Land Rover 90 TD to Discovery 200TDi Engine Conversion

Parts Required

1. Land Rover 90 TD
2. MOT failure Land Rover Discovery 200TDi
3. Disco conversion downpipe
4. Disco conversion intercooler pipes
5. Extended 200TDi oil cooler pipes
6. New rear crank oil seal
7. New clutch (clutch and release bearing)
8. New heavy duty clutch arm
9. New alternator and power steering belt
10. New filters and gaskets

Conversion Process

Work to do to 90

1. Disconnect battery and remove
2. Remove bonnet
3. Disconnect bonnet stay, bonnet then lifts all the way back and can be lifted off hinges
4. Remove front bumper, grille, and front centre panel
5. Drain coolant
6. Disconnect bottom radiator hose and drain all coolant
7. Remove air cleaner assembly, fan, fan cowl, and radiator

8. Remove turbo heat shield and loosen exhaust downpipe at first connection
9. Remove heater hoses and control cables from clips on rocker cover
10. Remove breather pipes from rear lifting bracket
11. Disconnect fuel pipe connections - remove fuel feed to injection pump, spill return from no 4 injector, fuel feed to lift pump, lift pump to fuel filter
12. Disconnect throttle cable and remove
13. Disconnect power steering hoses
14. Disconnect brake servo vacuum hose from vacuum pump
15. Remove engine wiring harness
16. Disconnect heater plug harness from heater plug number 4
17. Support engine with engine crane
18. Remove engine earth strap
19. Undo engine mounting rubbers top and bottom
20. Raise engine, remove rubbers, lower back onto chassis mountings
21. Remove starter and harness
22. Remove all bell housing fixings
23. Lift out engine
24. Remove fuel filter from bulkhead but keep fixings

Work to do to Discovery

1. Disconnect battery
2. Remove bonnet
3. Remove engine wiring harness from bulkhead
4. Remove radiator assembly
5. Disconnect cyclone hose from air cleaner hose
6. Remove air cleaner hose from turbo
7. Remove feed pipe/hose from turbo and intercooler

8. Disconnect heater hoses from cylinder head and heater rails
9. Remove bolt attaching breather pipe clip to cylinder head and move breather pipes aside
10. Disconnect hoses from power steering pump
11. Disconnect bypass hose from thermostat housing
12. Release bypass hose from retaining clips on front timing cover
13. Remove throttle cable from injector pump
14. Disconnect feed pipe and spill return pipe from injector pump
15. Disconnect both pipes from fuel lift pump
16. Disconnect servo hose from vacuum pump
17. Loosen exhaust downpipe at first connection
18. Remove oil cooler pipes from oil filter adapter
19. Disconnect ground strap from starter motor
20. Support engine with engine crane
21. Remove engine mount bolts
22. Remove all bell housing fixings
23. Lift out engine (I withdrew from front by angle grinding the front centre panel out of the Discovery)

Work To Do to 200TDi While Removed

1. Remove flywheel cover and fit old TD flywheel cover. This avoids having to cut and retap studs in different positions

2. Change the rear crank oil seal if any signs of leaks. Only use a genuine Land Rover one as its much better quality than the others

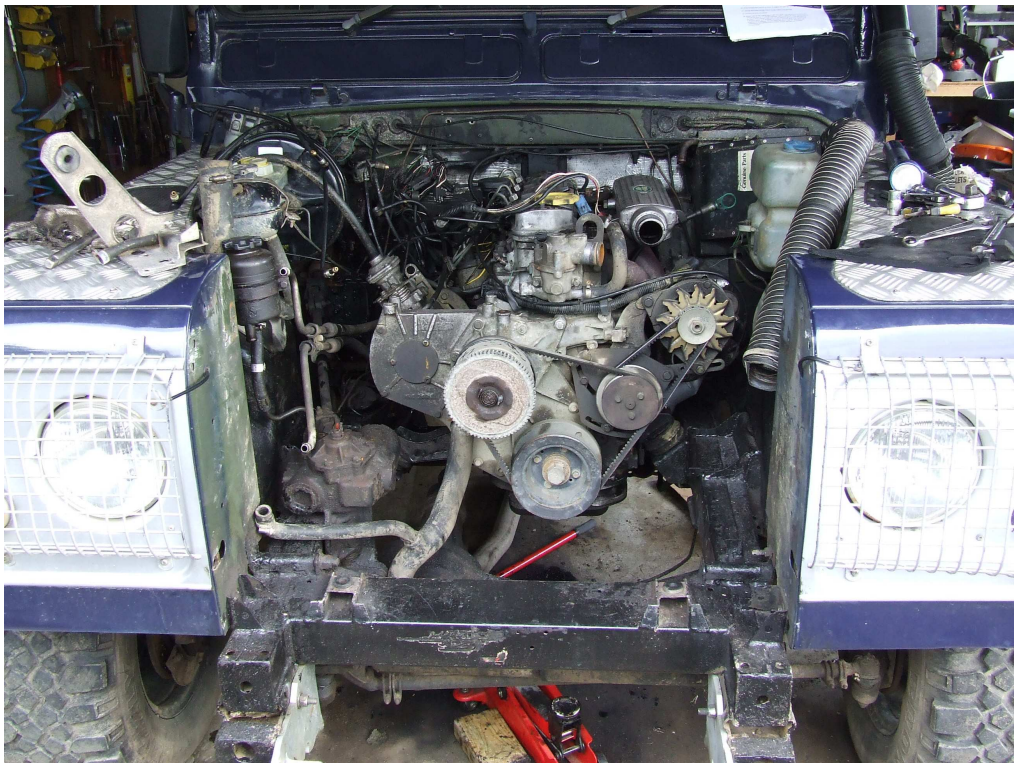
3. Fit a new clutch. I found that one of the small spark plug spanners is perfect as a clutch alignment tool

4. Fit new oil filter
5. Replace rocker cover and sump gaskets

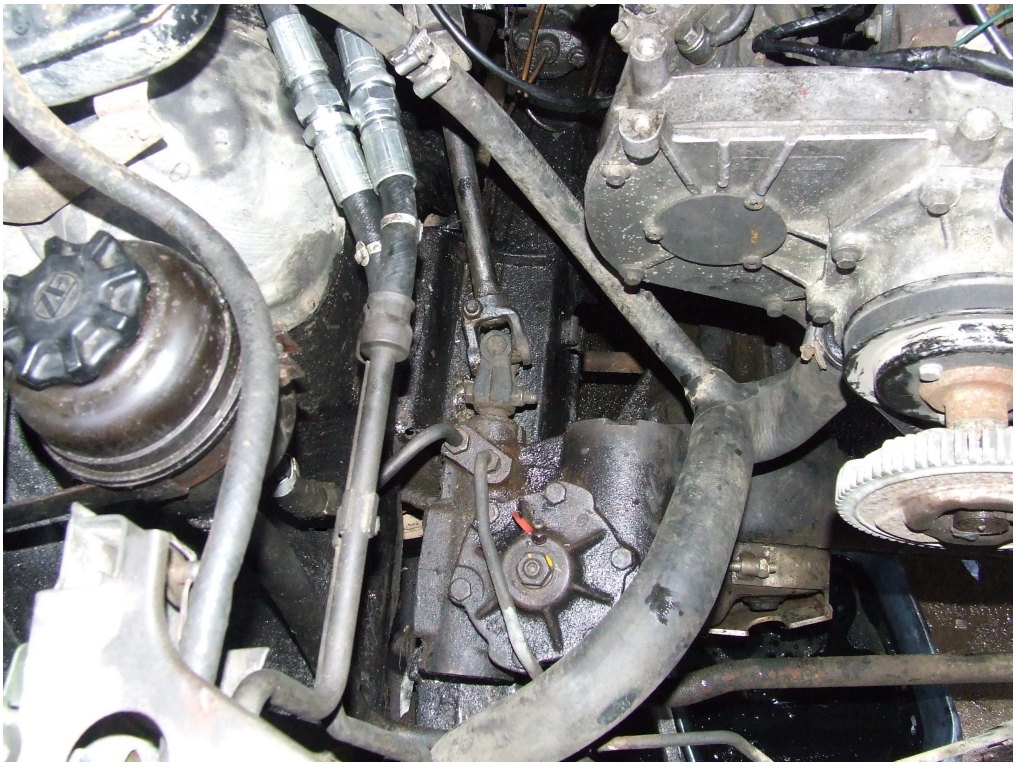
Work To Do to 90

1. Fit a new clutch release bearing
2. Fit a heavy duty clutch arm
3. Remove exhaust front section
4. Move clutch pipe mount from corner of bulkhead 6 inches across to the right
5. Clean up engine bay and protect exposed chassis areas while you have easy access
6. Cut down bottom radiator mount brackets by 3cm - Angle grind tops off, cut 3cm from height, reweld tops back on
7. Hoist engine into position
8. Line up bellhousing studs and attach all fixings. You may need to adjust angle to do this which can be done by an adjustable engine lifting bracket. I did it by jacking up the gearbox end
9. Connect starter motor wires and connect earth lead to chassis
10. Connect exhaust heat shield
11. Fit engine mount rubbers
12. Prepare to fit TD loom onto engine by noting colours of wires and positions of 200TDi loom.
13. Remove 200TDi loom and secure TD loom to engine. All the colours are the same so connect as the 200TDi loom was. The only change is to the alternator where you cut off the connector block and use spade terminals instead; the thin white wire is no longer used

14. Attach and adjust the Discovery throttle cable

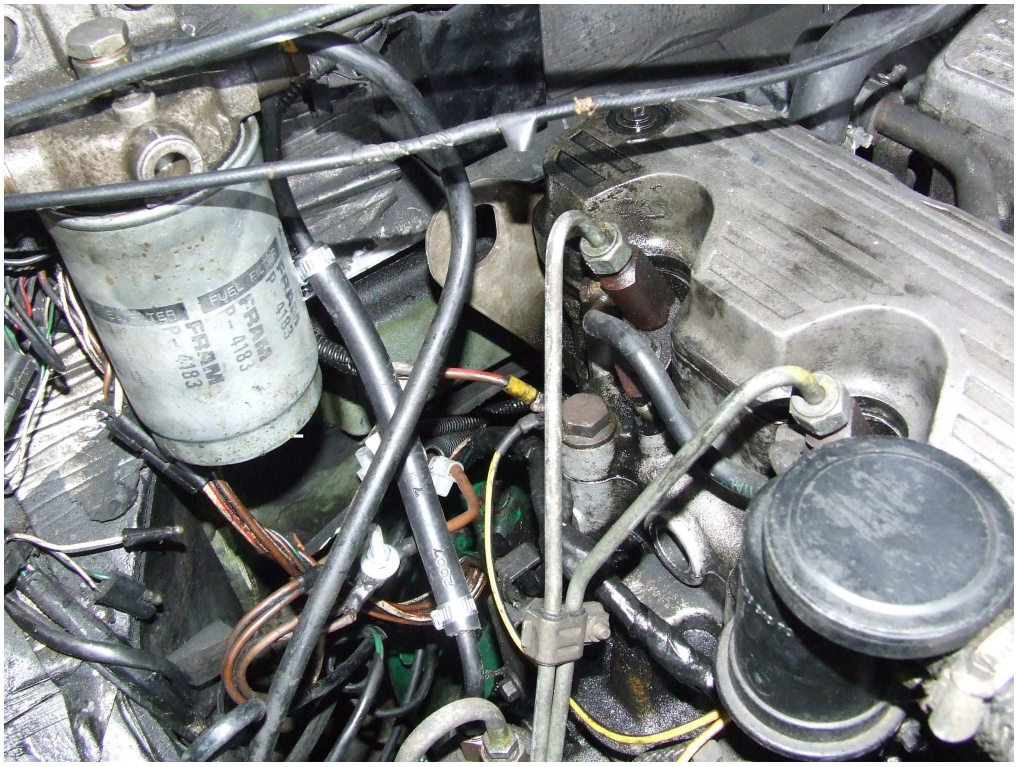


15. Fit the intercooler top and bottom pipes to the engine
16. Fit the extended oil cooler pipes. I secured mine with a bracket as they were longer than anticipated
17. Fit the internal heater pipes (steel pipe feeds rear, pipe nipple feeds front) using the old ones from the Discovery
18. Fit a new temperature sensor to match the TD gauge. Depending on your old TD engine the sensor from that may fit but there are two different types so not always. Mine didn't so the temperature gauge reads just under red when it should actually be in the centre
19. Fit the power steering pipes. I used the low pressure one from the TD and the high pressure one from the Discovery. The TD one still fits the bracket on the rear of the crossmember but the Discovery one is the wrong shape so you need to make a bracket to secure it to the chassis rail
20. I left the header tank from the TD and used the TD radiator pipe. The bottom engine connection is slightly kinked so adjust as best you can. The smaller pipe from it that goes to the header tank needs to be extended so I used part of the old Discovery pipework and a piece of standard copper heating pipe to join the two with small jubilee clips



21. Fit top radiator water pipe. I used a cut down pipe from the Discovery for this

22. Fit the 200TDi fuel filter to the bulkhead (this system is simpler than the TD). You will need to extend the existing fuel hoses with 8mm id (internal diameter) fuel pipe and small jubilee clips



23. Fill the PAS header tank
24. Fill the water tank
25. Check the oil level of engine and fill correctly (especially if you drained it all out earlier!)
26. Prime the fuel system with the hand pump on the lift pump.
27. Disconnect the fuel solenoid wire temporarily
28. Reconnect the battery
29. Turn the engine over with the ignition key which should prime the fuel and oil systems.
30. Reconnect the fuel solenoid wire
31. Turn the engine over with the key and this time it should fire up if all is correct!

32. Check for any leaks anywhere or strange noises!
33. Let the engine run up to temperature and double check for leaks again
34. Mount and fit the exhaust to the downpipe
35. Use the old TD air filter system and using a combination of pipes from the TD and Discovery you can just get it all to fit together

36. Test that the clutch and transmission is all working. You will probably need to bleed the clutch which will have lost fluid when fitting the new clutch arm
37. Refit bonnet, bumper etc
38. Test drive and make any necessary minor tweaks!

CONVERSION DONE ☺

Post Conversion Tweaks

1. I found the turbo whistle was louder than expected. This turned out to be the top turbo hose that needed tightening up.
2. Although acceleration was much improved I still found the engine lacking at the top end. This turned out to be the accelerator cable needing adjustment (in the cab) as it was only opening to about 75% of full throttle.
3. After a week or so the alternator and power steering belts needed adjusting again as the new ones had slightly stretched once bedded in.

Other Information

This was the first time I've ever changed an engine never mind doing a conversion from one engine type to another. I'm no mechanic by any stretch of the imagination but with a half decent collection of tools, a double garage to work in, and lots of advice I managed ok so I reckon most other people could. It was a great learning experience too so I highly recommend it!

I approached the job logically and did LOTS of reading up on the web and asked advice when needed on www.landyzone.co.uk which was invaluable. I loosely based my conversion on the excellent thread by Patman on Landyzone which can be found at http://www.landyzone.co.uk/lz/f7/200tdi-upgrade-begins-59862.html

Other useful links for the conversion can be found at:

http://forum.difflock.com/viewtopic.php?p=408398&sid=06139200c0b597e0fdf6f35a80771bfa

http://www.landyworld.co.uk/200tdiconversion.html

http://www.muddy-tyres.net/standard.aspx?page_id=8

http://forums.lr4x4.com/index.php?showtopic=2394