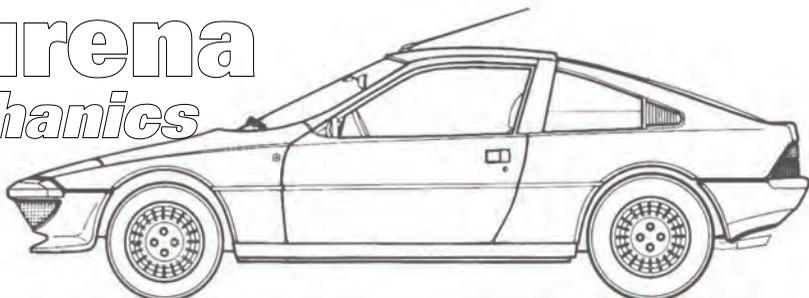


Murena mechanics

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Door mirrors

Door mirrors are essential items and particularly the right hand (passenger) one on the Murena for those of us in the U.K. since driving a LHD car here means you need good rear vision on that side. Unfortunately they can be fragile things as the main support castings are badly porous, and even a small tap can fracture them.

Even if the mirror is not hit and broken the gear mechanism inside the housing for the up and down mirror adjustment often fails, owing to the weight of, and aero forces on the mirror head and the torque that those apply to the epicyclic gear mechanism.

The epicyclic mechanism consists of two identical carriers with three 'axle stubs' on one side and a central gear on the other side whilst the third drive carrier has the three axle stubs on one side like the first two, but a large square hole in the centre, to turn the mirror support casting.

There are nine identical small gears fitted to the three 'axle stubs' on each carrier. When this assembly is slid into the alloy tube the nine gears mate with the teeth around the inside circumference of the tube.

This mechanism is rotated by the inner knob closest to the door inside the car, which is designed to locate on the first ring.



The inner knob location ring, above left, and the central gear on the other side of it, above right



The two sides of the two identical carriers above and with gears fitted on the axle stubs below left. The third drive carrier with the square hole, right



You rotate the knob which turns the first central gear and that rotates the mating three gears, which turns the first carrier which then turns the next three gears and therefore that second carrier and the central gear on that carrier turns the final three gears on the last carrier which has the central drive square hole.



Two views of the epicyclic gear assembly, with the square hole on the last carrier in the lower shot

Since this square hole is locked onto the alloy mirror support, (*below*) it rotates that support and therefore the mirror head, up or down depending on which way you rotate the adjusting knob.



You can only turn this mechanism with its 64:1 ratio, from inside the car. It can't be reverse rotated from outside and if you tried to do that, something will break.

If you study the shape of the front of the mirror head shells, they are mainly curved back to the top, from low down. This means the airflow is directed up over the mirror more than pushing against it uniformly. Consequently the airflow is trying to rotate the mirror head relatively clockwise on the LH (driver) side and anti-clockwise on the passenger side.

As the aerodynamic forces on the mirror heads are trying to rotate them, which we know it cannot do, a torque is being applied to the inner carrier with the square hole, and since this is plastic, and cracks from the corners of the square hole which are the weak points, that starts the failure of the adjusting mechanism.

The original axle stubs had metal pins in their centres to give them more strength, but at least one of the kits now available does not have these support pins and the plastic alone is not strong enough, so the torque shears the axle stubs off the carrier, and total failure takes place.



Note that some of the gear teeth are broken both on the carrier central one as well as the individual ones

Slightly different versions

One of the castings (*next column*) was made in two slightly different designs. Possibly



these were an early and later design, although I can't confirm that. What I do know is that if the design on the right in the picture above, is fitted, you have to be more careful about folding the mirror head, when moving it out of the way.

pressing on the arm (*picture above*) and putting any breaking force on it. If the 'ear' is already up against the support arm, as in the photo at the bottom of the previous column, then any additional twist on the arm will cause it to break!

Carefully study the next two photos and note that as the casting with the large spring rotates anticlockwise the 'ear' will come up against the flat face of the support arm. If it is the design without the protrusion (*above left*) then it can safely rotate further without

Strictly, when you fold the mirror head forwards or backwards, the casting with the spring should be held (by the long rod into the plastic block in the picture below) and not move anyway. The spring should compress allowing the three lugs to disengage the notches and allow the head to rotate without moving the casting, but there is always some movement in the system as the black plastic piece is not meant to be a tight fit, and the spring has to be pretty strong to prevent the mirror head folding back at speed.



So be careful when folding a mirror head in, and preferably always fold them



backwards, as that moves any load away from the flat face and makes it less likely to cause the support arm to break.

(Ignore those angled collars in the photos on the left as they are not used on the Murena)

Head shell mount

Although it does not do so very often, the head shell mount casting can break but usually only if the mirror head has had a substantial hit which probably means most of the mirror is broken anyway. For clarity I have removed the rubber bellows so you can see the alloy mounting in place.



Above: Mirror head mounting casting (with rubber bellows removed) and Below: broken casting



Mirror support & rod

The most common parts that get broken if a mirror head gets hit, are the mirror support and the central adjusting rod (*as below*). The arm that has broken off is the weakest



part in the system and that is because the alloy casting is so porous its many bubble holes weaken it, and the cross sectional area is too small for the load it has to take.

You cannot repair these by any form of gluing (and I have tried many types without success). One reason why it is impossible to repair this break satisfactorily is that at the break point the alloy casting gets distorted as it stretches just before it breaks, so the alloy casting is no longer the right shape even if you could glue to the two parts back together strongly enough. Similarly the brass adjusting rod bends first just before it snaps and would no longer fit even if you could join the two bits together.

You might alloy weld the head shell mount as there is room in that area, but it would be unlikely you could alloy weld the support arm as there is no real room where it fits and the weld would probably interfere with other things. Consequently Greig Dalglish made some new supports from solid alloy.



It is a complex and time consuming part to machine (hence the original being a casting) so the new replacement arm was never going to be cheap, but they are beautifully made and really strong. There were only a limited number made because of the cost and they may have all been sold already. He also made some new central rods, which are much more straight forward to machine but I think even these are a better quality than the original.

If you need either or both of these you would have to contact Greig (his details are in the club magazine) to find out if he has any left, and their current price.

Original Repairs

When these cars were new and in production, you could buy a replacement mirror glass; a head shell; the head shell mounting; the glass retaining surround; the rubber bellows, or a complete adjusting mechanism assembly; and thus replace whichever of those items you needed. The original cast support arm was never available as a separate item, only with the complete mechanism assembly (*below*).



Today you might be lucky to get a replacement glass, or a complete mirror assembly. However, be careful that the mirror is convex glass, not flat and for the correct side. A flat mirror glass is useless

as it has such a limited field of view and a complete car can be 'hidden' in the blind spots just behind and to either side in the area level with the rear bumper, as it could be, in another lane alongside you.

You might see people selling kits to repair these mirrors but make sure the carrier axle stubs have metal inserts in them, and the carrier with the square hole should be metal.

So today you are much more limited in what you can repair, but if you always keep any broken mirrors, and strip them down for the good parts that remain, you may be able to repair a broken mirror from the second hand parts you have (or can get hold of from others). The lesson is never to throw anything away, unless it really is no use any longer for a repair to another, or to use as a pattern to make another!

Replacing a mirror

Assuming you have obtained an original complete mirror, how do you fit it? In the centre of the two interior knobs there is a small Philips screw. Remove that and then take off the two adjustment knobs. The first knob is the 'in and out' adjuster, whilst the inner one is the 'up and down' adjuster.

When you remove the inner knob you will see that its inner shoulder hides the mounting locking ring which has four large



Notches in the locking ring

notches. There was probably a special factory tool that would have gone over the end of the barrel and engaged in these notches to secure or undo the ring. Since you won't have one of those, all you need is a medium size flat blade screwdriver. Engage the blade into one of the lower notch corners so that you can tap it in an anti-clockwise direction to loosen it. This is normally achieved quite easily by thumping the screwdriver with the palm of your hand. If it is really tight, tap the screwdriver handle with a small mallet.

Once it is loose, you can unscrew the locking ring off the barrel whilst holding the mirror head in the other hand and once it is off the thread, withdraw the complete mirror assembly out of the door. Note there is a keyway in the hole in the door to stop the alloy barrel from rotating.

Fitting a new assembly is simply the reverse procedure, making sure the rubber 'gasket' is located properly over the edge of the alloy flange to be trapped between the flange and the door and provide a water-tight seal. Don't worry if the mirror head appears to be in the wrong position. Once the locking ring is secured, the two adjustment knobs can be slid into place and the centre screw refitted. Then you can



adjust
t h i s
n e w
m i r r o r
i n t o
p l a c e .

Stripping the mechanism

Take the mirror assembly off the car, as described in the previous section. Next remove the flange, by lifting the edge of the rubber off the flange and sliding the flange off the adjusting body and put it to one side for now. The mechanism is normally still connected to the head at this point unless the mirror has been broken.

If the mirror is not broken, then you will need to unscrew the Philips screw at the adjusting pivot point, and unscrew the long rod from the plastic block. If the support arm and rod are broken, then the adjusting mechanism will already be disconnected! But you will still need to remove the Philips screw to remove what is left of the broken support arm, and remove the broken rod from the black plastic block.

Put the head shell with mirror glass somewhere safe! What you have left is the mechanism assembly, either complete as on page 5, or with the remains of the broken casting and rod. (*as below*)



To strip this, you need to undo the Nyloc nut off the remains of the rod, and push the rod out of the other end. If the rod is not broken you only need to undo the nut back about 6mm and push the nut up to the body which will expose the thick 'U' shaped clip at the other end, which was in the carrier recess. (*next photo*) Now remove the 'U' clip from the rod and push the rod with nut out the opposite end.



Once the rod is out, you can strip the remaining parts out of the tube. Have a nice clean area for these pieces to go on so you can see them all clearly. If the mechanism is broken, it may look like this:



Broken gear mechanism from inside barrel

Examine all the parts very carefully, even those that at first appear fine, because you will see that many of the gears will be damaged or have broken teeth. You should never re-use any gears even with only slightly damaged teeth. The carriers will probably be broken, particularly the pins that carry the gears, and the carrier with the square hole that rotates the alloy support casting, will probably have splits from the corners, if it is not already in pieces.

Make sure you remove all the bits from inside the casing including the tiniest bits of plastic from the casting teeth, because if you leave any at all, then when the item is rebuilt these can cause the new gears to jam in the casting causing the unit to fail again.

Repairing a mechanism

Unlike some years ago when you could get most of the items necessary to repair this mechanism, today it is not so easy. However, if you check the internet there are often some gear kits for sale, but make sure they have steel pins for the gear axles.

Sometimes you'll find someone selling kits where the carrier with the square hole is metal not plastic which should eliminate that weakness. But there are strong forms of plastic too so depending on the actual material used, a metal carrier may not be absolutely necessary.

Occasionally mirror glasses come up for sale but make sure they are convex glass and if they say it will fit both sides, query that as the two head shells are **not** the same. If they have made the glass symmetrical then it will not fit the head shells closely all the way around and there will be a small gap somewhere around the edge with both.

Never fit a RH glass in a LH head shell or vice versa, as it will usually end up with a broken mirror glass, either whilst fitting or soon after. Whilst the head shell is handed, left or right, the complete adjustment mechanism and mounting can be re-assembled in such a way that it can be fitted either side, and then re-adjusted into the correct position.

Assembling mechanism

Before you start to assemble the epicyclic gear assemblies, it is best to try the carrier with the square hole on the square alloy stub as it can be too tight and this will only make it split again. If it too tight, just lightly dress the flat faces so that it fits snugly but without having to force it on. It also should not be a loose fit, so take care.

Trial fit

I would suggest you make a trial assembly of all these parts, as in the previous photos on page 2, so you can see how it all goes together; to make sure it assembles easily, that the gears are free on the pins and the assembly as a whole works. If all is good, you can lightly grease the assembly.

Next insert this assembly slowly into the casing with the square hole end first. You will need to rotate each section slightly so the gear teeth line up with the casing teeth and then you can slide the assembly in until you get to the next set of teeth, then repeat until it is all in and the end piece is up against the end of the casing. I usually have the three gears of each section in a different position relative to one another to spread the load around the casing.

Next carefully push the central alloy piece into the other end making sure you have the 'O' ring in the casing recess and some grease on the rubber and alloy, and ease the square on the end into the square hole in the inner carrier. Rotate it back and forth until you feel it lined up and don't force it. Also position the arm relative to the keyway so everything should approximately line up without having to adjust around a long way.

With this mechanism now assembled, you can fit the central rod and 'U' clip. If the original rod was not broken and still has the nut and washer on it from when you stripped it, simply push the rod through from the support arm end until it has come out the other end sufficiently to get the 'U' clip on. Fit the clip and push it back into the recess and then fasten the nut at the other end. Don't do it up tight as you want the mechanism to rotate freely, but you only want a tiny bit of end float.

If you are fitting a new central rod, then fit the 'U' clip into the groove and push it through the mechanism so that the 'U' clip fits into the recess in the end first carrier. Next put the small washer and Nyloc nut on the other end and wind all the way down the rod. Again, do not tighten this up tight, but leave just a tiny clearance so the mechanism rotates freely, but there is almost no movement end to end. This mechanism is now complete and ready to be refitted to the mirror head.



The view into the mirror rubber bellows should look like that above. You screw the end of the new rod into the plastic block. As you screw it in, the open jaw of the new alloy piece will reach a point where it will fit over the pivot arm, the holes will align and you can put the screw back in to the jaw and mirror head pivot arm to secure them together. This job is a little tricky as the rubber bellows tends to get in the way, but if you push it back you can do it.



The photo at the bottom of page 8 shows the screw in but not yet secured. The screw should have a spring washer fitted to keep it secure from coming undone, but as it is a pivot the screw should not be so tight that it stops the mirror pivoting in and out.

Once the screw is secure you can slide the flange back on up to the shoulder and fit the rubber gaiter over the edges of the flange. The mirror assembly is now complete and ready to be fitted back on the car, as described earlier on page 6.

Fault Diagnosis

If you are inspecting a Murena which you are considering buying, or have only just bought it and you are not familiar with these door mirrors, you can estimate what may be wrong with them by a couple of simple checks.

If the mirror head is hanging down and only held by the flexible rubber, then the support casting has broken from being hit. When the casting breaks, the long adjusting rod usually breaks too so you will need to replace both pieces. Since these may be unavailable or very hard to get and will be costly, you should take this into account on any purchase price.

It may have a broken gear mechanism too, but you will only find this out as you strip the unit to repair it. If the gear assembly is in good order then these parts can simply be put to one side and refitted on re-assembly.

If the mirror was not hanging down and appeared to be correctly mounted, then you should check if the mirror head adjusts up and down, as well as in and out. If it adjusts in and out, then the long rod and pivoting mechanism are probably OK but if

it doesn't adjust up and down then the gear mechanism is probably broken, and again the parts may be difficult to get hold of, so bear this in mind.

If the glass is cracked, broken or missing, then be aware that correct original ones are not easy to come by, and the glass **must** be convex not flat, so any stick-on replacement possibility must be this type too.



The glass sits on four rubbers that fit on four pins in the head moulding, (*see above*) so if the glass is already missing, check if these small rubbers are still there as you will need them. If the glass is fitted but rattles or can be moved in the head shell it is likely these small rubbers are missing.

The mirror glass is held in the head shell simply by the clip-in surround bezel. To remove the bezel insert a blade such as a razor blade into the join line between the bezel and head shell and prise it off.

The mirrors were made in Italy by Vitaloni and fitted to the first generation of the Lancia Delta and some Beta Monte Carlo too, all built around the same period. The Lancias used a blue tinted glass whilst the Matra always had clear glass but in all other respects they were the same. Lancia owners now have the same trouble as us when it comes to repairs or replacement.

As these mirrors are not available any more, and may be difficult or impossible to repair if you cannot get the parts you need, the only alternative is to look for some other mirror you can fit instead.

Possible alternatives

The Delta in fact had two similar versions of this mirror, the first was the same as used on the Murena with round knobs for adjustment of the head; the second looked the same but had a small joystick in place of the knobs for adjustment, which was by cables but it won't fit the Murena as the door mounting is quite different and you would have to modify the Murena door.

There was a third mirror used on the later Delta (*below*) which has a fixed mirror head and the glass moves within the head for adjustment. It looks like the adjustment might be electrical (which could have been really good) but unfortunately it is only mechanical, controlled by a small joystick within that rubber knob. This also does not fit the Murena so only the first Vitaloni is common to both Lancia and Matra.



Lancia mirror which could have made a nice alternative but unfortunately doesn't fit our door

There are a few other mirrors of similar looking design such as one fitted to one of the Peugeot 205 models but this like many

of these door mirrors actually mount on the outside of the door with two screws and can only be adjusted from outside. Some have only flat glass, or smaller heads, or mount very close to the door surface also limiting their field of view.

Some owners have fitted one of the various BMW sport type door mirrors where the head mounts away from the door and therefore should give a good field of view, and you may even finally be able to have electric adjustment. But they will probably have flat glass and be expensive, (this is after all BMW) and the door will have to be modified to cover the original hole as well as mount the new mirrors.

An important point though is to check that they can be folded in, because I'm sure they will increase the width of the car, and it will make them more liable to being knocked and damaged.

One final point is that the head shell was never painted, just plain black as moulded, and I believe they are best left like that. The problem is that if you paint them, then as soon as they get scratched (and they will) they begin to look shabby. Better to leave them bare plastic which has a nice crinkle finish, and even when scratched they usually still look fine.

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