DISCO3CLUB

Land Rover
Discovery 3

Anglefire's Guide to Radiator Replacement

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Change Record.

DATE	Revision	Update Notes	Made By
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1. Introduction.

Welcome to Anglefire's Guide to Replacing the Radiator. The aim of this 'Guide' is to provide a set of instructions to enable the average owner to be able to remove and replace the radiator.

It can be used as a basis for the V6 TDv6. It may assist with the unit fitted to the 3.0l TDv6, but I cannot guarantee it will be exactly right for this variant. If you have used this guide on this model and have any updates we could use (inc pics) then please e-mail them to me mark@colston-online.co.uk and I will update this accordingly.

Please note that these are guidelines only and you should ensure that you are competent in the use of the tools required and take the necessary safety precautions. If you have any doubt of your competence, please contact your nearest Land Rover dealer or Land Rover independent garage who will be pleased to carry out this work for you.

Allow yourself around 6hours to remove and replace the radiator the first time, allowing for breaks for tea/coffee and a quick lunch.

It is also worth noting, that the Intercooler is removed/part removed as part of the process, so would be worth replacing at the same time if required.

Neither the author nor Disco3Club/Disco4Club can accept any responsibility for any accidents or injuries sustained whilst undertaking the work depicted in this guide.

All of the photos (unless otherwise indicated) are from my Discovery 3 MY06 TdV6 SE.

2. Tools

This is a list of tools that I used.

	Sump Plate	Radiator Shield	Grill / Headlights	Radiator	Removal of Intercooler	Check/Top-up Auto box
Pliers				X		
Claw Hammer			O			
15mm Spanner	X					
Small (6") Ratchet for Sockets				X		
Ratchet for Sockets				X		
Short Extension for Sockets				X		
Long Extension for Sockets				X (x2)		
Universal Joint for Sockets				X		
Trolley Jack	O					
7mm Socket				X		
8mm Socket				X		
9mm Socket						
10mm Socket				X	O	X
13mm Socket						
15mm Socket	X					
Torque Wrench for 10Nm						
Torque Wrench for 25Nm.						
Axle Stands	O	O	O	O	O	O
Ramps (2 Pairs)	O	O	O	O	O	O
Various Torx Bits						
Bucket				X		
Funnel				O		
Oil Pump/Syringe						X
Crawler Board	O	O			O	O
Breaker bar/Crow Bar						
Thin metal bar (I used a Small Screwdriver)					X	X
Nitrile, Latex or other protective gloves or barrier cream	X	X	X	X	X	X
Face mask and Goggles (against dust & rust)	O	O				
Ratchet Mountable Cross Head bit.				O		
Cross Head Screwdriver				O		
Flat Blade Screwdriver		X		O	X	X
Torch/Light				O		
Key : X – Required, O – Optional.						
Note: Cars are fitted with either Sump Guard (Metal) or Sump Shield (Plastic)						

Optional additions to the tool kit are:-

1) Regular cups of tea/coffee.

2) Box of plasters for grazed knuckles.

3) A suitably sized swear box, depending on a combination of a) location b) weather c) temperature d) 'help' by young children/dog/neighbours ☺

I would also recommend some spare self locking clips are obtained in case some break when removing the various covers etc. These are the BLACK ones, not the white ones. It is possible the white clips will also break, but I didn't – though I had spares for them.

Part Number	Description	Quantity in Pack
ANR 2224	Black Clips	5

3. Initial Preparation.

Raise the car to off road height if possible. This allows better access under the front of the vehicle.
Drive the car onto ramps, or otherwise lift the front of the car to allow access underneath.

4. Removal of Sump Gaurd.

Support the sump guard and remove the 4 retaining bolts and remove the plate. If you don't have a plate, then remove the plastic clips and remove the plastic cover.

At this point, you can see more clearly how much dirt is in your intercooler (IC) and may alter your plans and add an IC change or clean whilst it is accessible at the same time as replacing the radiator.

5. Removal of Headlights and Grill.

First job to do is to remove the grill and headlights.

The grill is simply a case of unclipping the four clips on the top, and the two about ½ way down the grill at either side.

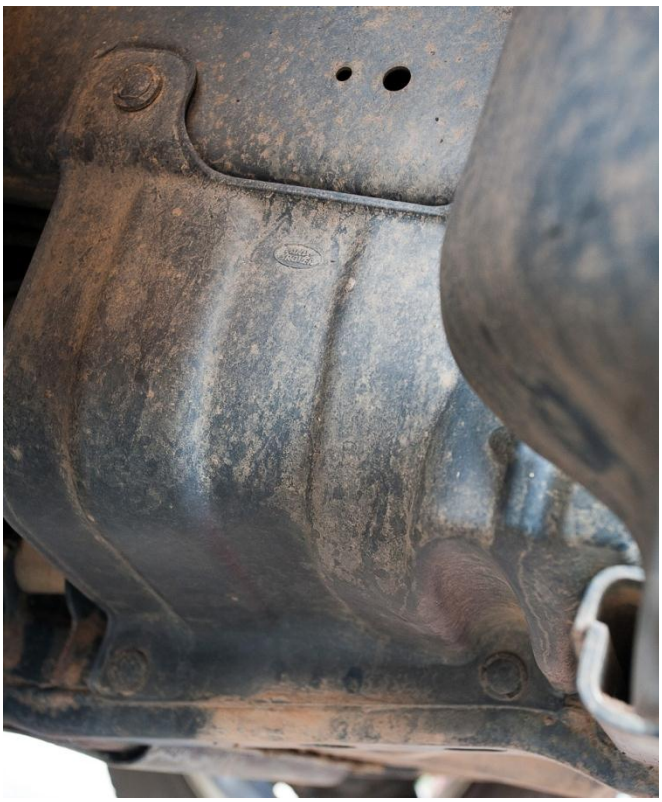
The righthand (As looking from the front) headlight is removed by pulling the two clips on either side of the light – I use a claw hammer on the rear most clip and mine are really tight. Don't pull the clips too far up as they only need to be up about 3/8"

Once the two clips have released the headlight, pull it forward and release the electrical connector. There is a locking clip which just needs a little pressure to allow the connector to pull out.

6. Removal of Covers and Access Plates.

Next, remove the two cover plates giving access to the intercooler hose connections.

Again, these are held on with the plastic self locking clips. One is circled above. The picture above is the right hand one, with the metal heat shield for protection against the FBH exhaust.



Next remove the radiator cover plate from under the car. There are just two bolts to undo. This gives access to all the water pipes and the end of the intercooler.

The second shot was taken after the radiator had been replaced, you can see the thermostat in the bottom left of the photograph.

The top and, ideally, bottom radiator cowl should now be removed. The top cowl needs the air duct from the filter box to the pipe ultimately running down to the turbo. This is a couple of screws and a jubilee clip.

The top cowl can then be removed once the top vent hose is also unclipped. It needs to be pulled up – but be very careful that the jubilee clips around the various pipes don't attack you and rip your finger open. ☺

Block the air pipe running towards the turbo. It's very easy to drop things in this – water, screws etc. None of which are healthy!

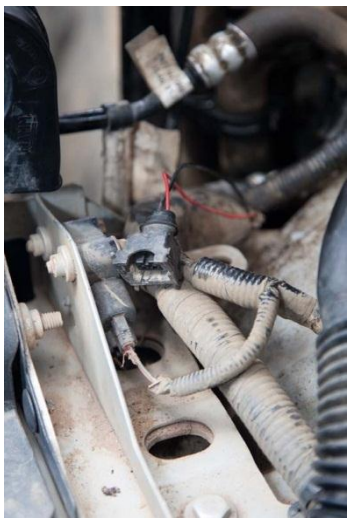
The bottom cowl should be removed – but the radiator can be removed without doing so – but I suspect is a lot harder – this is how I did it, and regret not taking the fan off and then the complete lower cowl.

If you don't take the fan off, then you need to release the fan from the viscous unit – it's four 10mm screws, which are accessed from the back. With the fan like this, there is just enough room to get the access needed to remove the pipes.

7. Radiator Removal.

Now you have the access sorted, you can remove the bottom hose and drain the system. I used a bucket on a plastic builders mixing tray to catch the released water. Don't do this if the engine is hot! You can then start to remove all the clips and pipes associated with the radiator.

First one I did was the expansion tank – two screws need to be removed just in front of the fuel burning heater (If fitted) Access is via the removed headlight aperture.

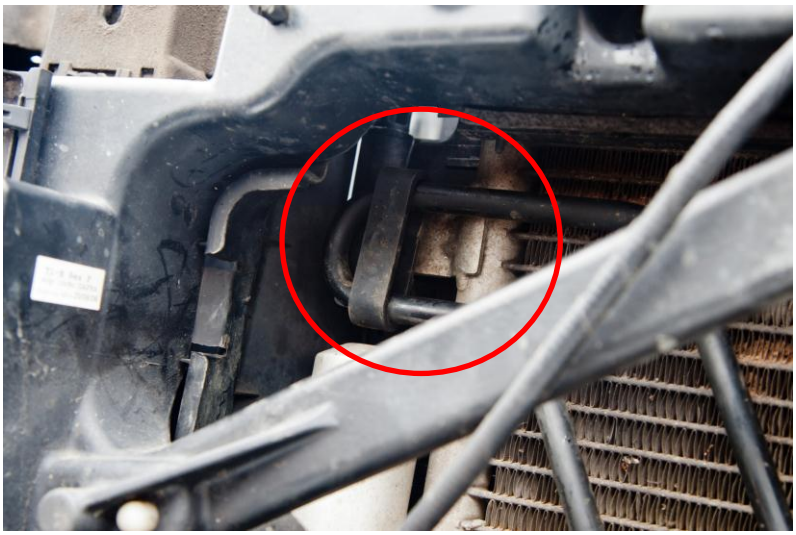


At the back of the expansion tank, is the hose to the system and at the top the return from the far side of the radiator. At the very bottom of the tank is the level indicating switch – a metal clip holds it in. The plug is shown in the last picture above.

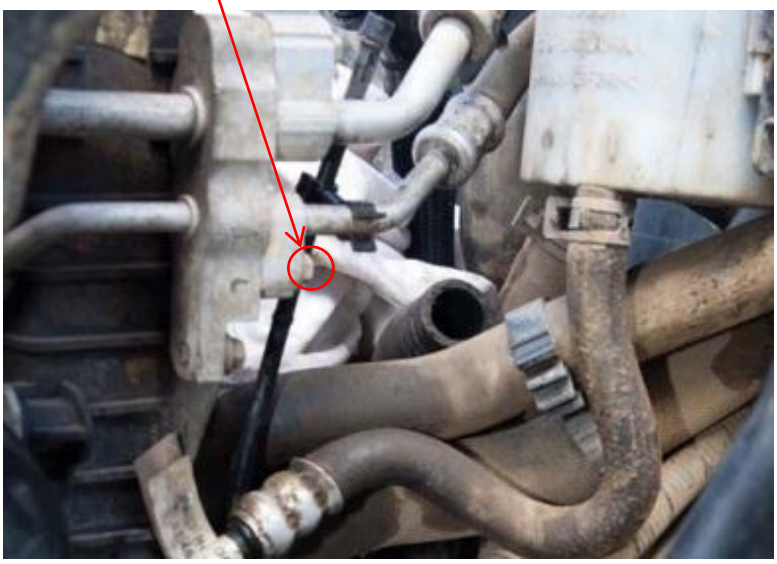
If you have an automatic gearbox, remove and plug the two oil pipes that go to the right hand side of the radiator. Some oil will probably come out of the pipes. The bottom one is very hard to get to, when you haven't fully removed the lower cowl.

Unclip and remove all the water pipes from the radiator – top hose on the left and two hoses on the bottom, as well as pulling off the intercooler flexible pipes. Access is very tight, especially from below – if you remove the lower cowl, I suspect they will be easier to get to from above.

You need to unclip the steering pump cooling pipe from in front of the radiator- it's held by a clip on the left hand side, which is very easy to break and a double clip on the right.



There are a couple of screws that hold the air conditioning condenser onto the radiator – top and 2/3^{rds} down on the left and middle right, together with a screw where the two pipes come from the AC system also on the right.

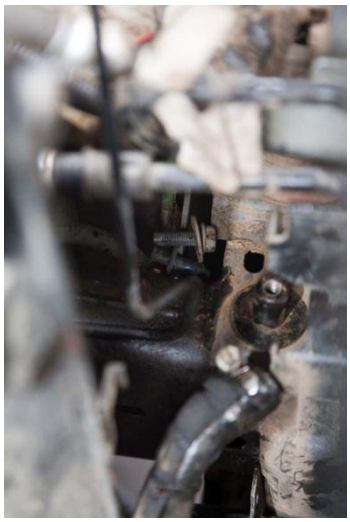


Another screw about 2/3^{rds} down the right hand side also needs removing. Both of these screws are by the main holding bolts for the radiator.

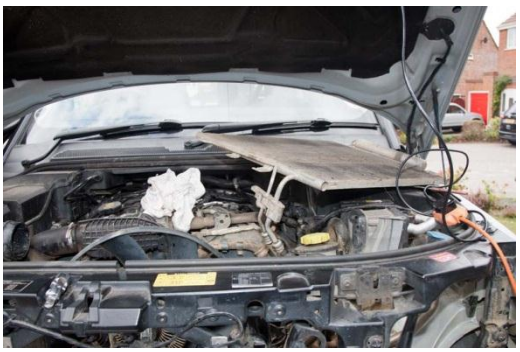
Remove the two plastic pins that hold the top of the raditor in place – you can just see them on the picture below.

They are removed by releasing the clip with a small screwdriver at the top of the radiator where the pins go in – the pins have an arrow showing the location of the release.

The two main bolts need to be removed – I used a 13mm socket on two 300mm (Ish) extension bars. The left hand one is easy to see and remove, the right hand one is partly obscured by the radiator – but there is just enough room to get the socket in if you pull the plastic cowl in front of the radiator forward a little. The picture below shows the peg once the radiator has been removed – and the bolt when it dropped off the socket.



Once the radiator is free to move slightly, the condenser can then be pulled forward and then lifted out of the way.



Again, with the lower cowl removed, the radiator and intercooler may just come out upwards from the engine bay. I had to half lift the radiator, and then remove the intercooler from the bottom of the radiator by removing the two

self-locking pins. From the front, knock the centre pin through. The picture below is looking from below, but they are accessed from above and below to actually remove them.

You then need to remove the sleeve – I used a 9mm socket over the end and tapped it with a spanner to compress the end to allow it to come out. Pull them out from the rear.

The picture above shows the principle using the socket on the end of the sleeve to compress the end.

Once the intercooler is free from the radiator, the radiator lifts out.

The new one can then be fitted in the reverse of the above, only fit the oil cooler pipes before the water pipes as it seemed easier that way round.

8. Filling and Bleeding the System.

The capacity of the system (2.7TDI Auto with Fuel burning heater) is about 10.3 ltrs. I bought 5ltr of the Land Rover Extended life coolant. According to the bucket the held most of the water that drained, I had removed about 7ltrs – so I worked on 8 and added about 4ltrs of the coolant and topped the rest up with water.

There are two bleed screws – one on top of the expansion tank and one clipped to a pipe under the engine cover. Undo them both just enough to allow the air to escape – but don't remove.

The official instructions that I have say the following:

Refill the cooling system.

Tighten the bleed screws to 14 Nm (10 lb.ft).

Fill the cooling system, keeping coolant to the upper level mark of the expansion tank, until a steady stream of coolant is seen returning to the tank.

Start and run the engine.

When the coolant bleed is complete and prior to installing the expansion tank cap, top up the expansion tank to 30mm above the maximum level.

WARNING: Release the cooling system pressure by slowly turning the expansion tank cap a quarter of a turn. Cover the expansion tank cap with a thick cloth to prevent the possibility of scalding. Failure to follow this instruction may result in personal injury.

- Hold the engine speed at 3,000 RPM for one minute.
- Return the engine to idle for five minutes.
- Hold the engine speed at 3,000 RPM for one minute.
- Run the engine until the thermostat opens.

Remove coolant expansion tank cap, allow float to settle and top-up coolant if required. Install cap.

9. Checking/Topping up Auto-Box

Remove the 6 bolts holding the cover under the gearbox. The front two can be undone first as the cover is held on by the two tabs – makes is easier to remove without it falling on your head.

The level/fill plug is next to the gear linkage. You will need an ~8mm allen key to remove this – it is quite tight, so I use one that came with an impact driver and fit it onto a socket wrench.

Once it is loose, leave it in until the gearbox oil has been warmed to the correct temperature, which is between 30°C and 50°C. Quickest way to raise the temperature is to put the car into drive and reverse – this also makes sure the oil is all around the system. MAKE SURE YOU PRESS THE FOOTBRAKE HARD so ensure the car doesn't move.

Ensure the box is returned to Park.

Remove the filler plug. A small amount of oil should just come out of the hole. If not, top up, using an oil syringe or similar – I used one from Machine Mart - http://www.machinemart.co.uk/shop/product/details/cgg500-500cc-oil-suction-gun/path/lubrication-fuel-transfer-equipment

Only use the original oil from Land Rover.

10. Acknowledgements.

Ian Bodsworth (Bodsy) for the document design.