Defender Diesel Turbo Tdi Engine Kit



Fitting instructions. Tdi Engine Kit. STC939D Instructions de montage. Kit moteur Tdi STC939D Einbauhinweise. Tdi Motorbausatz. STC939D Istruzioni di montaggio. Kit del motore Tdi. STC939D Instrucciones de montaje. Tdi Engine Kit. STC939D

Septembre 1992 September 1992 Settembre 1992 Septiembre de 1992



Important - Please read carefully

Please read and understand these instructions carefully before commencing work.

These conversions have been developed by Land Rover, in response to customer demand for the increased performance and improved fuel economy offered by the Tdi unit over earlier engines.

Great care has been taken to ensure that the instructions herein are correct for 90 and 110 Land Rover and Land Rover Defender vehicles.

However, due to the immense variety of LR models and special customer specifications, it is not possible to cover all vehicles manufactured since the launch of 90 and 110.

Land Rover accepts no liability for extra costs entailed through this conversion should the customer have a nonstandard vehicle or one which has been altered since it left the factory.

Should you have any queries concerning this procedure, please contact your nearest Land Rover Dealer.

Whilst every effort has been made to ensure their completeness, if you have any helpful comment on the instructions, please forward these to Land Rover Parts.

Following the completion of this conversion work, it is advisable to have the installation checked out by a Land Rover authorised dealer.

It is not intended that this conversion be conducted on any vehicle still within its Warranty period, otherwise this latter could be compromised.

A normal Land Rover 12 month Warranty will be offered on Genuine Parts supplied.

If in doubt over any of the procedures outlined in the instructions, please consult your Workshop manual, or if still unsure, your nearest Land Rover dealer.

These instructions contain part numbers refering to left and right-hand drive vehicles, to enable us to cater for all markets. Take care to fit the correct handed parts to your vehicle - see the parts list.

Before any work is carried out on a vehicle, please ensure that it is in sound mechanical condition. Pay close attention to the braking system and the fuel system. Ensure your tyres are capable of handling the higher performance of the Tdi engine, particularly when replacing an NA diesel or 2.5L petrol. Any tyres recommended as standard fit to current Defender Tdi will be suitable.

A 17-plate 95AH battery is also standard fit with the Tdi.

Please follow these instructions precisely. Any deviation from these notes may be dangerous or at least detrimental to the performance of your Land Rover product. If in any doubt, consult a workshop manual or your local dealer.

WARNING

Engines which are not properly installed can be dangerous. Read the instructions carefully prior to commencing work. Whilst fitting, comply with the instructions at all times. If in any doubt, consult your workshop manual or contact your nearest Land Rover Dealer.

- Disconnect battery.
- Note speedometer reading.
- Remove bonnet mounted spare wheel if fitted.
- 4. Remove bonnet.
- 5. Drain coolant.
- Remove and discard air cleaner assembly, fan, cowl, radiator (see 35 and 44) and air cleaner service gauge.
- 7. Disconnect oil cooler pipe work and remove cooler from vehicle.
- Remove turbo heat shield. Slacken exhaust down-pipe at elbow, engine block and exhaust coupling.
- Remove heater hoses. Disconnect control cables from rocker cover clip.
- Remove breather pipes from rear engine lifting bracket. Refit fixing in bracket.
- Disconnect fuel pipe connections:
 - fuel feed to injection pump.
 - ii) spill return from no 4 injector.
 - iii) fuel feed to lift pump.
 - iv) lift pump to fuel filter connection.
- Note routing, then disconnect throttle cable and remove from vehicle. If fitted, disconnect power steering hoses.
- 13. Disconnect brake servo vacuum hose from vacuum pump.
- Remove engine harness and lay aside to prevent damage.
- 15. Disconnect heater plug harness from No. 4 heater plug.
- Support engine with suitable lifting gear. Note engine weighs 270 kg. Remove engine earth strap (turbo side engine mounting).
- 17. Undo engine mounting rubbers top and bottom.
- 18. Raise engine, remove rubbers, lower back onto chassis mountings.
- 19. Remove starter and harness.
- 20. Remove bell housing fixings. Lift out engine.
- 21. Remove and discard air cleaner base.
- 22. Remove and discard fuel filter from bulkhead. Retain fixings.

Tdi Engine Preparation

Parts Required

- 23. Clean engine bay to aid re-assembly.
- Sling new engine for fitting (hanging slightly flywheel down). Jack/block up gear box bell housing if necessary to aid fitment. Remove viscous fan.
- Lower new unit into engine bay and mate up to transmission. Tighten bell housing fixings.
- Fit starter and harness -White/red to solenoid spade.
 Brown to solenoid live.
 Black to earth stud.

Ensure harness clears underside of inlet manifold to prevent short circuiting.

- Raise engine, fix mounting rubbers to engine mounting feet loosely. Lower into chassis mounts and tighten.
- 28. Connect earth lead to chassis (ref 16).
- 29. Re-fit exhaust down pipe.
- Fit new fuel filter assembly to bulk head with original fixings and in original position.
- 31. Re-fit fuel feed pipe to lift pump.

Assemble - Engine Systems

- 32. Re-fit turbo-charger heat shield.
- Fit new heater hoses; steel pipe feeds rear of heater matrix, pipe nipple in cylinder head feeds front.
- Refit oil cooler pipe work, connect to oil filter housing.
- Remove oil cooler pipe adaptors from old radiator and install into new radiator/intercooler assembly.
- 36. Connect oil cooler pipework to radiator.

Hose heater BTR 445 RH BTR 983 LH BTR 447 RH BTR 982 LH

CN100258 Hose Clip x 4 Split Pin PS603041 x 2

Radiator Assy NTC4893 Oil Cooler Adaptor ESR1262 x 2

Oil Cooler Pipe ESR1912 ESR1913

Assemble - Engine Systems

Parts Required

37.	Fit new throttle cable routed as original.		Throttle Cable ANR1419 NTC4945 LH
38,	Re-connect fuel shut off solenoid white/black wire and oil pressure sender white/brown wire.		
39.	Connect spill return to tank:-		
	i) ii)	Assemble one half of the brass connector assembly STC 935 connector, STC 936 olive and STC 937 nut. Slide connector onto spill return steel tube at injection pump; ensure fully home and tighten nut to effect seal.	Connector STC 935 Olive
	iii) iv)	Assemble second nut and olive into connector. Locate tank return pipe. (This has two metal fittings, a nut at its end and a banjo fitting approximately 250 down its length). With a sharp knife, cut the nylon pipe through 270mm (approx.) from the banjo fitting. This pipe must be cut squarely. Slide cut pipe through nut and olive into connector	STC 936 Nut STC 937
40.	until fully home. Tighten nut to effect seal. Connect glow plug timer and associated harness. See sketch, figure 1.		Relay Timer PRC 6913 Harness PRC 6083
	I)	Identify old brown/red feed to glow plugs. Remove eyelet from end of lead.	
	ii)	Crimp on bullet connector.	Bullet 2H2704
	iii)	Push on connector to isolate wire and tape back to harness.	Connector 3549L
	iv)	Drill 2mm hole in bulk head to accommodate self-tapping screw approx 153mm from fuel filter towards centre of vehicle and 25mm down from top edge, or utilise earth eyelet. Fix relay timer to bulkhead, using screw.	Screw AB612051
	V)	Snap connector in harness PRC 6083 to base of relay.	
	vi)	Run heavy brown lead along bulkhead wiring and down engine compartment parallel to main battery lead. Follow routing of battery lead and connect brown lead to battery + terminal. Use cable tie 568680 to fix cable run in place. See sketch.	Cable Tie 568680 x 10
12	vii)	Yellow/black lead from timer connects to No 4 glow plug.	
	viii)	Remaining wires from timer terminate in moulded plug which matches plug in existing harness.	

Assemble - Turbo/Cooling

Parts Required

 If fitted, re-connect PAS pump feed and pressure hoses. Ensure correct fitting of sealing washers and rubber "O" ring. Fit pipe clip NRC 8404 under old air cleaner position to support pipe-work together with plate NRC 8405.

- 42. Lower radiator onto chassis mountings. Transfer upper mounting rubbers into new brackets (upper) utilize existing radiator mounting fixings (M6 x12) and fasten to front panel. If fixing hole is occupied (i.e. bonnet latch fixing) use longer fixing screw already in place. Remove radiator transit plugs. See Tdi cooling arrangement, figure 2.
- 43. Refit bottom hose/expansion tank hose.
- 44. Assemble turbo outlet (downward facing connection) to intercooler pipework. This consists of pipe NTC 5628 which is shaped with a 51mm long bend and has long and short pipe runs either side. Flats allow it to clear inlet manifold and alternator areas.

Hose bend elbow ESR 1906 fits the shorter end of pipe NTC 5628. Fit to turbo charger and arrange so that the set is upward and slightly away from the engine. Hose elbow ESR 298 has an unequal bend, the long side of which joins pipe NTC 5628 and the shorter to the intercooler bottom connection. Joints are fixed and sealed with hose clips CN100608L 4 off.

Before tightening ensure adequate clearance with alternator and manifolds etc.

 Temporarily remove washer bottle and assemble air cleaner ESR 370 to cradle ESR 276.

> Connect engine breather hose to stub on air cleaner outlet. Fit elbow ESR 228 to air cleaner inlet. Existing fresh air ducting connects to elbow ESR 228.

Connect air cleaner to turbo inlet (centre of turbine housing) with hose ESR 415.

Push the air cleaner assembly against inner wing and back towards passenger compartment until air cleaner covers approximately half of the shock absorber cover. Turbo feed hose ESR 415 will form a tight 'S' bend.

Ensure clearance with adjacent hoses and pipe runs and mark the position of the cradle fixing holes upon the inner wing (3 places). Temporarily remove the air cleaner assembly. Drill three fixing holes 7mm diameter to mount the cradle to inner wing. Faster with fixings supplied.

Plate NRC8405

Brackets ESR282 LH ESR283 RH

Screw SH106121L x 4 Washer WA106041L x 4 Washer WL106001L x 4

Pipe NTC5628

Hose Elbow ESR 1906 Hose Elbow ESR 298

Hose Clip CN100608L x 4

Air Cleaner ESR 370 Cradle ESR 276

Elbow ESR 228 Hose Clip CN100908L Hose ESR 415 Hose Clip STC 128 Hose Clip CN100908L

Screw FS 106161 x 3 Washer WA106041L x 3 Washer Nut NH106041L x 3



 Re-install viscous fan unit together with new fan cowl. Lower shroud into slots in radiator surround with fan stowed in shroud, (safety warning uppermost).

Fix cowl to two studs on top edge of radiator assembly with nut and washer supplied. Locate fan on waterpump spindle and tighten down.

- 47. Fit intercooler to inlet manifold pipe work. Steel pipe NTC 5627 is coupled to intercooler with hose ESR 289. Pipe NTC 5627 is joined to inlet manifold hose with hose ESR 1906, fix and seal hoses with hose clips CN100608.
- Fit new top hose NTC 4895 with hose clips CN 100508 this passes under intercooler pipe NTC 5627.
- 49. Remove and discard existing bonnet prop.

Locate new bonnet prop MTC 2220 in bracket to right of one previously used in bonnet leading edge. Secure with anti-rattle spring washer WS 600061L and split pin PS 106161

- Bonnet prop securing clip locates on a bracket in the centre of the panel and is secured by screw SP104101L, spring washer nut WL104001L and NH104041L.
 Align clip with prop and tighten into place, refit bonnet.
- Replace coolant, oil, PAS fluid (if fitted) and start up. Check for leaks etc and allow to warm up as normal. On PAS-fitted vehicles, move steering wheel from lock to lock to fill PAS system. Top up if necessary. Re-check fluid levels in usual manner after engine has cooled.

Final Dress

- Affix warning label to top of radiator as shown in cooling system diagram.
- 53. Record new engine number for log-book.
- Apply Tdi decals to wing lowers, forward of bulkhead joint line.

Parts Required

Cowl ESR 335

Washer WS105001 x 2 Nut NH105041 x 2

Pipe NTC 5627 Hoses ESR 1906 Hose Clip CN100608L x 4 Hose ESR 289 Hose NTC 4895 Clip CN100508 x 2

Prop MTC 2220 Washer WS 600061L Split pin PS 106161L

Clip MRC 7623 Screw SP104101L Washer WL104001L Nut NH104041L

Label ERR 321

Decal BTR 516MUB

Part description

Complete Tdi Engine

Heater Hose Heater Hose Worm Drive Clip Throttle Cable Brass Fuel connector Assy. Split Pin Glow Plug Harness Glow Plug Timer Relay Self Tapping Screw Bullet connector Connector tube. Cable Tie Radiator/Intercooler Assy Radiator Mounting LH. Radiator Mounting RH. Label Plate - PAS pipe. Pipe Hose W Sealing Washer Pipe Hose Elbow Hose Elbow Hose Elbow Worm Drive Hose Clip Air Cleaner Assembly Cradle Hose Clip Hose Clip Hose. Flange Screw Plain Washer Lock Washer Nut Fan Cowl Washer Spring Nut Coolant Hose Hose Clip Bonnet Prop Washer Spring Washer Plain Split Pin Securing Clip Screw Lock Washer Nut Tdi wing decal Harness **Bulb Capless** Cable Oil Cooler Adaptor **Oil Cooler Pipe**

Part number

STC8376/STC1092

BTR 445 **BTR 447** CN100258 x 4 ANR1419 STC 935, 936 & 937 PS603041 x 2 PRC 6083 PRC 6913 AB612051 2H2704 3549L 568680 x 10 NTC 4893 ESR 282 **ESR 283** ERR 321 NRC 8405 NTC 5628 **ESR 298** ESR 354 x 4 NTC 5627 ESR 1906 x 2 ESR 289 **ESR 228** CN100608L x 8 ESR 370 ESR 276 CN100908L x 2 STC 128 ESR 415 FS 106161 x 3 WA 106041L x 3 WL 106001L x 3 NH 106041L x 3 **ESR 335** WS 105001 x 2 NH 105041L x 2 : NTC 4895 CN100508 x 2 MTC 2220 WS 600061L WA 110061L PS 106161L MRC 7623 SP104101L WL104001L NH104041L BTR 516MUB x 2 STC934 RTC3635 DRC1538 x 5 ESR1262 x 2 ESR1912 ESR1913

Part number Left-hand drive Only

BTR 983 BTR 982

NTC 4945

ROUTING OF FEED TO GLOW PLUG TIMER



nows togging TANK SEAM AND TONL LEVEL TO BE BETWEEN TSPSTEL HOUNTED BRACKET-EXPANSION TANK @ O 4407-18221N LOOP O 19.5 Q 440 E- 83×5 VM 70901 VM --- このないのないのない、「あっ」のになく - MANAD CALLE THE O - NHY DEGALI MUT-1 CFF () SHIDDLET SCREW-MA - NY 104044 MUT - WIT - WIT DC - אנה דוצו Passane Belief (אי D WATEREST WASPER / CN 100308 CUP / 0 CO XNYL NOSNYGGE ENGLASS (Satis Array Hox 🖉 🖉 🖉 G 節 Da Section States Tdi COOLING SYSTEM G - Т.SP.О.М. 4557 - РРЕ - МТЕЯСОО, 58 ТО МАМРОLD 34-В 4 200 ŝ 6 al EN10554 ((@ - 2.046 Ø. -INVOLUTION-2019 - ISK'NO ASSY-APPE-TURBD TO WILECOLUR A -NTC 4815 TUP HOSE CONTRACTOR ELUP-1 DH - NTT LIPIN HOSE - BALED FIXING TOROLE IS JIVIN D SEENDTE - EN 100608 CUP-2 044 Z б - MACERS LARCED C (SPUSE FAN DW. ł BIRDER LABOR (D) QL 3 19 Re Plot interpool of Hore etbow Hore etbow Hore Citp Acce Bracket settum nose R Pure intercourse Hosa eltrow Hosa elbow Hosa elbow Hosa elbow Cito hosa Ø d No. 90 intercodar to mantiple ĩ (B) CSF 0183 MOUNTING DRACKET # NTCS529 4 ESR209 10 ESR209 10 ESR206 11 CN*00604 12 NTCS827 13 ESR285 ESR1302 14 ESR280 15 CN100608L 15 ESR280 Turbo Io Interco ٢ 9 0 1 - DBLDDBD LABOL 9 0 C. C. NITUSOU NUT 2011 Û - THAT I BELLAR () A - 1001 -00 0 TOPDUE S. ANM --2 B - 110 1 02-94 א דבוא (עראנא) AC 106145 WORLD 40FE E SH 0062 MOUNTING BRANKTY ----STOTA BUSH-20FF ENTARY ASS^ COUNS UNIT NECTION GROWING TOTAL CHIRDRA FLIP-1 CH 3

Figure 2

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50









BUILT ON SUCCESS



Introduction

The new 200 Tdi Diesel Engine

At the heart of Land Rover's award winning Discovery is a new breed of diesel engine – the 200 Tdi

This technically advanced, precision engineered power unit has set new standards for diesel power, economy and reliability

Now the proven qualities of the 200 Tdi engine are being made available to inject new heart into other, older Land Rover vehicles.

The 200 Tdi has already demonstrated clear potential as a powerpack in its widely praised application for the current production Defender utility vehicle range.

Land Rover Parts has developed total Tdi engine conversion packages for other Land Rover models.

The reasons why the 200 Tdi is certain to be the first choice of owners and operators are the same as those which have made the Discovery the success it is.

Extraordinary power. Increased torque. Faster acceleration. Remarkable economy. Longer service intervals. Lower maintenance costs. Quieter performance. Cleaner emissions.

Tried and tested over two million miles through blistering desert heat and freezing Arctic wastes, the 200 Tdi has emerged as the power unit which demanding fleet users and owner operators have been waiting for.

Performance

The 2.5 litre, 4-cylinder turbacharged, intercaoled, direct injection diesel 200 Tdi produces 107 bhp (80kW) – more than enough to deliver the power needed for the toughest tasks.

A Tdi powered vehicle has better climbing ability, impraved aff-road performance and a greater capacity for payload than previous Land Rover diesel engines. It is more relaxing to drive and needs fewer gearchanges.

Economy

The figures for the Tdi-engined Defender 90 speak for themselves – 32.3 mpg at a constant 56 mph; 28.3 mpg on the urban cycle; and 21.2 mpg at a constant 75 mph*.

With fuel now accounting for around a fifth of all vehicle operation costs, the 200 Tdi can make a substantial contribution to reduced operating bills.

Low Ownership Costs

The 200 Tdi is designed far more efficient running and langer service intervals. Which means less time off the road and lower running costs. 12,000 miles or 20,000 kilometres separate each service, with oil and filter changes needed only every 6,000 miles.

Engine design and underbannet layout makes maintenance easier and enables routine checks to be carried out quickly. Replacement Genuine Parts support and Land Rover Service is readily available from any Land Rover Franchised Network Dealer.

Easy Installation

Each Land Rover 200 Tdi conversion is engineered to fit exactly, without complications. Each conversion package is supplied with all the Genuine Parts components and ancillaries needed to complete the task.

All components have been approved by Land Rover engineers to meet the highest quality of design and construction they demand.

Built-in Quality

The same uncompromising approach to production standards which has given Land Raver an unrivalled reputation for build quality, attention to detail and in-depth strength has ensured the quality of the 200 Tdi engine.

Land Rover factory technicians work to the highest levels of quality practice to ensure that every engine meets exacting standards.

Statistical process controls make doubly certain that they get it right first time, every time.

Each 200 Tdi engine undergoes demanding hot-run tests and each has a computer-stored performance pedigree held at the Salihull factory for future reference.

Quieter Operation

Diesel noise is dramatically reduced in the 200 Tdi through a two-stage direct injection system which creates even less combustion noise than other direct injection equipped matars.

It means reduced levels of sound intrusion, both inside and outside the vehicle.

Environmental Concern

The design and construction of the 200 Tdi engine ensures lower emissions of carbon dioxide, the 'greenhouse gas' associated with global warming.

Engine emissions of CO2 and oxides of nitragen hydrocarbons are also minimised to levels substantially below EC limits.

*Manufacturer's data see inside flap.





BUILT TO ADAPT

- ① Alloy aluminium cylinder head Light weight excellent heat transfer properties
- ② Bosch two stage lift injector Improved noise characteristics
- (3) Fast response timed heater plug Improved starting
- Bosch VE fuel injection pump Provides accurate fuel charge for direct injection combustion
- Garrett T25 turbocharger Matched with integral intercooler to provide optimum combination of low speed torque whilst maintaining high speed performance
- Intercooled air charge Maximises engine efficiency with improved output
- ⑦ Direct injection combustion system Improved economy, with reduced CO₂ emission representing the latest direct injection technology
- (B) Aluminium ladder frame Improves powertrain stiffness





New full build Idi engine

- clutch assembly
- starter motor
- alternator
- fuel systems
- power steering pump (option)
- turbo charger - engine mountings

New cooling system - radiator/intercooler

- oil cooler
- hose matrix
- fixings

Exhaust system * - front silencer

- rear silencer
- down pipe
- intermediate pipe
- fixings and brackets

Ancillaries

- air cleaner
- glow plug timer
- bonnet stay
 Tdi decals
- wiring harness *
 throttle cable
- fixings

Fitting instructions

- detailed instructions
- illustrated
- in five languages
- * Available to NA models only



