

ENGINE

Type	V8
Number of cylinders	Eight, two banks of four
B o r e	88.90mm (3.500 in)
Stroke	71.14mm (2.800 in)
Capacity	3528 cc (215 in ³)
Valve operation	Overhead by push-rod
Maximum power-bhp-8.13:1	150 at 4750 rev/min (SAE J1349)
Crankshaft	
Main journal diameter	58.409-58.422 mm (2.2996-2.3001 in)
Minimum regrind diameter	57.393-57.406 mm (2.2596-2.2601 in)
Crankpin journal diameter	50.800-50.812 mm (2.0000-2.0005 in)
Minimum regrind diameter	49.784-49.797 mm (1.9600-1.9605 in)
Crankshaft end thrust/ (end float)	Taken on thrust washers of centre main bearing 0.10-0.20 mm (0.004-0.008 in)
Main bearings	
Number and type	5, Vandervell shells
Material	Lead-indium
Diametrical clearance	0.010-0.048 mm (0.0004-0.0019 in)
Undersize bearing shells	0.254 mm, 0.508 mm (0.010 in, 0.020 in)
Connecting rods	
Type	Horizontally split big-end, plain small-end
Length between centres	143.81-143.71 mm (5.662-5.658 in)
Big-end bearings	
Type and material	Vandervell VP lead-indium
Diametrical clearance	0.015-0.055 mm (0.0006-0.022 in)
End-float crankpin	0.15-0.36 mm (0.006-0.014 in)
Undersize bearing shells	0.254 mm, 0.508 mm (0.010 in, 0.020 in)
Piston pins	
Length	72.67-72.79 mm (2.861-2.866 in)
Diameter	22.215-22.220 mm (0.8746-0.8748 in)
Fit-in connecting rod	Press fit
Clearance in piston	0.002-0.007 mm (0.0001-0.0003 in)
Pistons	
Clearance in bore, measured at bottom of skirt at right angles to piston pin	0.018-0.033 mm (0.0007-0.0013) in
Piston rings	
Number of compressions rings	2
Number of oil control rings	1
No. 1 compression ring	Chrome parallel faced
No. 2 compression ring	Stepped to 'L' shaped and marked 'T' or 'TOP'
Width of compression rings	1.56-1.59 mm (0.0614-0.0626 in)
Compression ring gap	0.44-0.57 mm (0.017-0.022 in)
Oil control ring type	Perfect circle, type 98-6
Oil control ring width	4.811 mm (0.1894 in) maximum
Oil control ring gap	0.38-1.40 mm (0.015-0.055 in)

Continued

Camshaft

Location Central
 Bearings Non serviceable
 Number of bearings 5
 Drive Chain 9.52 mm (0.375 in) pitch x 54 pitches.

Tappets Hydraulic-self-adjusting

Valves

Length: Inlet 116.59-117.35 mm (4.590-4.620 in)
 Exhaust 116.59-117.35 mm (4.590-4.620 in)
Seat angle: Inlet 45° to 45 1/2°
 Exhaust 45° to 45 1/2°
Head diameter: Inlet 39.75-40.00 mm (1.565-1.575 in)
 Exhaust 34.226-34.488 mm (1.3475-1.3575 in)
Stem diameter: Inlet 8.664-8.679 mm (0.3411-0.3417 in)
 Exhaust 8.651-8.666 mm (0.3406-0.3412 in)
Stem to guide clearance: Inlet 0.025-0.066 mm (0.0010-0.0026 in)
 Exhaust 0.038-0.078 mm (0.0015-0.0031 in)
Valve lift (Inlet and Exhaust) 9.49 mm (0.374 in)
Valve spring length fitted 40.4 mm (1.590 in) at pressure of 29.5 kg (65 lb)

lubrication

System type Wet sump, pressure fed
 Oil pump type Gear
 Oil pressure 2.11 to 2.81 kg/cm² (30 to 40 p.s.i.) at 2400 rev/min with engine warm
 Oil filter-internal Wire screen, pump intake filter in sump
 Oil filter-external Full flow, self-contained cartridge

FUEL SYSTEM

Fuel system type Lucas hot wire system electronically controlled
 Fuel pump-make/type AC Delco-high pressure (electrical) immersed in the fuel tank
 Fuel pump delivery pressure 2.4-2.6 kg/cm² (34-37 p.s.i.)
 Fuel filter Bosch in-line filter 'canister' type

Airflow Sensor

Make and type Lucas 'Hot Wire' 3AM

Injectors

Make and type Lucas 8Nf

Electronic Control Unit

Make and type Lucas 13CU

Fuel pressure regulator

Make and type Lucas 8RV'

Fuel temperature sensor

Make and type Lucas **6TT**

Coolant temperature sensor

Make and type Lucas **3TT**

Bypass Airvalve (Stepper motor)

Make and type Lucas **2ACM**

Throttle potentiometer

Make and type Lucas **215SA**

Lambda sensor

Make and type Lucas **3LS**

COOLING SYSTEM

Type Pressurized system with cross-flow radiator and remote header tank, thermostat control, pump and fan assisted

Type of pump Centrifugal

Thermostat 88°C (190°F)

TRANSMISSION

Transfer ~~gearbox~~ **LT230**

Type Two speed reduction on main gearbox output. Front and rear drive permanently engaged via a lockable differential.

Transfer gearbox ratios

High **1.222:1**

Low **3.320:1**

Automatic gearbox

Model **ZF4HP22**

Type Four speed and reverse epicyclic with fluid torque converter and lock up.

4th **0.728:1**

3rd **1.000:1**

2nd **1.480:1**

1st **2.480:1**

Reverse **2.086:1**

Overall ratio (final drive):

High transfer

Low transfer

4th **3.155:1** **8.555:1**

3rd **4.332:1** **11.775:1**

2nd **6.440:1** **17.388:1**

1st **10.772:1** **29.133:1**

Reverse **9.002:1** **24.505:1**

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SHIFT SPEED SPECIFICATION

Automatic ~~ZF4HP22~~ Gearbox

OPERATION	SELECTOR POSITION	VEHICLE SPEED APPROX.		ENGINE SPEED APPROX. (RPM)
		MPH	KPH	
KICKDOWN				
KD4-3	D	78-95	125-153	
KD3-2	3(D)	56-61	90-98	
KD2-1	2(D)3(B)	27-34	43-55	
KD3-4	D	N/A	N/A	
KD2-3	D(3)	59-64	95-103	4750-5200
KD1-2	D(3)2	34-39	55-63	4600-5250
FULL THROTTLE				
FT4-3	D	60-66	97-106	
FT3-2	3(D)	39-45	63-72	
FT3-4	D	73-79	117-127	3980-4330
FT2-3	D(3)	54-59	87-95	4350-4800
FT1-2	D(3)2	29-34	47-55	3950-4650
ZERO THROTTLE				
ZT4-3	D	19-25	31-40	
ZT3-2	D(3)	12-15	19-24	
ZT2-1	D(3)2	6-7	10-11	
PART THROTTLE				
PT4-3	D	46-53	74-85	
PT3-2	D(3)	29-36	47-58	
PT2-1	D(3)2	10-12	16-19	
LIGHT THROTTLE				
LT3-4	D	26-30	42-48	1430-1650
LT2-3	D(3)	18-22	29-35	1420-1820
LT1-2	D(3)2	9-10	14-16	1180-1220
TORQUE CONVERTER				
1987 Model year				
Lock Up (IN)		40-43	64-69	1480-1820
Unlock (OUT)		38-41	61-66	1430-1560
1988 Model year				
Lock Up (IN)		50-53	80-85	1875-2000
Unlock (OUT)		48-51	77-82	1825-1930
NOTE: The speeds given in the above chart are approximate and only intended as a guide. Maximum shift changes should take place within these tolerance parameters.				

Drive shafts

Type
 Front Solid bar 28.6mm (1.125 in) diameter
 Rear 51mm (2in) diameter
 Universal joints Open type 03EHD

Rear axle

Type Spiral bevel, fully floating shafts
 Ratio 3.54:1

Front axle

Type Spiral bevel, enclosed constant velocity joints, fully floating shafts
 Angularity of universal joint on full lock 32"
 Ratio 3.54:1

STEERING

Power steering box

Make/type Advest Varamatid linkage
 Ratio Variable: straight ahead 17.5:1

Steering pump

Make/type Hobourn-Eaton series 200
 Operating pressure - straight ahead position - at idle 7 kgf/cm² (100 p.s.i.) maximum
 Full lock (left or right) at idle 28 kgf/cm² (400 p.s.i.) minimum
 Full lock (left or right) 1000 rev/min 70.77 kgf/cm² (1000-1100 p.s.i.)
 Steering wheel turns, lock-to-lock 3.375
 Steering wheel diameter 406.4mm (16 in)
 Toe-out measurement 1.2 to 2.44mm (0.046 to 0.093 in) toe out
 Toe-out included angle 0° 10' to 0° 20'
 Camber angle 0° Check with vehicle in static unladen condition, that is, vehicle with water, oil and
 Castor angle 3° five gallons of fuel. Rock the vehicle up and down at the front to allow it to take up a
 Swivel pin inclination 7° static position

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SUSPENSION

Type Coil springs controlled by telescopic dampers front and rear

Front Transverse location of axle by **Panhard** rod, and fore and aft location by two radius arms

Rear Fore and aft movement inhibited by two tubular trailing links.
Lateral location of axle by a centrally positioned **'A'** bracket bolted at the apex to a ball joint mounting. A **levelling** unit is positioned between the ball joint and upper cross member.

ROAD SPRING DATA

Specification	Part No.	Colour Code	Rating	Free length	No of Coils
A	572315	Blue Stripe	2375.1 kg/m (133 lb/in)	391.16 mm (15.4 in)	7.18
B	NRC4306	Blue & White Stripe	2375.1 kg/m (133 lb/in)	417.57 mm (16.44 in)	7.55
C	NRC8113	Pink & Purple Stripe	3182.1 kg/m (178.2 lb/in)	418.36 mm (16.47 in)	8.75
D	NTC3285	Green & Pink Stripe	3182.1 kg/m (178.2 lb/in)	435.2 mm (17.134 in)	10.21

Standard Suspension	Specification	
	Right Side	left Side
LHD Front	A	B
LHD Rear	C	D

Shock absorbers (dampers)

Type Telescopic, double-acting **non-adjustable**

Bore diameter **35.47mm** (1.375 in)

BRAKES

Front service brake

Type	Outboard discs with four piston calipers
Operation	Hydraulic, servo assisted self-adjusting
Disc diameter	298.17mm (11.75 in)
Total pad area	98.1cm² (15.2 in ²) per brake
Total swept area	816 cm² (126.48 in ²) per brake
Pad material	DON 230
Pad wear indicator	Inboard pad right hand caliper

Rear service brake

Type	Outboard discs with two piston calipers
Operation	Hydraulic, servo assisted, self-adjusting
Disc diameter	290.0mm (11.42 in)
Total pad area	65.81 cm² (10.2 in ²) per brake
Total swept area	717 cm² (111.2 in²) per brake
Pad material	DON 230
Pad wear indicator	Inboard pad left hand caliper
1987 model year improvement pad wear indicator	Inboard pad right hand caliper

Parking brake

Type	Mechanical-cable operated drum brake on the rear of the transfer gearbox output shaft
Drum diameter	254mm (10 in)
Width	70mm (2.75 in)
Lining material	DON 269

Servo/master cylinder

Manufacturer	Automotive Products
Servo type	AP 50 + 50
Boost ratio	4.0:1
Master cylinder type	AS AS 15/16 Cast iron
Fluid displacement - Primary	5.13 cm ³
- Secondary	9.15 cm³
Nominal split	38162
Unit weight	8.7 Kg
Maximum bleed pressure	2,76 bar (40 lbf/in²)

Servo/master cylinder - 1987 Model year improvement

Manufacturer	Lucas Girling
Servo type	LSC 115
Boost ratio	5.6:1
Master cylinder type	25.4mm AS/AS (steel tube construction)
Fluid displacement - Primary	5.16 cm ³
- Secondary	9.17 cm ³
Nominal split	36164
Unit weight	3.75 Kg
Maximum bleed pressure	2,76 bar (40 lbf/in²)

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WHEELS AND TYRES

Type and size Alloy **7.00J** X 16
 Tyre size **205R16** (tubeless). Note: Vehicles must be fitted with 'S' rated tyres

AIR CONDITIONING

System A.R.A.
 Compressor **Sanden SD510**
 • 1988 introduction **Sanden SD 709**

WIPER MOTORS

Tailgate wiper motor

Make/type **IMOS** (non-serviceable)
 Running current, wet screen at 20°C ambient 1.0 to 2.8 amps
 Wiper speed, wet screen at 20°C ambient 37 to 43 cycles per minute

Windscreen wiper motor

Make/type Lucas 28W **2-speed**
 Running current (Link disconnected) 1.5 amps at 39 to 45 **rev/min** (normal speed)
 Rotary link speed 60 to 73 **rev/min** (high speed)

ELECTRICAL

System **12** volt, negative ground

Battery

Make/type Land Rover Parts and Equipment/Chloride maintenance free **14-plate-380/120/90**

Alternator

Manufacturer Lucas
 Type **133/80**
 Polarity Negative ground
 Brush length
 New 20 mm (0.78 in)
 Worn, minimum free protrusion
 from brush box **10** mm (0.39 in)
 Brush spring pressure flush with brush box face 136 to 279 **g (5 to 10 oz)**
 Rectifier pack output rectification 6 diodes (3 positive side and 3 ground side)
 Field winding supply rectification 3 diodes
Stator windings 3 phase-delta connected
 Field winding rotor poles 12
 Maximum speed 16,000 **rev/min**
 Winding resistance at 20°C 2.6 ohms
 Control Field voltage sensed regulation
 Regulator-type 15 TR
 voltage 13.6 to 14.4 volts
 Nominal output
 Condition Hot
 Alternator speed 6000 **rev/min**
 Control voltage 14 volt
 Amp 80 amp

Coil

Make/type Lucas **32C5**

1988 Model Year

Make/type Bosch 0221 122 392

Distributor

Make/type Lucas 35 **DLMB**
 Firing angles **0°-45°-90°** (every **45°**) \pm 1°
 Application 12V Negative ground
 Pick-up air gap adjustment
 (Pick-up ~~limb~~/**reluctor** tooth) **0.20** mm to **0.35** mm (**0.008** in to 0.014 in)
 Pick-up winding resistance 2k to **5k** ohms

Fuses

Type **Autofuse** (Blade type)
 Blow ratings to suit individual circuits

Horns

Make/type Klamix (~~Mix~~) **TR99**

Ignition module

Make/type Lucas **9EM** amplifier module, distributor mounted

Spark plugs

Make/type Champion RN1 2YC
 Gap **0.85** to 0.95 mm (0.033 to 0.038 in)

Starter motor

Make/type Lucas **M78R** pre-engaged
 Minimum brush length 3.5 mm (0.138)
 Minimum **commutator** diameter 28.8 mm (1.13 in)

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REPLACEMENT BULBS	TYPE
Head lamps)	12V 60/55W (Halogen) sealed beam
Auxiliary driving lamps)	12V 55W H3 (Halogen)
Side lamps)	12v 5W bayonet
tail lamps)	12v 5/21W bayonet
Reverse lamps)	12v 21W bayonet
Stop lamps)	12v 21w bayonet
Direction indicator lamps)	12v 21w bayonet
Rear side marker lamps)	12v 4w bayonet
Number plate lamps)	12v 5w capless
Instrument panel lamps and warning lamps)	12v 1.2W bulb/holder unit
Ignition warning lamp (Instrument panel))	12v 2w capless
Interior roof lamps)	12v 16W 'Festoon'
Clock illumination)	12v 2w bayonet
Cigar lighter illumination)	12v 1.2W capless
Door edge/puddle lamps)	12v 5W capless
Auxiliary switch panel)	
illumination (green))	12V 1.2W capless
Heated rear screen warning lamp (amber))	12v 1.2W capless
Hazard warning lamp)	12V 1.2W capless
Automatic graphics illumination)	24v 5w capless
Heater/air conditioning graphics illumination)	12v 1.2W capless
Differential lock warning lamp)	12V 2w bayonet
Column switch illumination)	12V 1.2W capless

CAUTION: The fitting of new bulbs with wattages in excess of those specified will result in damage to vehicle wiring and switches.

VEHICLE DIMENSIONS

Overall length	4.45m (175 in)
Overall width	1.82m (71.6 in)
Overall height	1.80m (70.8 in)
Wheelbase	2.54m (100 in)
Track: front and rear	1.49m (58.5 in)
Ground clearance: under differential	190mm (7.5 in)
Turning circle	11.89m (39 ft)
Loading height	715mm (28.1 in)
Maximum cargo height	1.02m (40.2 in)
Rear opening height	0.87m (34.3 in)
Usable luggage capacity, rear seat folded	2.00m³ (70.6ft ³)
Usable luggage capacity, rear seat in use	1.03m³ (36.2ft ³)
Maximum roof rack load	75 kg (165 lb)

VEHICLE WEIGHTS AND PAYLOAD

When loading a vehicle to its maximum (Gross Vehicle Weight), consideration must be taken of the vehicle curb weight and the distribution of the payload to ensure that axle loadings do not exceed the permitted maximum values. It is the customer's responsibility to limit the vehicle's payload in an appropriate manner such that neither maximum axle loads nor Gross Vehicle Weight are exceeded.

	Front		Rear		Total	
	kg	(lb)	kg	(lb)	kg	(lb)
Curb weight	980	(2160)	972	(2143)	1952	(4303)
Gross Vehicle Weight					2720	(5997)
Maximum axle loads	1150	(2535)	1620	(3572)		

NOTE: CURB WEIGHT equals the minimum unladen vehicle weight plus full fuel tank.

GROSS VEHICLE WEIGHT equals the maximum all up weight, with the driver, passengers, payload equipment and towing attachment load (where applicable)

GROSS VEHICLE WEIGHT CONDITION - the maximum axle weights shown are individual axle loadings which allow for the fitting of optional equipment. The loading of both axles up to their respective maximums **MUST BE AVOIDED**, as the overall maximum vehicle weight would then be exceeded.

Maximum permissible tongue weight is **250kg (550 lb)**.

Maximum permissible towed weights

	On-road	Off-road
Trailers without brakes	750 kg 1650 lb	750 kg 1650 lb
Trailers with brakes require Class III hitch	3500 kg 7700 lb	1000 kg 2200 lb

NOTE: It is the Owner's responsibility to ensure that all regulations with regard to towing are complied with. This applies also when towing abroad. All relevant information should be obtained from the appropriate motoring organisation.

TYRE PRESSURES

Pressures: Check with tyres cold	Normal on and off-road use. All speeds and loads		Off-road 'emergency' safe use maximum speed of 40 kph (25 mph)	
	Front	Rear	Front	Rear
bars	1.91	2.6	1.1	1.6
lb/in ²	28	38	16	23
kg/cm ²	2.0	2.7	1.1	1.6

These pressures may be increased for high speed motoring. Any such increase in pressures may be up to an absolute maximum pressure of 2.8 bars (41 p.s.i.) 2.9 kg/cm².

Normal operating pressures should be restored as soon as reasonable road conditions or hard ground is reached.

After any usage off the road, tyres and wheels should be inspected for damage particularly if high cruising speeds are subsequently to be used.

Towing: When the vehicle is used for towing, the reduced rear tyre pressures for extra ride comfort are not applicable.

WARNING: Tubeless wheels and tyres are fitted to this vehicle and under no circumstances must an inner tube be fitted.

TYRE PRESSURES - 1989 model year

Rear axle tyre pressures must be increased to 2.8 bars (41 p.s.i.) 2.9 kg/cm² for either of the following operating conditions:

1. Sustained high speed driving.
2. When rear axle loads exceed 3410 lbs (1550 kgs) e.g. with five passengers plus 220 lb (100 kgs) payload.

ENGINE 3.9 V8

Type	V8
Number of cylinders	Eight, two banks of four
Bore	94.00 mm (3.700 in)
Stroke	71.12 mm (2.800 in)
Capacity	3950 cc (241 in ³)
Valve operation	Overhead by push-rod
Maximum power-bhp	178 at 4750 rev/min (SAE) 1349)
Compression ratio	8.13:1

Pistons

Clearance in bore, measure at bottom of skirt at right angles to piston pin	0.018-0.041 mm (0.0007-0.0016 in)
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Piston rings

Number of compression rings	2
Number of control rings	1
No 1 compression ring	Molybdenum barrel faced
No 2 compression ring	Tapered and marked 'T' or 'TOP'
Width of compression rings	1.478-1.49 mm (0.058-0.059 in)
Compression ring gap	0.40-0.65 mm (0.016-0.026 in)
Oil control ring type	Hepworth and Grandage
Oil control ring width	3.0 mm (0.118 in)
Oil control ring rail gap	0.38-1.40 mm (0.015-0.055 in)

ELECTRICAL

Electronic control unit

Make/Type	Lucas 14CU
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Coil

Make/Type	Bosch 0-221-122-392
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TRANSMISSION

Borg Warner transfer gearbox

Type Two speed reduction on main gearbox output, front and rear drive permanently engaged via a centre differential controlled by a Viscous unit giving a 50/50 nominal front and rear torque split.

Transfer gearbox ratios

High 1.206:1
 Low 3.244:1

Automatic gearbox ratios

4th 0.728:1
 3rd 1.000:1
 2nd 1.480:1
 1st 2.480:1
 Reverse 2.086:1

Overall ratio (final drive):

	High transfer	Low transfer
4th	3.11:1	8.36:1
3rd	4.27:1	11.48:1
2nd	6.32:1	17.00:1
1st	10.59:1	28.50:1
Reverse	8.91:1	23.96:1

SHIFT SPEED SPECIFICATION - 1989 MODEL YEAR ONWARDS
Automatic ZF4HP22 Gearbox

* Denotes 1989 model year specification

OPERATION	SELECTOR POSITION	VEHICLE SPEED APPROX		ENGINE SPEED APPROX (RPM)
KICKDOWN				
		MPH	KPH	
KD4 - 3	D	84 - 92	136 - 150	
* KD4 - 3	D	79 - 96	127 - 155	
KD3 - 2	3(D)	57 - 62	91 - 99	
KD2 - 1	2(D,3)	27 - 34	44 - 56	
KD3 - 4	D	N/A	N/A	
KD2 - 3	D(3)	60 - 63	96 - 104	4750 - 5200
KD1 - 2	D(3,2)	34 - 40	56 - 64	4600 - 5250
FULL THROTTLE				
FT4 - 3	D	61 - 67	98 - 108	
FT3 - 2	3(D)	40 - 46	64 - 73	
FT3 - 4	D	74 - 80	119 - 129	3980 - 4330
FT2 - 3	D(3)	55 - 60	88 - 96	4350 - 4800
FT1 - 2	D(3,2)	29 - 34	48 - 56	3950 - 4650
PART THROTTLE				
PT4 - 3	D	47 - 54	75 - 86	
PT3 - 2	D(3)	29 - 37	48 - 59	
PT2 - 1	D(3,2)	10 - 12	16 - 19	
LIGHT THROTTLE				
LT3 - 4	D	26 - 30	43 - 49	1430 - 1650
LT2 - 3	D(3)	18 - 22	29 - 35	1420 - 1820
LT1 - 2	D(3,2)	9 - 10	14 - 16	1180 - 1220
ZERO THROTTLE				
ZT4 - 3	D	19 - 25	31 - 41	
ZT3 - 2	D(3)	12 - 15	19 - 24	
ZT2 - 1	D(3,2)	6 - 7	10 - 11	
TORQUE CONVERTER				
Lock up (IN)	D	51 - 54	81 - 86	1875 - 2000
Unlock (OUT)	D	49 - 52	78 - 83	1825 - 1930
<p>NOTE: The speeds given in the above chart are approximate and only intended as a guide. Maximum shift changes should take place within these tolerance parameters.</p>				

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