

Alfa Romeo 147

Engine oil change guide



Alfa Romeo 147

Engine oil change guide

This guide will help you to change the oil on Alfa Romeo 147. Photos used in this guide are from TS version, but JTD should be similar as well as other Alfas (156, GT,...)

I was hesitating if I should make a guide for such a simple and routine task but as I have seen a lot of my friends to put the car for this job to a service and others were asking me to change the oil for them. That's why I thought a guide like this may be useful for someone willing to start to do same basic maintenance tasks by himself.

Quick guide (for advanced alfisti):

1. Get new engine oil, oil filter and preferably oil sump plug washer.
2. Go for a drive to heat up the oil (10km or more).
3. Lift the bonnet and unscrew the oil filler cap.
4. Lift the car.
5. Unscrew the drain plug (M18 screw, 8mm hex key) and drain the oil to a container (5 liters minimum capacity).
6. Lower the car to stand flat (if you jacked up only one side) so that all oil can be drained.
7. Clean the drain plug and screw it back in (tightening torque 22Nm, preferably use a new washer).
8. Put a container under the oil filter and unscrew it. Let the oil drain.
9. Screw in new filter and tighten it by hand.
10. Lower the car, fill in the new oil (4,4 liters), close the cap.
11. Start the engine; let it idle for a minute. Turn it off. Wait a minute. Check the oil level and fill up if necessary.
12. Go for a drive, check for leaks to be sure.

Step by step guide:

Engine oil to use:

Alfa Romeo recommends using Selenia oils. You can use this brand or any other well known brand provided the oil is the right viscosity and more importantly the same or above recommended API/SAE rating.

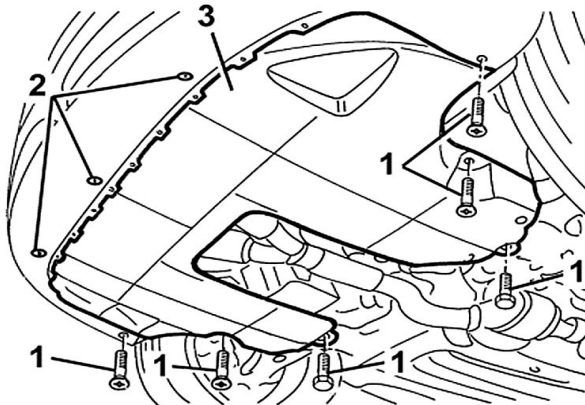
1. Go for a drive to warm up the oil. Oil is properly warmed up few minutes after your engine reached its operating temperature. It takes usually 8 -10 km.

2. Open the bonnet and unscrew the oil filler cap so that air can enter more easily when the oil flows out.



3. Raise the vehicle.

- If you can't raise the vehicle completely, secure the car against movement (pull handbrake, cog the rear wheels) and lift the front right wheel with a jack. (preferably lift both sides if you have 2 hydraulic jacks). Put the car on axle stands if you can as it is not safe to work under the vehicle lifted on jack(s) only. If you don't have them, push a spare wheel, brick or a wooden log under the car so that it doesn't fell on you in case the hydraulic jack lets go...
- Remove the bolts fixing under engine protection if (you have one) and remove the protection. This is not a must as you could get to the oil filter without doing this but it makes the job easier and cleaner.



4. Locate the engine oil drain plug. It is well accessible, located on the bottom of the oil sump, close to the exhaust. It is M18 plug and you need 8mm hex key to unscrew it. Preferably use a long lever as it can be stuck.

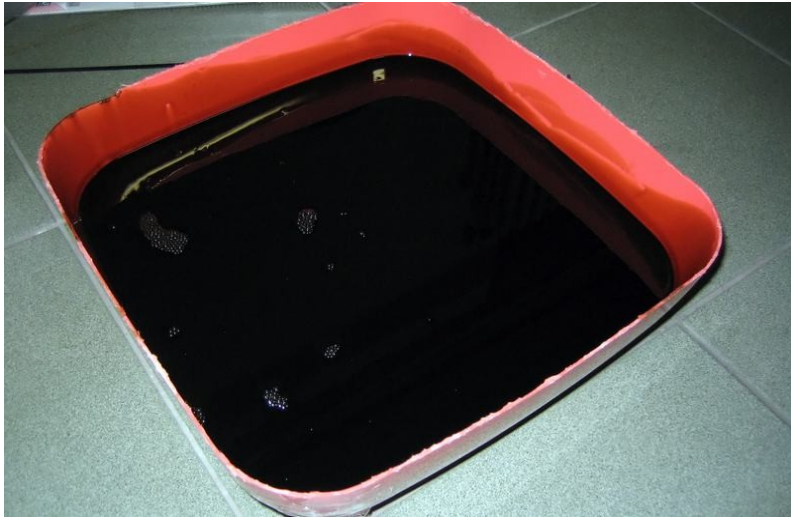


5. Put a suitable container (min 5 ltr. capacity, flat enough to fit under the car) under the drain plug. Unscrew the plug and let the oil drain out. Wear gloves as the sump and oil are very hot. Lower the car if you lifted only one side so that the car stands flat and all oil can flow out.



Note:

It might be useful to use from time to time some sort of engine flush to clean the engine. This is how my oil looked after an engine flush applied for the first time at 90k kms. Some people report this can even cure a noisy variator on TS engines as well.



6.

Clean the drain plug and put a new washer on it (18mm). It is recommended always to use a new washer as you will avoid over tightening the thread in case of leaks and possible stripping the thread in aluminum sump. There are at least two versions of original Alfa washers, one is copper and second is steel with pressed in rubber insert. Both are fine as well as any other copper washer.



7.

Raise the car again and screw the plug back in. The best way is to use a torque wrench set to recommend 22 Nm. This way you know the plug is tight and you don't strip the thread.



8.

Locate the oil filter. It is just in front of the oil sump, under the A/C compressor.



9.

Unscrew the oil filter. It might be doable by hand but it is much easier with the right tool. There are many sorts of oil filter keys widely available and they are usually very cheap.



Don't forget to put a container under the filter; there is enough oil in it to make a big mess. Lower the car and let it drain with filter removed.

10.

Oil the seal on the new filter, it will help you to screw it in easier and fit properly.



11.

Screw in the new filter and tighten it by hand.

12.

Lower the car to the ground, lift the bonnet and fill in the new oil. Twin Spark engine capacity is 4,4 liters.



Close the oil filler cap and start the engine. It might happen that you will see a "low oil pressure warning" at startup, but this should go off quickly. Let the engine idle for a minute or two, turn it off and wait for a few minutes. Check the oil level on the dipstick and fill up if necessary.

13.

Take the car for a short spin and check for leaks. Job done.

Alfa Romeo 147

Gearbox oil change guide

Disclaimer:

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Alfa Romeo 147

Gearbox oil change guide

This guide will help you to change the gearbox oil on Alfa Romeo 147. Photos used in this guide are from TS version, but JTD should be similar as well as other Alfas (156, GT,...)

Quick guide (for advanced alfisti):

1. Get new gearbox oil.
2. Go for a drive to heat up the oil (10km or more).
3. Lift the car and unscrew the filler plug (M22 screw, 12mm hex key).
4. Unscrew the drain plug (M22 screw, 12mm hex key) and drain the oil to a container (2 litres minimum capacity).
5. Lower the car to stand flat or lift just the right side of the car so that all oil can be drained.
6. Clean the drain plug from the iron particles (the plug is magnetic to catch them up).
7. Screw in the drain plug.
8. Fill in new gearbox oil till the oil level reaches the bottom of filler plug (about 2 litres).
9. Screw in the filler plug and go for a drive.
10. Check for leaks to be sure.

Step by step guide:

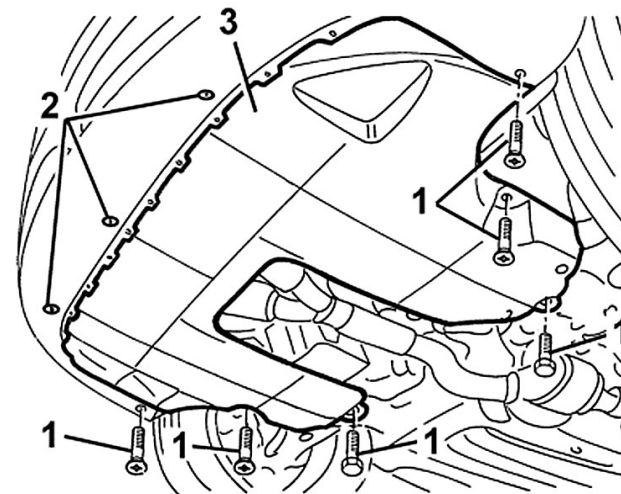
Note: As the drain and filler plugs can be seized, you might prefer to try to release them when the engine is still cold. If you see you can turn them and you are able to remove them only than go for a drive to heat up the oil. It is much easier to work on seized screw under the car when the engine is cold as trying to release it when it is hot. On the other hand, when the metal is hot you might need little less force to release the screw, so it is up to you. I took the first option.

Gearbox oil to use:

Alfa Romeo recommends using TUTELA CAR ZC75 SYNTH gearbox oil. This one is 75W-80, API GL5 oil type (rated 75W-90 in the older documents). You can use other brand as well provided it is the same spec (especially API GL5 rating). I used **Mobil** Mobilube 1 SHC 75W-90, GL5.



1.
 - Raise the vehicle.
 - If you can't raise the vehicle completely, secure the car against movement (pull handbrake, cog the rear wheels) and lift the front left wheel with a jack. (preferably lift both sides if you have 2 hydraulic jacks)
 - Remove the bolts fixing under engine protection if (you have one) and remove the protection.



2.
 - Locate the gearbox oil filler and drain plugs. Filler plug is located on the front part of the gearbox, few cm to the left from some gearbox sensor. You can see two wires coming out of it. Drain plug is more difficult to get to; it is located on the side of the gearbox, close to the front left wheel, hiding just at the bottom of the gearbox side behind front lower arm. There is not much space to get to it.



Drain plug
(pictures were taken after the oil change, that's why the gearbox is dirty of oil)



Filler plug

- Check if you can unscrew the plugs. You will need 12mm hex key to do this. The plugs might be really seized. In my case the filler plug was quite easy to remove, but the drain plug was a problem. First, it is located very inconveniently to be access with tools, I had to cut 1-2 cm from my hex key to be able to reach it. Than I spent about 30 min trying to release it using WD40, slight hammering to release it by vibrations and at the end a lot of force applied on the longest lever I could make. I had to combine bits from my toolbox to make the HEX key as long as possible to apply adequate force.



3. When you are sure you will be able to release the bolts, lower the car and go for a drive. You should do about 10 km to properly warm up the gearbox oil and mix it well. Than go back to the garage, and lift the car again.
4.
 - Unscrew the oil filler plug
 - Put a container under the drain plug (at least 2 litres)
 - Unscrew the drain plug. Use gloves so that the oil doesn't scald your hands.



- Use a container as wide as possible, as the oil will not flow out in a single stream, in my case it flew just on the suspension arm opposite the drain plug and splatted in all directions making quite a mess under the car. It might be a good idea to put some paper under the car so that you don't leave mark on the pavement or in your garage.



- Lower the car to stand flat so that the most of the oil can flow out. You can eventually lift front right wheel only to drain it completely.
5. Now you can clean the drain plug of the metal particles. The drain plug is magnetic, so that it catches all metal particles in gearbox oil, results of gearbox wear.



before

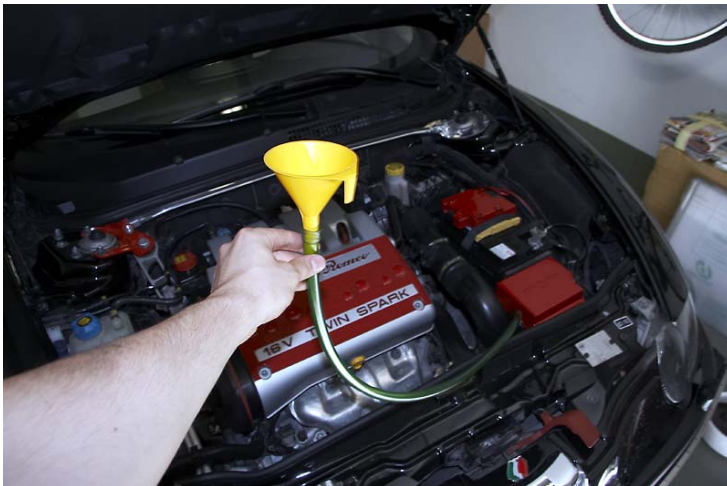
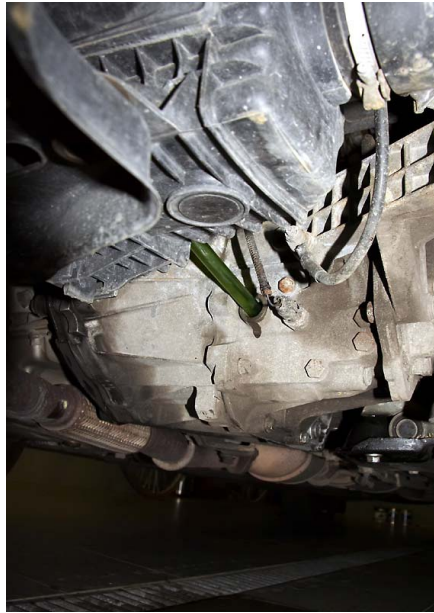


after

6. Screw in the drain plug. There really is not enough space to use a torque wrench so I made it tight just according to my judgment.

7.

- Fill the gearbox with new oil.
- The filler hole is not exactly conveniently located to be accessed with an oil bottle in your hand so I decided to use a hose I pushed few cm into the gearbox and held the other side above the engine with a funnel attached to it.
- Lower the car from the jack so that it stands flat and start pouring the oil to the gearbox. It might take some time if you use a thin hose, as the gearbox oil is thicker than engine oil.
- According to spec, the gearbox has a capacity 2,01 liter. However, you will never drain it completely empty. When you are finishing the second litre pour slowly as the oil will probably start to flow out. I managed to put about 1,8 – 1,9 litre in when it started to flow out.
- Keep the car flat on ground for a minute so that the oil can flow out and level stabilizes on the bottom of the filler screw



8. Lift the car again, tighten the filler plug and lower the car to the ground.

9. Take the car for a short spin and then check for leaks. Job done.

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Alfa Romeo 147 GTA/Ti headlights conversion guide

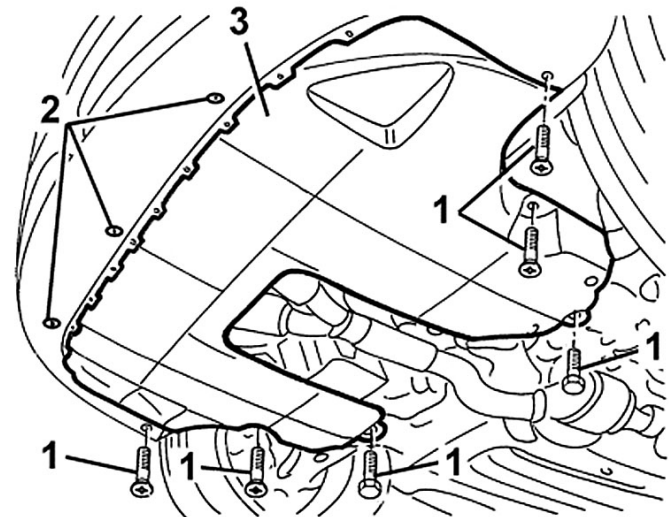
This guide will help you to convert the standard headlights on Alfa Romeo 147 into the GTA/Ti pack headlights with black inner plastic.

Quick guide (for advanced alfisti):

1. Lift the car
2. Remove the front wheels
3. Remove plastic inner wheel arches
4. Disconnect front turn indicators
5. Remove the front bumper (disconnect headlight washers first if you have them)
6. Remove headlights
7. Open the headlight housings and paint the inner plastic black or car color
8. Use silicone sealant to piece the headlight together
9. Install everything back in reverse order
10. Enjoy

Step by step guide:

1.
 - Raise the vehicle.
 - If you can't raise the vehicle completely, secure the car against movement (pull handbrake, cog the rear wheels) and lift the front with two hydraulic jacks.
 - Remove the bolts fixing under engine protection and remove the protection.

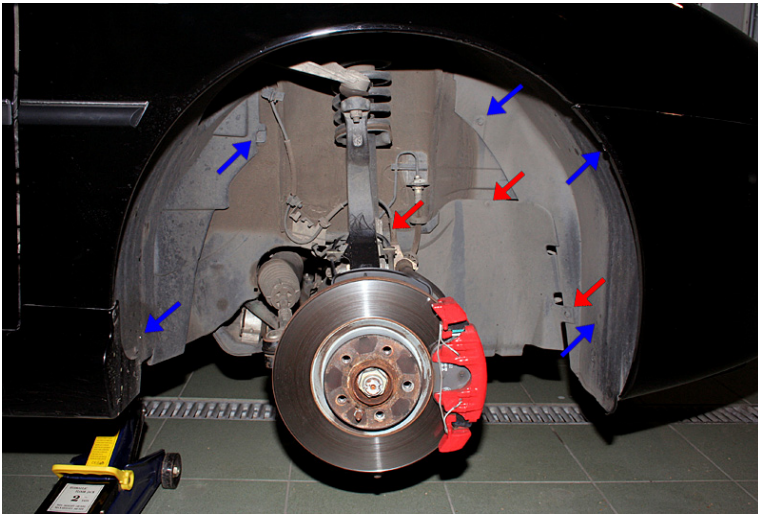


Alfa Romeo 147 GTA/Ti headlights conversion guide



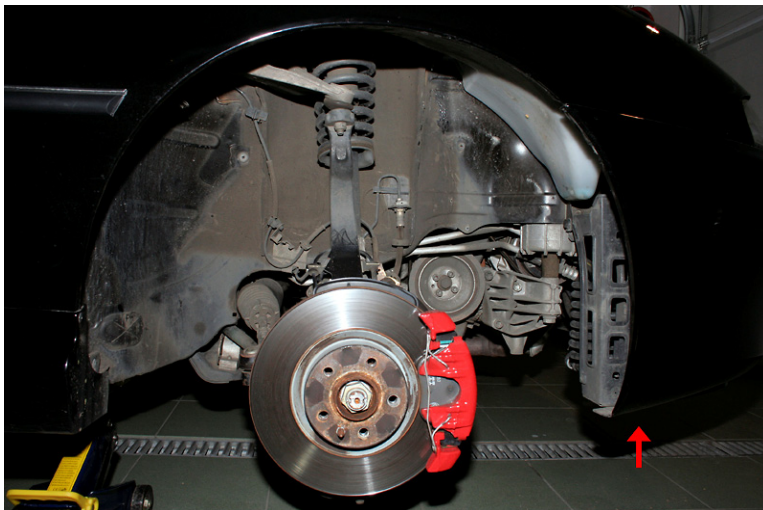
2.

- Take off your front wheels.
- Unscrew the engine dust protection retaining bolts (red arrows) and remove the protection.
- Unscrew the 5 wheel arch bolts (blue arrows), detach the wheel arch and remove it.

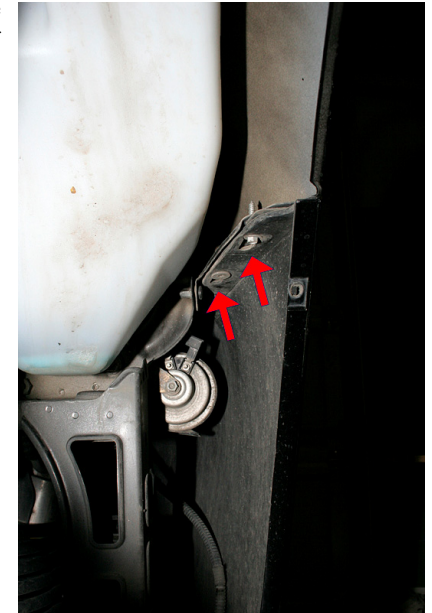


3.

- This is how the right inner wing looks like without the wheel arch. Follow the same procedure for the left side of the vehicle.
- Remove the lower bolt holding the bumper on the sides (red arrow)



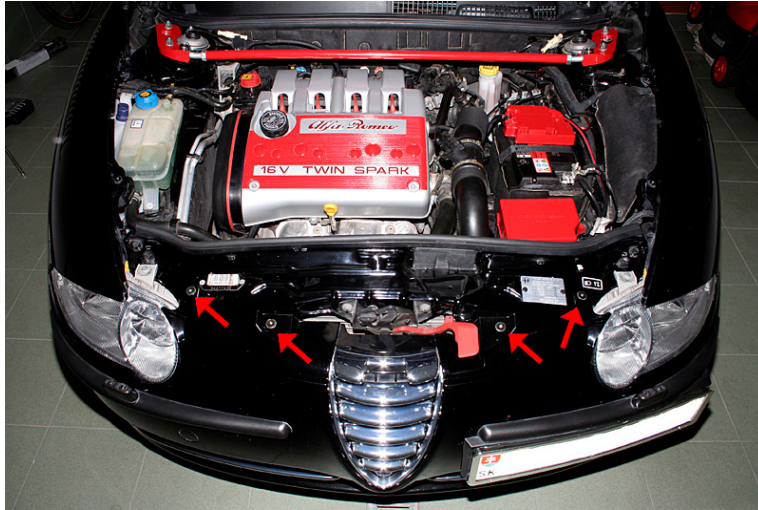
4. Working from under the wing remove the two bolts on the inner side of the bumper (red arrows).



5. By now, you should have removed all five bolts from under the bumper. The three in the front (red arrows) you should have removed in step 1 with the under engine protection. The two on the sides you should have removed in the step 3.



6. Remove the four bolts on the top of the bumper, under the bonnet (red arrows)



7.

- Before removing the bumper, disconnect the front turn indicators (red arrow). You can get to the connector very easily from under the bumper.
- Put some blanket on the ground under the bumper so that it doesn't scratch itself when you remove it.



- Start removing the bumper. It should go very easy. Start on the side, from the wheel arch. There are two pins on each side holding the bumper. When the bumper comes off them, the rest is not difficult.

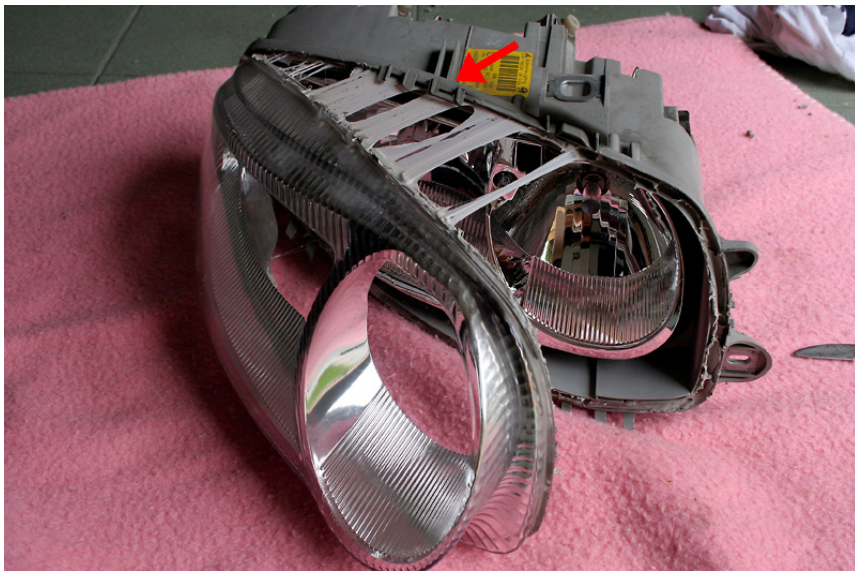
- If you have headlamp washers, remove the bumper only partially, so that you can get to the pipe connector. It is fine if you can ask second person to hold the bumper for you till you unplug the connector. You have to unplug the hose entering pressure distributor. That's the thing where the hose splits into two separate ones. Use pliers to move the safety-catch upwards on the hose and unplug the hose (blue arrow) from the pressure distributor. When you do this, water starts running out of the hose till the water reservoir is empty. You will need a bucket to catch it. If you don't want to loose 5,3 liters of your screen washing liquid, you can have some sort of plug prepared to stop the water running out.

8. Remove the headlights. Each one is held by three screws (red arrows). Remove them, pull the headlights partially out and disconnect the connector on the back. To disconnect it easier, plug the connector fully in as this will loosen the plastic catch inside the connector. Than push the pin on the back side backwards and unplug the connector.



9.

- With a sharp knife or small flat screwdriver try to get out as much sealant as you can from the groove between plastic headlight body and the glass (it is plastic too, but I will further refer to it as glass)
- There are three pins holding the light together (and sealant of course). Two pins at the bottom and one on the top of the light cluster (red arrow).
- Start dismantling the light from the bottom side, as bottom pins are shorter and easier to open as the upper one. You will probably need to use wide flat screwdriver as a lever to loosen the sealant at more places
- Don't rush or use excessive force!!!! The headlight body isn't made of very hard plastic and you can scratch the glass easily too. Take your time and prise off the glass very slowly.
- The sealant is very sticky and likes to smudge the glass, your hands and everything around.
- When you take the headlight apart, take out the inner chromed plastic of the glass.
- Clean the edge of the glass of the sealant. First mechanically, then use some solvent. I used benzine for technical purposes and it worked quite well. You can clean the glass completely, but be careful not to scratch it.
- Clean the headlight body groove of the sealant. This hasn't to be perfect, but you have to make the groove wide and clean enough to be able to fill it with new sealant.



10.

- Paint the headlight plastic black or body color if you like.
- Don't forget to degrease it before painting
- I used two-compound black polyurethane paint as primer and black glossy spray as final finish, but you can probably use any primer suitable for plastic and coating. The temperature inside the light never reaches 100 °C and most paints are able to sustain this.



11. Install the painted plastic into the glass. Work in clean environment, as all dirt will be visible in your headlight when you seal it.



12. Fill the groove in the headlight body with silicone sealant. I used universal transparent silicone, as it can be used with almost all materials and stands up from -60C to +150C. Another good idea is to use silicone for aquariums or neutral silicone that isn't so acid. I am sure there are some better sealants, but I had nothing other available at the moment.
- Never touch the mirror coating on the reflectors parabola. It is delicate and scratches or turns matt easily. Don't clean it with cloth, as dust particles could scratch the surface. If there is dirt on its surface, try to blow it away with compressed air. If you really have to clean it, use microfibre cloth and liquid used for cleaning optical instruments, like photographic lenses. Don't use any liquids that leave residues. You don't want the surface to turn matt.



13. Put the headlamps together. Bind them with some tape and let the sealant dry. You should open the back side of the headlamp and take out all the bulbs so that the light was vented. Some sealants release vapors when they are drying and this could cause a dim film on the glass or parabola. This stands for the plastic you painted too. Although most paints are quickly dry for the touch, they can release some vapors in the next hours during the process of hardening. If you seal the painted plastic too early into the headlight, it can't breathe. Let it dry outside overnight.



14. Enjoy the result



15. Complete the installation of headlights, bumper, inner arches and wheels following steps 1-8 in reverse order.



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Alfa Romeo 147

On board instruments installation guide

This guide is describing how I installed oil temperature and oil pressure gauges to my Alfa Romeo 147. I wanted to have them for a long time. I consider oil temp important as I want to know when I can start to drive “temperamentally” after startup and oil pressure reading can warn me if something is going wrong. And at last but not least.... I like the looks of the gauges in the car interior ☺

Step by step guide:

First step was obviously getting the gauges. I searched many websites, first I wanted to buy VDO gauges, but they were so expensive... At last I found gauges made by EQUUS. Unknown brand to me but they looked nice and came with the necessary sensors for about 40 EUR. I got them from www.conrad.sk, but they can be found in many countries where Conrad has distribution network (www.conrad.de, www.conrad.at, ...).



Alfa Romeo 147

On board instruments installation guide



Gauges have very nice clean design, definitely nothing special, but they will match any interior and backlight can be switched between red or green. Needles have yellow backlight and this can not be changed.



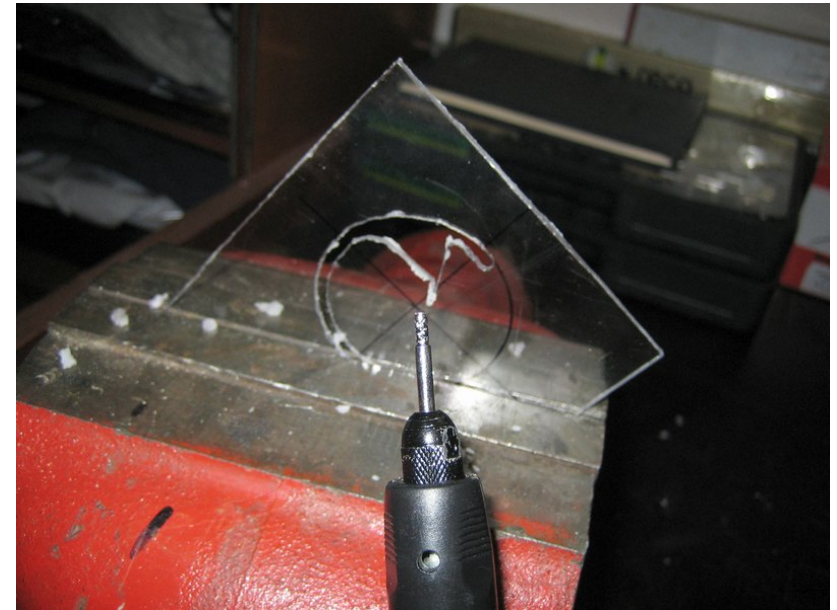
This is the complete set of equipment you get in the package. It includes temp and pressure gauges, temp sensor, pressure sensor, backlight bulbs with silicone caps to change the backlight color, screws, connectors to be crimped on the sensors and installation manuals. All you need to buy separately is the wire to connect the sensors and adaptors to install the sensors into the engine block.



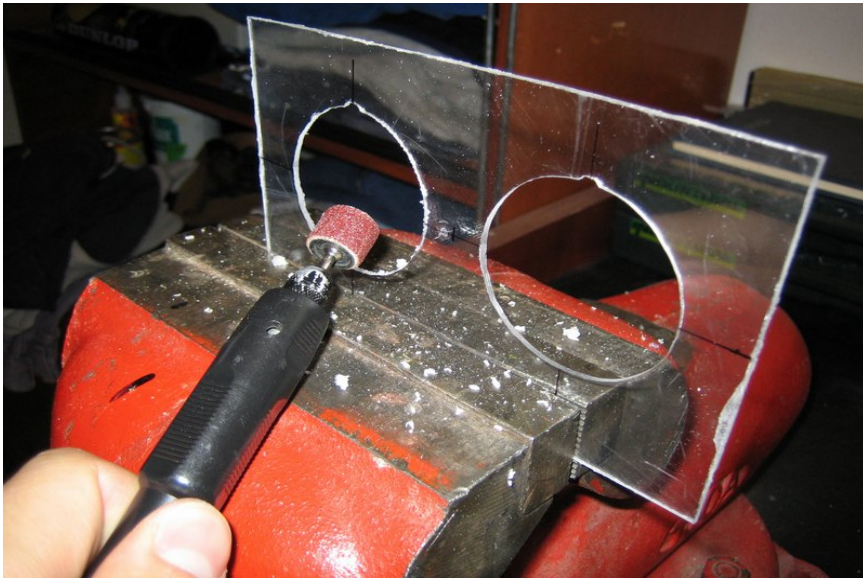
I decided to install the gauges in the empty space in front of gear lever and below the A/C. This way I am losing some place in the car to hold my CDs for example and I am losing the cigarette lighter (I will find a new place for it later) and ashtray (no big loss, I never ever used it).

First I had to make a frame for the gauges. On the following pictures can you see my first version that I made from thin plastic. I realized soon that it had been too thin and fragile and I had to make a second one from thicker plastic. I would recommend 2,5 - 4 mm thick plastic, whatever you can get.

After having the plastic plate in the right shape I drilled a hole and then cut out the circles for the gauges by means of small mill.



I grinded the edges to be smooth and to have the shape of nice circles big enough for the gauges (53mm diameter in my case).



I decided to cover the frame with black leather. It is much nicer finish than simple paint, looks elegant and in black color suits any interior trim. I put thin layer of plastic foam on the frame under the leather to make it softer for the touch.



I glued the leather onto the frame and let it dry out.



I cut the hole for the gauges with sharp scalpel.....



....and installed the gauges.



I prepared the installation place in the car. I took out the ashtray door and cigarette lighter. My lighter was stuck in some way, I disconnected the connector at the bottom and I had to take it out by breaking it with pliers and pulling out. For this you have to put away the gear lever leather gaiter by gently squeezing the chrome plastic trim and taking it out.



At this point, I am missing the pictures as I accidentally deleted them ☹.

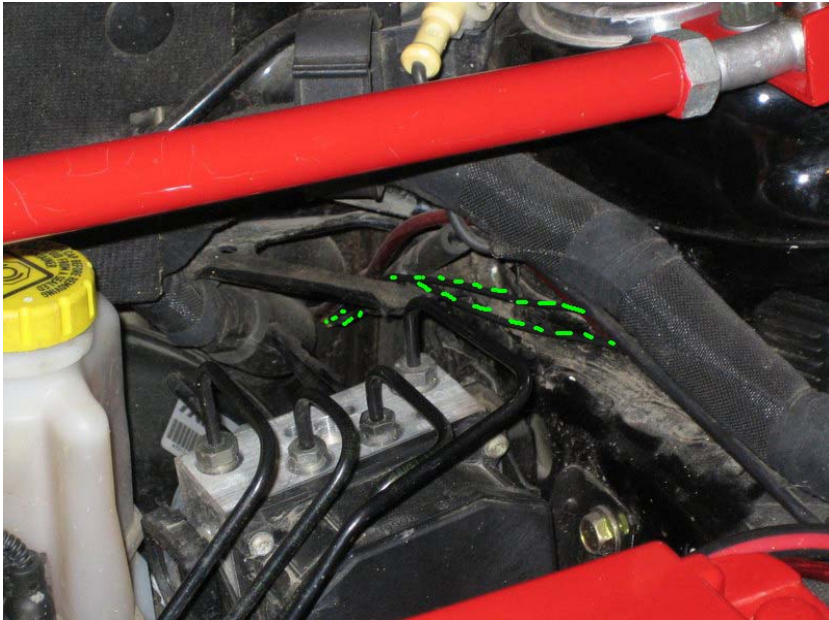
I followed by electrical connection. First I connected longer cables to old cigarette lighter leads. It includes all I need. +12V, Ground and dashboard light switched 12V. Wiring the gauges is not difficult. Both gauges have to be connected to +12V. Both have to have ground connection. Gauges backlight bulbs obviously need ground and dashboard switched +12V as well. The difficult thing is to wire the sensor cables. I have soldered them to the gauges, run through ashtray hole, under the fuse box through the rubber seal into the engine compartment. To pass them through, I used sharpened wire that I stuck through the rubber seal from engine compartment into the interior.

When all the wires are connected I fitted the gauges into the interior. I screwed two pieces of metal bended in 90 degree "L" shape onto the central console and I stuck in the gauges plate by means of double sided tape. The tape is more than enough to hold the gauges and the gauges plate has so tight fit it holds in place almost alone.





This is where I passed the sensor cables from engine bay into the interior.



The wires pass along the battery, go down around fuse box and follow to the front until they reach the harness that goes from under the headlight to above the radiator.



I connected the cables with the harness passing just above the radiator and by the front right light I turned them down to get to the oil filter.



I joined the wires to the pipes in place to hold them firm. I tried to avoid the pipes that get too hot or too cold.



Here is the place where the sensors will be installed. Those two screws on the side of oil filter will be replaced by the sensors.



Oil temp sensor already in place. I unscrewed the blank screw from the block (get the right size tool, the screw is really tight fit) and installed the sensor. The installation hole is 18mm so you will probably need the right size adaptor for your sensor.



Oil pressure sensor is the same job. There is not much space, so you might have problems installing sensors so close. 1 or 2 mm more in diameter and I would have serious problems with the installation. I had to bend the temp sensor lead a bit not to short-circuit it with pressure sensor.



View from the side. You can see how much I had to bend the temp sensor to get a safe fit.



Here can you see how much oil I lost during the installation of both sensors. Almost nothing. As the oil circuit is not under pressure, only few drops from oil filter will come out. I had the screw out for maybe one second. With one hand I unscrewed the plug and with second hand immediately screwed in the sensor. Few seconds job.



Sensor installation is finished. I wrapped the pressure sensor in rubber insulation tape to avoid accidental contact with temp sensor. I connected the sensor wires and turned the engine on for 1 minute to check for leaks. Then I made a 10 km drive to see if the gauges work and checked for leaks again. On the next day, I made a long trip of about 200km and checked for leaks again to be completely sure. Everything seems ok so far.



Daily use experience:

So far I was able to see the readings only during nice summer temperatures 22-32°C. I don't know yet what the temperature and pressure will be in freezing weather.

As I expected, oil temperature starts to rise up much slower than engine/water temperature. My water temperature gauge is almost reaching the normal 90°C when the oil temp only starts rising from 50°C. It takes 10-13km city driving in warm weather for oil to reach 90°C and 3km more to reach 100. Once warmed up, oil temperature varies from 100-115 degrees, depending on outside temp, driving conditions, speed, revs... Once I hit 120°C, but I was trashing the car a lot.

Regarding the oil pressure, after the cold start it rises to about 5,5bar at idle and can go up to 6bar when driving the car with cold engine. I think in winter after starting the engine at -15°C I will see even 6-6,5bar after startup. As the oil is warming up the pressure goes down. With hot oil, the pressure at idle is about 2bar and during driving usually 4-4,5bar. Under heavy load it goes up to 5bar and with minimal load it can fall to 3bar.

Note: due to sensor installation place, the temp reading shows temperature of oil going from the sump through the oil pump and oil filter. This way the oil cools down a little. Oil in the engine block or cylinder head coming back to the sump has higher temperature; I guess at least 10-15 degrees.



Alfa Romeo 147

Q2 wing mirror covers installation (satin metal finish)

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Alfa Romeo 147

Q2 wing mirror cover installation (satin metal finish)

In case you like Alfa Romeo 147/GT Q2 satin metal finish mirror covers, this guide will show you how to install them.

Quick guide (for advanced alfisti):

1. Remove mirror glass (unplug the heater element if you have heated mirrors)
2. Remove mirror cover (release inner catches and push forward)
3. Clip the new cover in place
4. Re-attach the mirror glass (plug-in the heating element first)
5. Enjoy the result ☺

Step by step guide:

Note: I don't recommend doing this in temperatures below or close to zero. The plastic clips are very delicate when cold and have a tendency to break. The higher the temperature, the easier you can adjust/bend them without breaking.

1. As the first thing, you obviously need to get the covers. I don't think this is a widely available item in web-shops or on e-bay (Dec. 2007) so the easiest way is to order them from your Alfa Romeo dealer. I did it this way, they arrived in a week and both cost me about 50 EUR.



2. For start, you have to remove the mirror glass. You have to lever it out. The best way to do this is to work not in one corner only as this will only tip the glass. Work with two tools simultaneously in opposite corners. You can use flat screwdriver, a knife or anything flat and thin. To be safe, wrap the tool into a cloth not to damage something.



3. The mirror glass will eventually pop-out and you can remove it. If your mirrors are heated, you have to unplug its connectors, they just slide out.



4. The cover holds on 4 clips. Three of them are well accessible (red arrows) and one (yellow arrow) is accessible only if you take apart all the mirror adjustment assembly. But this is not necessary to do as if you release the three and if you apply reasonable pressure on the cover, the fourth will eventually pop out without breaking (at least in my case did).



5. The cover comes out by sliding it forward. If your car is not brand new, the cover will be probably “glued on” by water and dirt that has progressively got between the frame and cover. I was surprised how much force I had to use to slide the cover (be sure the clips are released and didn’t pop back in as in this case force will not help).



6. Now you can clean the wing mirror frame and slide the new cover in place. Be careful that the clips slide into the holes smoothly, they are 4 and you can’t see them under the cover. In my case there was always one hitting the plastic and going to break. I had to bend it few mm to fit in place.



7. Push the cover in till you hear all clips to “click”



8. Admire the result ☺



Alfa Romeo 147

Custom subwoofer built guide

Disclaimer:

This guide describes how I did the job. It may not be complete or something might be not described detailed enough. Follow this guide at your own risk. Please only attempt this if you feel you are competent. I'm not responsible for any damage you might cause. Always use common sense not excessive force. Don't blame me or this guide if you break something. It was your choice to try this.

You can use and reproduce this guide and photos it contains freely in any way you consider useful for any Alfa-owner. You can make it publicly available on any Alfa-Romeo dedicated website, just please let me know about this.

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Alfa Romeo 147

Custom subwoofer built guide

In this guide I will try to describe, how I built my subwoofer. This is not a detailed DIY guide and it definitely doesn't describe the best way how to build a subwoofer for 147 but you might find it useful in some way.

When I started to plan building a subwoofer I had one main objective - To have the subwoofer as small as possible providing still very good sound quality (contradictory requirements, I know). Because of this I made this plan:

- To build a sealed box as ported or band-pass box usually needs much bigger volume.
- To use 20cm (8") speaker as larger speakers require bigger box and more powerful (and physically larger) amplifier.
- To fit the subwoofer in the boot, behind the rear left wheel and to make use the space as well as possible – I was going to build fiberglass box

Note:

This subwoofer was my first work with fiberglass. If you have some experience, your result will be probably much better. If you don't have any experience, try to get some info first. But as I made this subwoofer at the first try, so you will be probably able to do it as well. ☺

Step by step.

First, I made the fiberglass part of the box (back part). I wanted the box to fit perfectly into the boot and I could find only one way how to do this – to laminate it directly on the boot walls. To do this I had to isolate the walls and make a separating layer to protect them.

If you make something dirty with fiberglass resin, it is almost impossible to clean it. If you don't want to destroy your boot upholstery, you have to cover everything you think you can damage (that's everything you can touch ☺).

I used painter's paper tape (masking tape), 5cm thick, that I stucked directly on the boot walls in more layers. I was afraid that the tape might soak the resin and stick permanently to the wall so I used a layer of aluminum kitchen foil. And than one more layer of paper tape. It turned up as unnecessary precaution, but better to be safe than sorry.



At the end of masking, my boot looked like this. I still recommend covering the boot and everything you might touch with old newspapers, or some foil. I put some blankets around the rear headrests as well as I tried to separate car interior from the boot, because of the smell of fiberglass resin.



This is everything I used for laminating:

- glass-fibre cloth
- two compound fiberglass resin with hardener
- scissors
- paint brush
- pair of chirurgical gloves (not shown in the picture)

During the actual work I wasn't able to take any pictures. It is not very clean work, I had my gloves dirty of the resin and I didn't want to damage my camera ☺. The process is quite simple. I painted the paper tape with the resin, attached the glass-fibre cloth and painted it again till it was well soaked. I repeated this process till I had four layers of glass-fibre cloth. The resin is drying very quickly when it is mixed with hardener, you can use it only for about 10-15 minutes at 20 °C. Then it starts changing into a gel and can't be spread by painting any more.



This is how my fiberglass box looks like while drying. Three hours later, I could easily take the molding out and to my surprise I could peel most of the paper tape down quite easily.



This is the result of what I was able to do in one afternoon.



With electric saw I cut the sides to have (more or less) straight edges.

Between this picture and the next one, there is some time difference as I forgot to take pictures of all the steps. As the edges of my molding were not exactly straight and didn't hold the shape I needed, I had to make a frame, cut from one piece of MDF and nailed to the fiberglass. At the places of missing side walls I fitted carton paper to make a mould and laminated it. You can see the result.



Please ignore the red metal reinforcement I used. I accidentally broke the MDF frame and I had to strengthen it till the resin dries out. I removed the reinforcement later.



This is the back part of the box. You can ignore the surface finish, it looks very bad in the pictures but it is not that bad for the touch and needs a lot of sandpaper work anyway.

Notes:

- Laminating makes very bad smell. It is better to do it in open air and not in closed garage. Consider that when you laminate the box directly in your boot, your car will be full of this smell for some time.
- When you cut or grind laminate, the dust is very annoying. If you don't use gloves and mask for your face, your skin will itch you half day ☺.
- The resin usually has two components. When you mix them you have to spend it quite fast. Don't prepare 0,5 or 1 liter of the mixture as you will not have time to use it all.
- Buy more paint brushes and buy the cheapest ones. When you make a pause during laminating, or you want to finish something next day, or you need to repair something, you always need a new brush. The used one gets stone-hard after few minutes and can't be cleaned.



I sprayed the inside of the box with spray used for underbody (chassis) protection. If you are very serious in car audio you can use so called "noise-killer" spray available in audio shops, but according to the information on my spray, this one has the same composition (asphalt and bitumen) for 1/4 of the price.

This is the detail of the spray can I used. This kind of material of various brands and colors is available in any car shop.





As the subwoofer walls have to be as rigid as possible and resistant to vibration with good sound damping properties, I decided to paint it from the inside with bitumen underbody coating. Though it is quite thick material, I was still able to paint it with a normal brush. Though it dries very quickly for the touch in thicker layer it is quite delicate. Because of this I let it dry for a week.



I had some rest of Dynamat sound damping I used previously during my audio installation, so I decided to stick a layer of Dynamat too. It was not exactly necessary but it won't harm either ☺.

If you heat up Dynamat a little with a hairdryer it is very easy to work with and adapts to almost any curves of the box.





Connectors' installation is simple. I drilled two holes in place where I considered the connectors most convenient. I soldered copper wire to the connectors and installed them. I used $2 \times 5 \text{ mm}^2$ twin-lead cable as the wire should be as thick as possible to reduce resistance. I sealed the connectors inside of the box with bitumen sealant so that they resist vibrations. As I didn't want the cable to just lay at the bottom of the box, I stuck it into a layer of bitumen.



When you build a subwoofer, you have to know its volume to choose appropriate speaker for the enclosure you have. Or you can choose the speaker first, and build an enclosure with an appropriate volume to its characteristics. When building a box, it is easy to calculate the volume, but with curved custom shape, it is almost impossible. As I wanted to know the volume of the box I have built I could come to only idea: fill it up with water ☺.





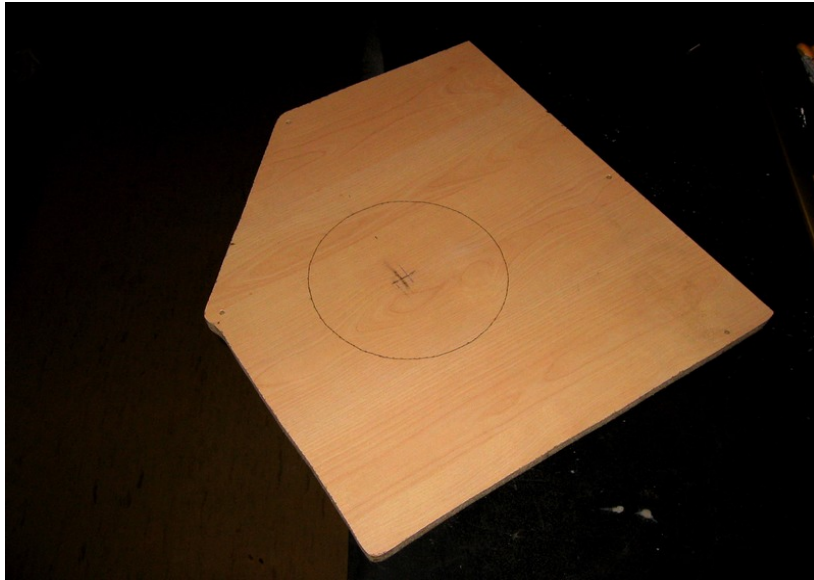
Filling the box with water has one more advantage. You can easily find if the box has some leaks or if it is completely tight. My box had two minor leaks. They were so small that they probably wouldn't influence the sound anyway, but it was good to know about them. No big deal, I just had to reseal the inside of the box. I was anyway planning to paint the box with one more layer of fiberglass resin.

The volume of my box is 16,5 liter. I am planning to put some sound dampening material inside and installing a speaker will further reduce its volume as well.

After the inside of the box was sealed I installed sound deadening material. You can choose various kinds of material and you can find on internet forums long arguments which one is the best. Considering the shape of my box, used materials, the fact that it plays in the boot I don't think I would be able to hear the difference between simple foam and special synthetic wool for speakers ☺. I chose ANS foam (whatever ANS means) made by Sinus Live, mainly because I found it in the shop near my house. It is easy to cut and glue.

I needed the frame of the box to lay flat on the front part of the box and it was slightly twisted. I had to put a layer of fiberglass body filler on some places and to grind the frame plane. You can see stains on the frame where I had to smooth it.





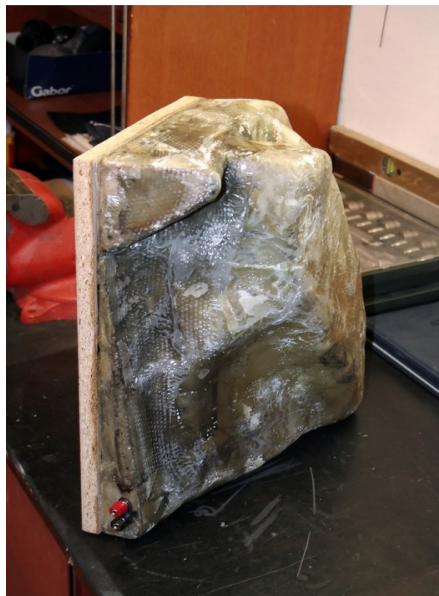
I made the front of the box out of 20 mm thick MDF board. It was not difficult, as I had only to draw the outline of my box on the MDF and cut it out by electric saw. Then I cut the hole for the speaker. Even though in this stage I didn't have the speaker, I had chosen the type I wanted and downloaded the technical specification from the manufacturer's website. So I knew the hole had to be 180 mm in diameter.



I connected the front and back of the box using universal transparent silicone and 13 screws. The good thing is that the box is completely sealed now, but it can not be disassembled in the future. After it is smoothed and upholstered it is even impossible without destroying it. But for me it is not a problem as this was the plan. It would be much more difficult to build a box that could be opened.



My work is at least starting to look like a box ☺. Not a nice one, but this can be still improved. I have to smooth the surface roughness with a filler. I used fiberglass filler for places where I needed thicker layer as the glass fibres inside the filler make it very resistant and it doesn't crack. For thin layers and final finish I used polyester fillers as they are easier to smooth with a sandpaper.



Just some more pictures before the grinding....





Another close-up of the fiberglass body filler I used on the back of the box that has to be smoothed.

I don't have any pictures from the smoothing process as I didn't want to damage my camera with the fine dust. Anyway, I used only some sandpaper and a lot of patience ☺. Good idea is to work outside, as the fiberglass dust is a real pain.

This is how the box looks like ready to be upholstered. It doesn't look very attractive on the pictures because of various colors of the material used, sealants, body fillers, resin..... but this is not a problem. The objective was to have a smooth surface that fits into the boot. When the box is covered with carpet it will look completely different.



Covering the box with upholstery was time consuming, but it was the part of the job I enjoyed most. I started with the easiest surface – front of the box. There is not much one can do wrong with gluing a carpet on flat surface ☺



When the glue dried out I cut the hole for the speaker with a sharp knife.



Some more pictures from the process. There is only one experience for the future – Measure twice, cut once ☺





This was the most difficult part of the box to upholster because of its shape. It can hardly be covered with a single piece of carpet. I had to work with 4-5 smaller pieces I cut separately.

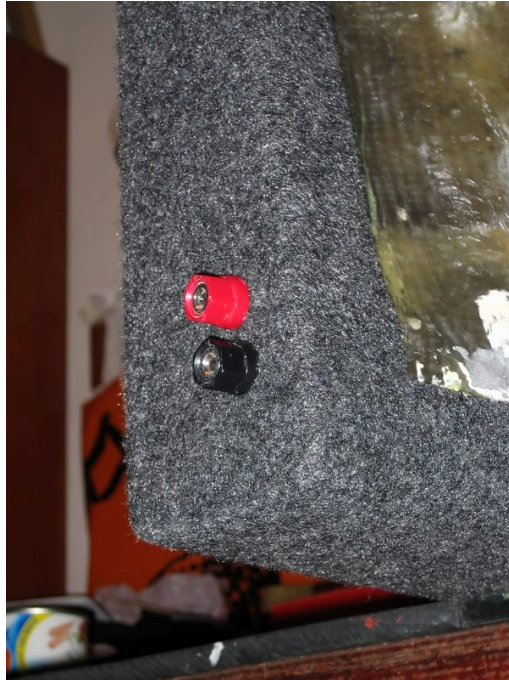


The lines where the carpet pieces meet are still visible, but I think that for my first time I did a pretty good job ☺.

Anyway, this part of the installed box is not visible so it doesn't have to be upholstered at all. I did it as I couldn't live with the feeling of unfinished job ☺.



You can see on these photos of the box corner with the terminals that even difficult curved areas can be covered with upholstery very neatly if you are careful.



This is the speaker I chose to install. I chose HERZ ES200, 20cm (8") subwoofer speaker because of the already mentioned reasons. It has recommended 15 liter enclosure, and its power characteristic (200W RMS / 400W peak) responds perfectly to my Blaupunkt GTA 250 amplifier (160W RMS / 400W peak) in 1ch bridged mode. Its reasonable price of 75€ played its role too ☺.





Speaker installation is quite easy and you can't do much wrong. I soldered the wires to the speaker as I don't expect to take the speaker out often (if ever). Simple connectors can be used as well, but if they don't fit tight the vibrations might make them loose after some time.



This is how my box looks like in the boot. It doesn't take too much space, fits perfectly and even the carpet color is very similar to the boot lining ☺. The last remaining issue is how to clamp the box in the boot as otherwise it would fall in the first corner.

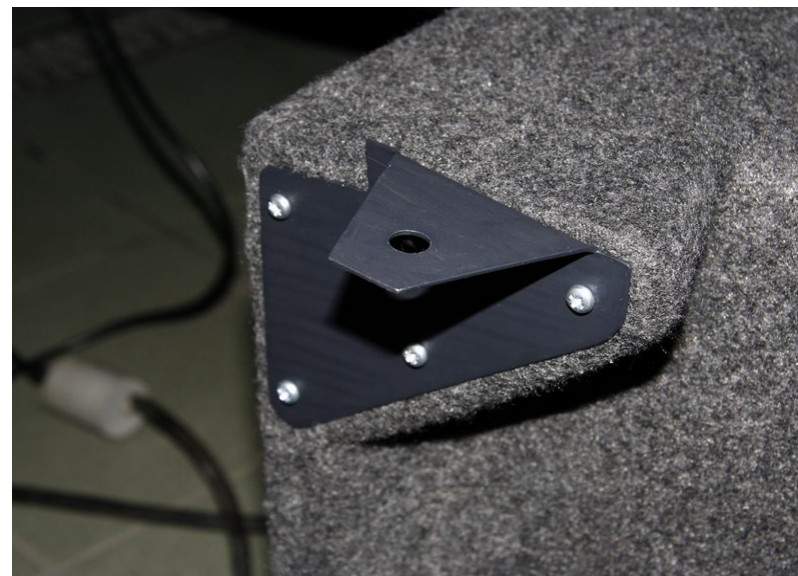




Here comes the part I consider the poorest designed part of my subwoofer ☹, but I couldn't come to something better. How to fix the box in the boot? My aim was to make the box easily removable without need of any tool. In worst scenario I might be forced to change the spare wheel in a blizzard and in that case I don't want to fiddle with the box in my boot ☺. As I didn't want to screw the box directly into the thin plastic trim in the boot (the screw thread wouldn't last frequent removing), I had to make some metal fixing point in the boot and their counterparts on the box.



Subwoofer mountings on place. One of them is screwed in wooden front panel, second one is held by screws in fiberglass on the box side. I used more screws, to lower the stress put on fiberglass material. I am sure that two screws would be enough to hold the box in place, but I have always tendency to come it strong.





I cut holes into the boot trim to host the screw nuts. I cut them a little larger, so that I had freedom to fit fixing points exactly on the spot where I needed them.

Afterwards I installed the fixing points. To be on the safe side, in addition to the screws I used some glue as well. As my subwoofer fits perfectly into the boot bay, two firm fixing points are more than enough to hold it without any movement during any kind of driving ☺



This is how my subwoofer fits in place. It is not extremely nice and spoils the look a bit, but in real life it is not that bad ☺. I would like to have better idea of how to hold it firmly, but I will probably stay with this system as it works fine.





To make the subwoofer work a functional amplifier is obviously needed. But how to install and wire an amplifier is a story for different guide ☺.

Finished !!!



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This guide describes how I did the job. It may not be complete or some steps might not be described detailed enough. Use it for your inspiration, not as step by step guide.

If you decide to build your box based on this guide, follow my steps at your own risk. Please only attempt to do it if you feel you are competent. I'm not responsible for any damage you might cause on the material or on your car. Always use common sense not excessive force. Don't blame me or this guide if you break something. It was your choice to try this.

March 2006 revision

Contact: quadri_foglio_verde@yahoo.it

Alfa Romeo 147

Brake pads and discs change guide (front)

This guide will help you to change front brake pads and discs on Alfa Romeo 147. Photos used in this guide are from Alfa Romeo 147, but many other Alfas, Fiats and Lancias share the same brakes.

Note:

During the installation showed in this guide I was installing aftermarket brake components (Galfer Extreme brake kit 37.09.500). Nevertheless this kit is direct replacement for OEM components so even though the parts you can see on the pictures look different, the procedure is exactly the same (with one difference of anti squeal carbon shims described in the later text). I think this guide is detailed enough to be usable for beginners and I tried to describe in the text alternative ways to do certain task as well.

Quick guide (for advanced alfisti):

1. Get new brake components (pads and discs if needed).
2. Lift the bonnet and unscrew the brake fluid filler cap. Fluid level will rise during installation so if the level is close to max suck some fluid out.
3. Lift the car and remove front wheel.
4. Remove pad spring.
5. Remove covers on caliper mounting bolts, unscrew them (7mm hex key) and pull them out.
6. Lift the caliper with pads off the discs, remove old pads and hang the caliper on some wire/cable but NEVER let it hang on its hose.
7. Compress the caliper piston to make space for new pads (described more in text).
8. Clean the caliper as much as you can off dirt and rust. Check if it is not damaged (rubbers).

If changing discs as well:

9. Remove the caliper mounting bracket (19mm hex socket).
10. Unscrew the disc holding pin (12mm hex socket) and lift the disc off the hub.
11. Clean everything you can from rust.
12. Install new disc and secure it with its pin (10-14 Nm).
13. Refit caliper mounting bracket with its screws (111-123 Nm).
14. Fit the new pads. Inner pad has a spring clip that fits into the piston.
15. Slide the caliper/pads assembly onto the disc.
16. Fit the caliper mounting bolts (117 Nm) and fit their protective caps.
17. Install pad spring.
18. Refit the wheel (88 – 108 Nm) and lower the car to the ground
19. Change pads (and discs) on the other wheel.
20. Check brake fluid level and close the cap.
21. Go for a drive. Start VERY slowly till you are sure your brakes work fine. Drive gently for the first 100 – 200 km to bed in the pads. *(In case you installed aftermarket pads, run them in according to manufacturer advice)*

Alfa Romeo 147

Brake pads and discs change guide (front)



Step by step guide:

1.

Get new brake components. You can go for OEM components but you can get aftermarket ones as well. They are usually only slightly more expensive and most of them (made by some well known manufacturer) are usually better (at least definitely not worse) than original ones.

2.

Open the bonnet and unscrew the brake fluid reservoir cap so that air can run out as the fluid level rises during installation of new pads. In case your fluid level is close to max, you can suck some fluid out of the reservoir to make some space.

Put the sucked out fluid into a small bottle/container and close it. Don't leave it exposed to the air. Glycol based brake fluids (Dot 4, Super Dot 4, Dot 5.1) are hygroscopic and easily absorb air humidity. This lowers their boiling point. This is the reason why the brake fluid should be changed every two years.

Be very careful when manipulating with brake fluid as it is a very good paint stripper. Don't drop it on the paint.



Alternatively, you can cover the top of the reservoir with some cloth and tighten it with rubber band so that in case it overflows, the damage is minimal. This prevents impurities and air entering the system as well.



3.

Raise the vehicle. If you can't raise the vehicle completely, secure the car against movement (pull handbrake, cog the rear wheels) and lift the front wheel with a jack. (preferably lift both sides if you have 2 hydraulic jacks). Put the car on axle stands if you can as **it is not safe to work under the vehicle lifted on jack(s) only!!!** If you don't have them, push a spare wheel, brick or a wooden log under the car so that it doesn't fell on you or on the ground in case the hydraulic jack lets go...



4. Remove brake pad spring. Just prise it off. If you have painted the calipers be careful as the spring likes to scratch them. In my case they need repaint anyway.



5. Release brake hose from the bracket. It might be useful to clean it now and check if the rubber has no cracks and connecting pins are in good condition.



6. Remove plastic caps on the bolts holding the caliper (from the inner side of the caliper). With 7mm hex key unscrew the screws holding the caliper and take them out. In fact they are not screws, but sliding pins allowing the caliper to slide/float on them.



7. Now the caliper is released and theoretically you can slide the caliper/brake pads assembly off the disc. In my case of worn discs the disc had a recess on its edge and the pads were actually bitten into the disc and could not slide over its edge.

In this case now is a good time to directly compress the caliper piston. At this moment you can compress it with the old brake pads on and you don't risk its damage as in the case you try to compress it later and you don't have the right tool.

At this moment it is very important that you have opened the brake fluid reservoir in the step 2 so that the brake fluid flowing away from the caliper piston has enough space to flow back.

When compressing the piston, **WORK SLOWLY!!!** Give the fluid some time to flow through the valves in opposite direction.

Alternatively you can open the caliper bleeding nipple and push the fluid out through it. In case you have a suitable hose to fit the nipple and container for the fluid this might be a way to do it as well. Don't forget to close the bleeding nipple immediately after pushing the caliper piston back to prevent air entering the system. If you use this procedure, you don't need to open the brake fluid reservoir showed in the steps 2 and 3. After the job is done press the brake pedal 2-3 times so that the new pads catch the disc surface and then check brake fluid level. It might need topping up.

In my case, I used a big clamp to compress the piston. I put it over the inner side of the caliper and outer brake pad. This way you can SLOWLY!!! compress the caliper piston and make enough space to take the caliper with pads out and have the piston in the right position to install new pads.



8. In my case this method worked like a charm, the piston was pushed back and the caliper assembly could be taken off already compressed and ready for new pads.



9. When the caliper is released you can take the old pads out. Outer pad is immediately loose, inner pad has a metal spring clip fitting into the piston. You have to pull the pad out of it.

Clean the caliper piston from the rust; check its rubbers if they are not damaged and in case you didn't push the piston back enough in the previous step, now you can do it. You can use a proper caliper piston retraction tool (elegant and professional way to do the job) or you can push it back when the inner pad is still installed with any sort of lever or clamp (emergency solution). It is always better to damage/scratch the old pad as the caliper or its piston.



When you put the caliper aside NEVER HANG IT ON ITS HOSE!!! Use any wire or string to hang the caliper but the hose shouldn't be strained or bend too much.

Note:

If you are changing the pads only, skip to step 16. If you are going to change the brake disc as well, follow to the next step.

10.

Remove caliper holding bracket. It is held by two bolts, you need a 19mm hex socket to unscrew them. They might be stuck and you need some brute force to loosen them. You can use some penetrating oil to make the job easier. It is not exactly necessary to remove the brackets, you can remove one bolt only, loosen the second one and turn the bracket around the bolt few cm to make space to remove the disc. I removed the bracket to clean it from rust with a steel brush, especially where the pads slide.



11.

Unscrew the disc holding pin (12mm hex socket).



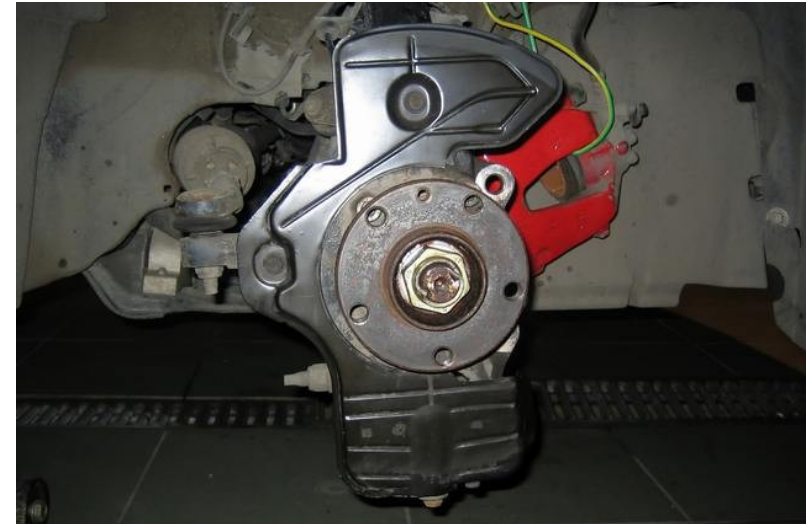
12.

Lift the disc off the wheel hub.



13.

Clean the wheel hub from the dirt and rust. The surface where the disc sits has to be flat and clean.



14. Install the new brake disc and secure it with its pin (12mm hex socket, tightening torque 10-14 Nm)

15. Install the caliper holding bracket (19mm hex socket, tightening torque 111 – 123 Nm)

16. Install the new inner pad. It clips into the caliper piston. Alternatively you can use some copper grease (copperslip) on its back to avoid brake squeal and vibration.

My personal opinion is not to do it. What is more important than this, all parts should be clean from rust, dry and freely moving. Any additional grease only catches dirt and makes thing messy. The only parts that should be greased are the caliper holding screws/sliding pins (see step 6) as the caliper slides on them. Cleaning everything with a steel brush can do for the caliper function the same job as copperslip.

Anyway, copperslip on the back of the pad is widely used practice. In case you decide to use it, just make sure it doesn't get onto the disc and pad surface.

In my case the pads came with anti-squeal carbon shims to be put on their back. It is basically a thin sticker made of carbon mesh imbedded in some soft rubber-like material to be put on the back of the pad. It works better than copperslip but is not widely spread and not easy to get.



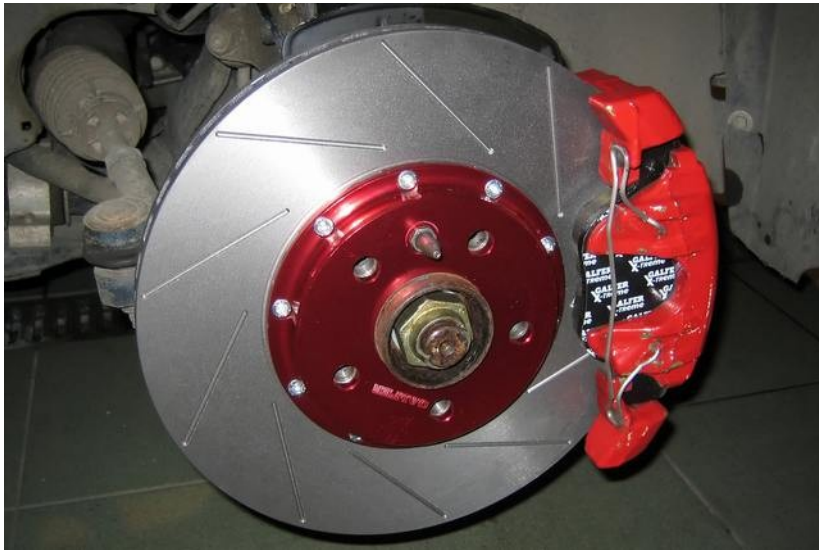
17. Install the outer pad into the caliper holding bracket; just put it onto the disc surface.



18. Slide the caliper with the inner pad installed on the bracket with outer pad and secure it with its bolts (7mm hex key, tightening torque 117 Nm). Put plastic protective caps onto the bolts.



19.
Fit the pad spring.



20.
Refit the wheel (alloy wheel bolts torque 88 – 108 Nm) and lower the car to the ground.



21.
Go for a drive. Start VERY slowly till you are sure your brakes work fine. Drive gently for the first 100 – 200 km to bed in the pads.

If you installed new pads on old discs the run-in period might take a little longer till the pads wear to the worn disc shape (disc is most probably not totally flat so the pad surface doesn't have perfect contact).

In case you installed aftermarket pads, run them in according to manufacturer advice. Some pads might require a special run-in procedure depending on their manufacturing process and whether they passed scorching or not.

22.
Job done ☺

Note:

On some cars the pads might have a brake pad wear indicator. On Alfa 147 it is fitted only on the inner pad of front left wheel. Disconnect the connector, slide it out of its bracket and remove with the brake pad.

In case your new pads have connectors on both sides, you can cut the unnecessary one on the right wheel.

In case your new pads don't have indicators, tie the sensor cable on the car out of the way.



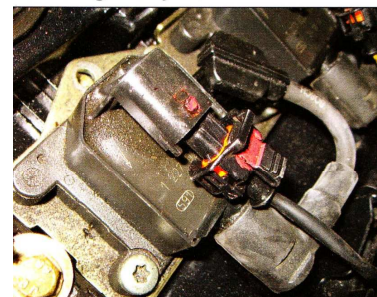
TIMING BELT CLINIC



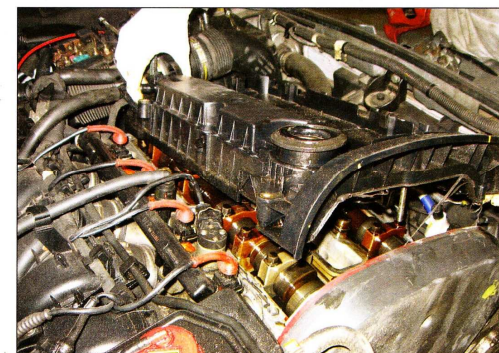
ALFA ROMEO 16v TWIN SPARK



1 First job is to remove the top engine cover: just a few bolts and it lifts off. Early cars had an alloy cover, so if your 1998-onwards car has one, it's probably had an engine swap!



2 Remove the forward coil packs: just four Torx bolts and the clip connectors and it's away.



3 Now for the cam cover held down by nine bolts – these are either Star drive or Torx, but they are not tight and a 5mm Allen key will do fine.

What's involved in changing a cambelt on an Alfa Romeo? We visit Nottinghamshire Alfa Romeo specialist to find out.

This month we're looking at Alfa Romeo 16v twin spark cambelts as fitted to the later 155, 156, 166, GTV, Spider, Alfa GT and the 147. The engine in question arrived in 1995 and is still in production, although it's now about to be replaced. Given correct maintenance – 36,000-mile cambelt and idler replacement and 10,000-mile oil changes with an eye on the oil level – they are an okay engine and will run to 150,000 miles, if not more. We've heard of them with 200,000 miles!

The problem is that Alfa GB extended the cambelt change intervals from 36,000 to 72,000 miles, with a 'visual inspection' at 36,000 to appease the fleet market. As a result, a lot of them broke at anything around 50-60,000.

When the belt strips its teeth (it rarely snaps), you've bent a lot of valves at the very least. Sometimes the impact of the piston hitting an open valve can fracture the top big end bearing shell, which results in a death rattle later, and often the valve will squash the top of the piston, nipping the top ring and resulting in oil burning issues later.

The early engines with the aluminium top cover (pre-156) were better than the later plastic cover engines, which had an appetite for oil. Because there's no oil level sensor, a lot of them have run out of oil – look how many are on eBay with knocking cranks.

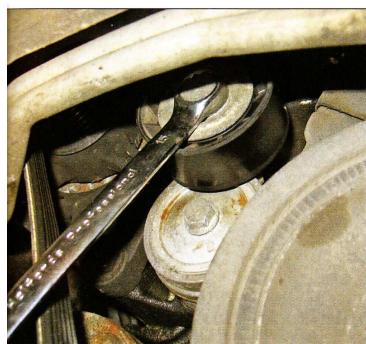
We visited Nottinghamshire Alfa Romeo specialist Alfa Tecnico in Huthwaite (01623 510570) to see what's involved. If you're a good mechanic and have done other cambelts, the Alfa 16v cambelt is a fairly easy one to do – but only with the special tools. At the very minimum you need the cam locks and a DTI gauge to measure TDC because there are no timing marks whatsoever, so if you don't have these, forget it.

Disclaimer:

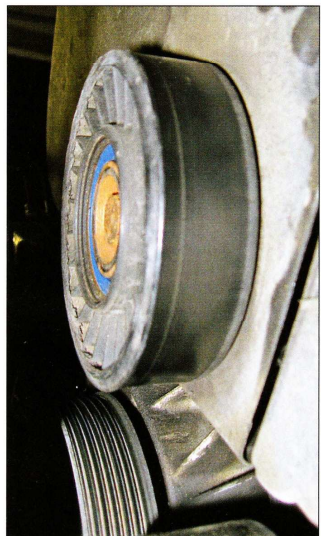
This guide describes how I did the job. It may not be complete or something may not be described detailed enough. Follow this guide at your own risk. Please only attempt this if you feel you are competent. I'm not responsible for any damage you might cause. Always use common sense not excessive force. Don't blame me or this guide if you break something. It was your choice to try this.

You can use and reproduce this guide and photos it contains freely in any way you consider useful for any Alfa-owner. You can make it publicly available on any Alfa-Romeo dedicated website, just please let me know about this.

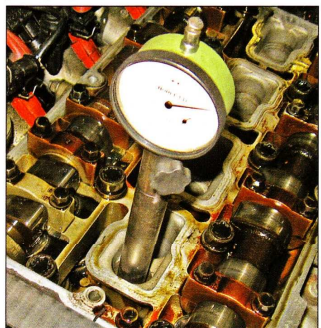
Contact: quadri_foglio_verde@yahoo.it



4 With the front wheel off, you need to look up under the arch, locate the auxiliary belt tensioner and turn it anti-clockwise. Make a note of the way the belt runs, and slip it off. A new one is a good idea.



7 Now the top idler needs to be removed, a 15mm bolt which is pretty tight.



9 Now the technical bit. Remove number one spark plug and fit the DTI gauge. Because there are no timing marks, this is the only way to get 100% perfect TDC. Without this, forget it.



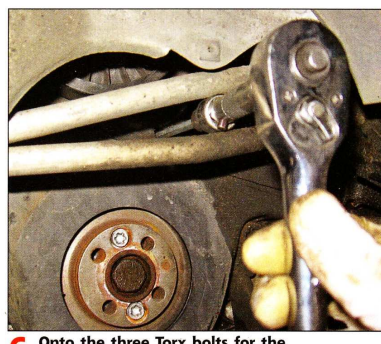
5 Now remove the four T45 bolts holding the crank pulley. These pulleys can be a swine to remove – WD40 around the centre hub and careful persuasion are needed, but beware of the plastic belt guard behind. This one is cracked.



8 The top belt cover also needs to come off. Alfa use no less than seven bolts! This photo shows the top and bottom covers and the bolt locations.

The 2-litre engines also have two balance shafts, and there is a balance shaft belt to replace and a roller – these MUST be replaced with the cambelt because they snap and get tangled with the cambelt.

Until quite recently, these engines used plastic GM-style belt rollers, but these have now been replaced with steel ones, which are a lot better. Only ever use the genuine belt kits, around £104 plus VAT. Don't even



6 Onto the three Torx bolts for the lower belt cover. Two are easy, but the top one is well recessed and needs a long Torx shaft and a magnet to fish it out. These lower covers are often broken, so clean it up and get busy with the Araldite!

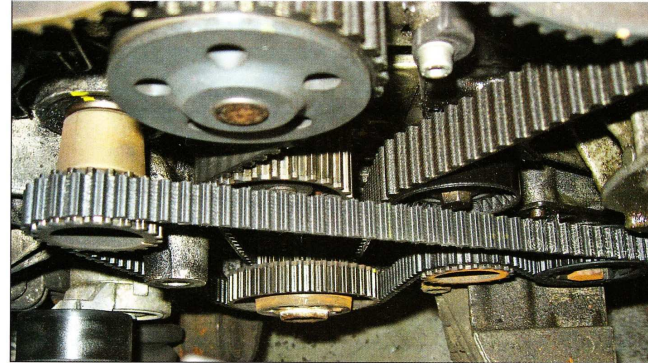
consider changing the belt without new rollers!

To be honest, these are not really a DIY belt change unless you buy the tools, but at least you know what's involved. Alfa Tecnico charge £235 to do a 1600/1800 belt swap with new tensioners, and £350 for a 2-litre with the balance shaft belt and roller included.

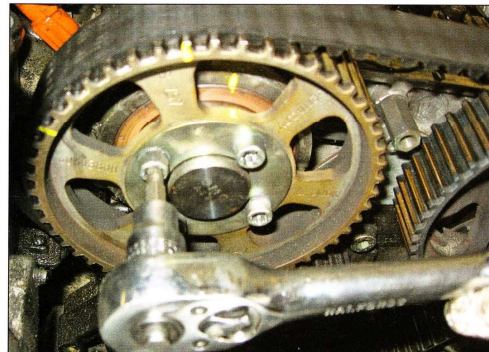
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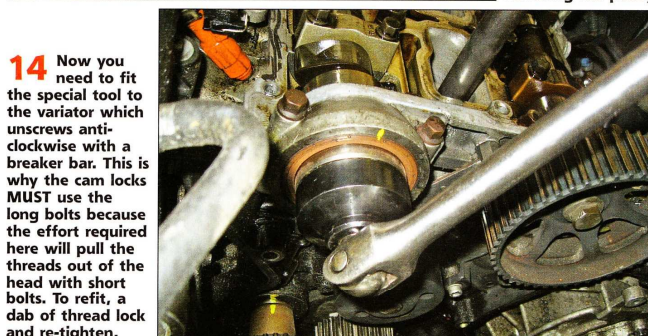
10 Remove the camshaft bearing caps and fit the cam locks as shown. Note that the 1600 engine has different cam locks and 1800/2000 ones will NOT do. The locks come with longer bolts – do not mix the bearing caps up and do NOT use the standard ones if you are replacing the Variator. The caps must go back on the same way they came off – fit them back to front and the cam will seize.



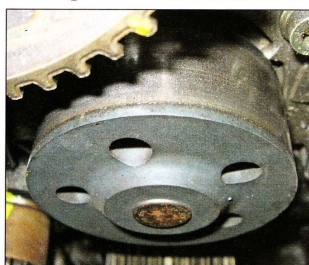
11 First of all, attend to the balancer shaft belt on 2.0 engines. The tensioner wheel is the one on the far right. Slacken the bolt from behind the alloy mounting bracket and the belt will go loose, but the special tool is essential to refit it.



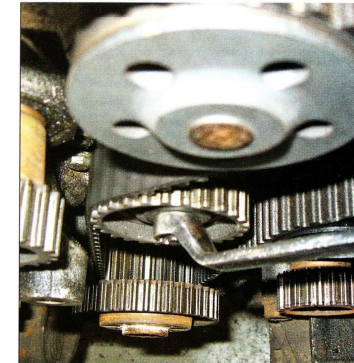
13 Onto the variator. If it had a bit of a diesel-like rattle at idle, it needs changing. You need a special tool to replace it, and start by removing the three bolts holding the pulley to the inlet cam and removing the pulley.



14 Now you need to fit the special tool to the variator which unscrews anti-clockwise with a breaker bar. This is why the cam locks MUST use the long bolts because the effort required here will pull the threads out of the head with short bolts. To refit, a dab of thread lock and re-tighten.



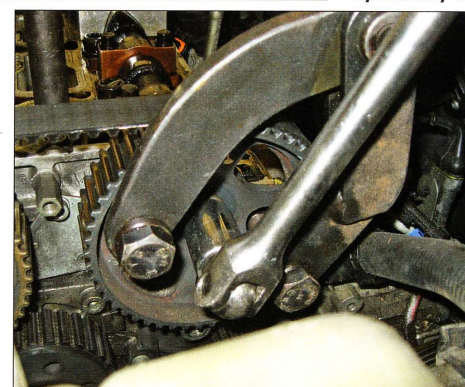
16 This is the water pump, which is pretty reliable. A new one is about £40 and you might want to renew it at this stage – it's not a bad idea because if the bearings collapse (very rare), the belt comes off. By 80,000 miles, it's probably time for a new one anyway.



12 As for the cambelt itself, slacken the tensioner nut, move the tensioner sideways and the belt will now come off. Look at how tired and cracked it was and breathe a sigh of relief. One by one, remove each tensioner wheel and replace it with the new steel one. A dab of medium threadlock is not a bad idea on the bolts. Tighten them to 28 Newton metres.



15 This is what the variator looks like – it's £86 plus VAT and while they don't actually fail and cause major damage, a bad one will rattle and put extra strain on the belt. It is fed by oil from an extra bearing cap and hydraulically advances the inlet timing.



17 Now to fit the new belt. The tensioner idler needs to be fitted and pushed against its tension spring. The 18mm centre bolt for the exhaust cam must also be loosened so that the pulley can be rotated back and forth. The idea is that you fit the belt, tension it, the pulleys move to the correct position and then lock the cam pulley bolts. The pulley needs to be held like this but beware the cam position sensor behind it!



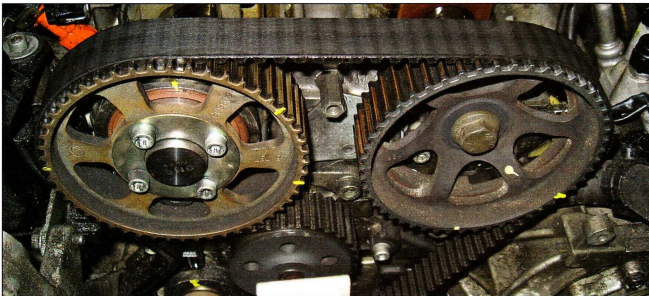
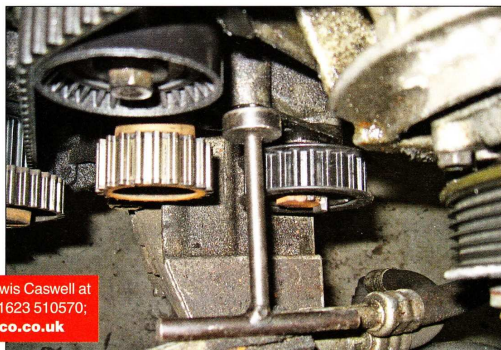
18 Alfa mechanics use a special tool to rotate and set the cambelt tensioner. It is possible to set it without this with some very careful levering, but it's vastly easier with it.



20 This photo shows the cambelt tensioner final position. The little pointer must be aligned with the hole as shown here.

19 A similar T-shaped tool is needed to set the balancer shaft tension. While it's possible to set the cambelt tensioner without the tool, it's just about impossible without this one.

Thanks are due to Lewis Caswell at
Alfa Tecnico, tel: 01623 510570;
www.alfatecnico.co.uk



21 Reassembly is a reversal of dismantling. With the belt on and the tensioner set, re-tighten the cam pulley bolts to 10Nm (four inlet bolt) and 130Nm (exhaust cam centre bolt). The camshaft cap bolts are 17Nm and the various idler bolts are 28Nm. A dab of medium-strength threadlock is, again, wise.

TIMING BELT CLINIC – ALFA ROMEO 16V TS CONTINUED

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