. This system has proved far more reliable, which is one reason why neither owners nor mechanics ever tend to think to check the instruments as often as they should! They just expect them to work. You can now have a similar system on your 2.2 Murena.

Engine Fan Switch

During one of my improvements to the cooling system I realised there is an ideal place to fit an engine temperature switch, so you can have a primary switch there and leave the radiator switch as first backup.

There is usually about a 3° drop between the engine and the radiator owing to the distance and under-car airflow, so if the engine will now activate the fan at 95°, that is about 3° before the radiator would have reached that temperature, so the system is further improved.

M.o.T.

The reason I said to mention the cooling to the garage when having an M.o.T. is the engine will need to be hot for them to check the emissions and there is a period when it is up on the ramp and they are checking underneath, particularly checking the steering and braking system, where they need the engine idling to give steering assistance and servo assistance for the brakes, etc. There may be no one watching the temp. gauge!

If they don't wish to allow you to be in the car, or you are going to leave the car and not be there when they do the test, make it very clear to them that the radiator switches can be temperamental and that they must use the over-ride to run the fan. If you suggest that they will be liable if they overheat and crack a head and they will have to pay for the damage, I think you will find they will prefer to run the fan manually rather than be faced with a large bill!

However, if you now have an engine temperature switch as well, I think you can rest assured the system will work. The odds on both switches failing is tiny.

System Improvements

So what improvements can we make? The first thing here is to realise I am talking mainly about the 2,2 model which I have. The 1.6 being a smaller unit has more air space around it and is probably less of a problem regarding cooling.

There are several areas of concern which we can address. One is the small bleed hose with that tight 180° bend at the end on to the thermostat housing, plus the plastic reducer between the two different hoses. Another is the water pump which can fail after long periods unused, such as being laid up during the winter. Being unable to monitor the coolant level remotely is another. Finally, fan switching is another which we have just covered.

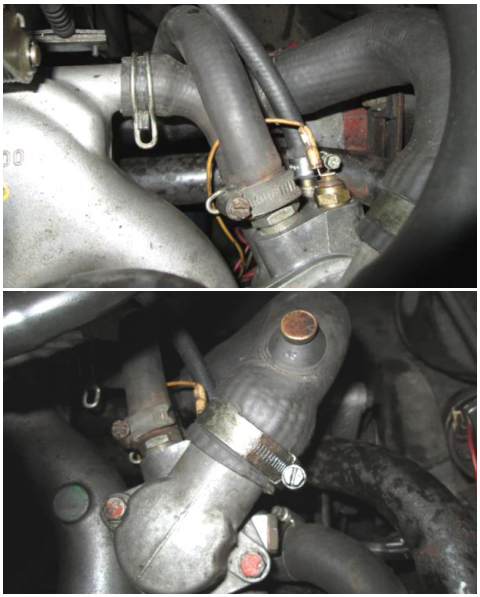
Reducer and 'U' bend

The circulation bleed hose from the engine thermostat housing to the header tank is made with two different size hoses and a plastic reducer joining them. This reducer is just above the starter motor and often breaks once it gets old and brittle. Yours may have already been changed by now. I recommend this is replaced with a metal one, which is easy to have made.

The second fault with this hose, which runs from the header tank, down under the inlet manifold (either type of carburettor - down or side-draught) via that tight 'U' bend at the end, to where it is attached to the thermostat housing. This connection is on the right hand side and really should have been blanked off. There is another connection point directly below the temperature transmitter, and this should have been used for this small hose. The hose would then have had a final bend of less than 90°, which is much more gentle and should be far more reliable. You can see the difference in the next two photos; the first being as originally installed (left), and the second (*right*) with my modification.

Obviously the small hose will now have to loop around under the carbs. and not be attached to the water pipe running under the inlet manifold. That is not a problem, but you must attach and support it correctly.

The next two photos show this on an engine I have just repaired, and you can see how much better it is now. (*photos below*)



You can also see in the lower photo, the blanking plug now fitted on the right hand side of the thermostat housing. This is the position where the new engine temperature switch for activating the fan, will fit. It has exactly the right thread (M14 x 1.5mm) for these switches! The one you want has a 95/90°C setting. At the same time the radiator switch should be changed for a 92/87°C switch. This will allow for the approximately 3°C drop between the engine and radiator.

Coolant Level Sensor

If the above mods. have improved the cooling system, there is one other critical item that really needs to be fitted to give you peace of mind when driving. That is a coolant level sensor in the header tank.

You may start a journey knowing the system is fine, but if a leak develops *en route* then you need to be able to detect this as soon as possible, and long before the lack of coolant will lead to any cylinder head damage. A header tank level sensor is the only real way to alert you to any drop in the coolant level.

Without any level sensor, you would have to stop and check the coolant level frequently which is a bit tedious and impractical. You may watch your gauges carefully and you might notice a rise in the temperature, but sometimes even this can be too late.

Best of all though is that the Murena already contains a warning light system, so it is easy to fit a level sensor to the car and connect it to the system. The system normally only monitors the brake fluid level and the pad wear of one front and one rear pad (if these are still connected).

Most brake pads these days usually have the aural warning button, (even though they are usually fitted the wrong way around and need to be refitted!) so you don't need that rear pad warning light connection. You can extend it across to the header tank and use it for a level sensor instead.

A simple level sensor is available from Car Builder Solutions for around £12, see:
http://www.cbsonline.co.uk/
This is a simple two wire switch which you would wire up as follows: one wire goes to earth and the other wire connects to the spare wire that was for the right hand rear brake pad warning. Now when the float drops it will connect this wire to earth and bring on the dash warning light.

I have one of these fitted and wired exactly as described and it has made a huge difference already. After disturbing the cooling system there was an air pocket still remaining but unknown at the time. As soon as this worked its way out, the level in the header tank dropped and I was alerted to it by the sensor and dash warning light.

Water pumps

First a warning about the 2.2 water pump. I have found some with incorrect curved 7-vane alloy impellers fitted to them which will never circulate the coolant at idle (unless they have a smaller diameter pulley) and therefore the engine will overheat if left idling, even if the fan is running. These pumps should have a flat 6-vane steel or maybe an 8-vane alloy impeller. The normal pulley is 120mm diameter.

Assuming you have the correct pump the next problem is that it normally has a sprung carbon seal that rubs against the impeller hub face. These carbon seals can crack or the hub face becomes worn or corroded and then the carbon seal cannot seal the pump.

After years of experience I've found that they commonly fail when the car is unused for long periods and starts to be used again. Typically the car gets restored or sold and the owner, or new owner, eventually puts it on the road again and starts using it. Unfortunately, shortly after getting the car back on the road, the pump starts leaking. So the pump needs overhauling.

Improving the pump

Why talk about overhauling the pump? Why not simply buy and fit a new one? Well, 1.6 pumps are usually still available, but the 2.2 pump is becoming very difficult to source. Simon Auto do have some, but at a cost of over £250 on an exchange basis from Germany, with P&P both ways, they have become very expensive!

However, there's now an overhaul kit which contains a modified seal assembly. This has a ceramic seal for the carbon seal to rub against and the impeller face condition is no longer important. The hub does need 5mm machining off it to allow for the larger seal assembly, but you end up with a better pump that is also cheaper and will withstand being left unused for long periods unlike the original.

Radiators and Fans

The radiator appears to be basically the same one as used in the Citroën Visa 1.4GT. (which is another rare beast; when did you last see one of those?!) For the Murena it had a top and bottom bracket attached to the alloy core to mount the cowling, electric motor and fan.

Re-cored radiator with 12", light, modern, 8-blade fan

Now I have weighed one of these cooling fan assemblies - it is 2.35 kg and all this weight is loaded directly onto the alloy core. It has a 6-blade fan and draws quite a heavy current as can be seen from the drop on the instrument panel charge meter reading when the fan's running.

These radiators are no longer available, and even getting them re-cored is very difficult. Simon Auto have had some copies made in aluminium, with stainless steel brackets for the fan housing since the steel brackets used to corrode and drop off! These are over £300 like many custom alloy radiators.

Radiators and Switches

Now you could mount the original fan assembly back on if you wish or you could fit one (*bottom of previous page*) of the newer universal fan assemblies such as those on Car Builder Solutions website, which are only 1 kg. You could even mount two (*as below*) which will still be lighter than the original, as one owner has done! With two, he has connected the radiator & over-ride switches to one and the new engine fan switch to the other.

Regarding the radiator fan switch, one reason it may be somewhat unreliable is that it is switching the current to the fan motor directly. This would be better if it used a relay, taking the load off the switch contacts. So that could be the first modification to the system.

With a relay controlling one 6A cooling fan motor, you can connect the manual over-ride to this as well, plus the engine switch if you have one fitted. If you have two 4A fans as in the example below, these could be electrically coupled together but you should definitely use a relay, or you could use them separately wired.

Periodic Replacements

You should replace your thermostats now and again - well they don't last forever. Since they operate in the same area for much of their life they have a habit of becoming worn and sticking in that same spot. Then they don't function as well as they should. Many people think that they open fully once you get to the set temperature. That is not so. They still have some extra opening available when running

Aluminium radiator with two 9", light, modern, fans

normally. So when the temperature first starts to creep up as you come to a halt in traffic, or on a very hot day, they should open up more to increase the coolant flow to maximum. In a similar way if the outside air is particularly cold, they may close a little compared to when the ambient temp. is mild. As thermostats get old and sticky they can no longer regulate the opening or flow smoothly, which is why it is useful to replace them occasionally. The time to do this is when you are replenishing the system anti-freeze.

Hoses, core plugs and matrices

Whilst replenishing the anti-freeze, that is also the time to check all the hoses, core plugs, heater, radiator etc. for any signs of corrosion, perishing, cracking, etc. If you have to change any of them, you will not have to disturb the system again. Bleeding the system of air is relatively easy if you follow the procedure I have outlined below. But always monitor the system carefully for a short while afterwards as it is when things have been disturbed that you often get problems. Once it has settled down it should remain trouble free.

Bleeding the Cooling System

Since the top of the radiator is high and the outlet and pipes under the car very low, when filling the system at the rear, you will trap the air in the radiator. It simply cannot go down to the bottom of the radiator to flow back to the engine or header tank.

Consequently Matra provided a bleed connection at the top of the radiator which connects back to the header tank with a small bore hose.

To bleed the system you will need to remove this hose from the header tank and cap off that header tank outlet first. I normally leave the thermostat out at this point since that gives the new coolant a clear passage to the front and the radiator. Now you can connect a vacuum pump to that bleed hose, but have a clear section of hose between the pump and bleed hose so you can see when the fluid starts to come through.

As you fill the system the air can be drawn from the radiator, allowing it to fill completely. Once the coolant starts to arrive back at the vacuum pump, without any air bubbles, you can remove the cap you fitted to the header tank outlet and refit the bleed hose to it. Next, almost fill the header tank and put the cap back on.

Now start and run the engine so that the pump will circulate the coolant and fill all the system and bring any remaining air back to the header tank and top of the engine. You should see the tank level drop. If it drops down near the bottom you will have to switch the engine off, carefully remove the cap and top it up again. Then restart the engine and repeat this until the level remains constant.

A bleed screw was fitted in the top house from the thermostat to bleed any air at the top of the engine. You can test if the system is good, by feeling the pipes in the front compartment, with the spare wheel removed, and both sides should be getting hot at this stage as the fan should not have cut in to draw any air through the radiator.

If all is OK you can now refit the thermostat and top up the system and re-check everything again.

Roy Gillard