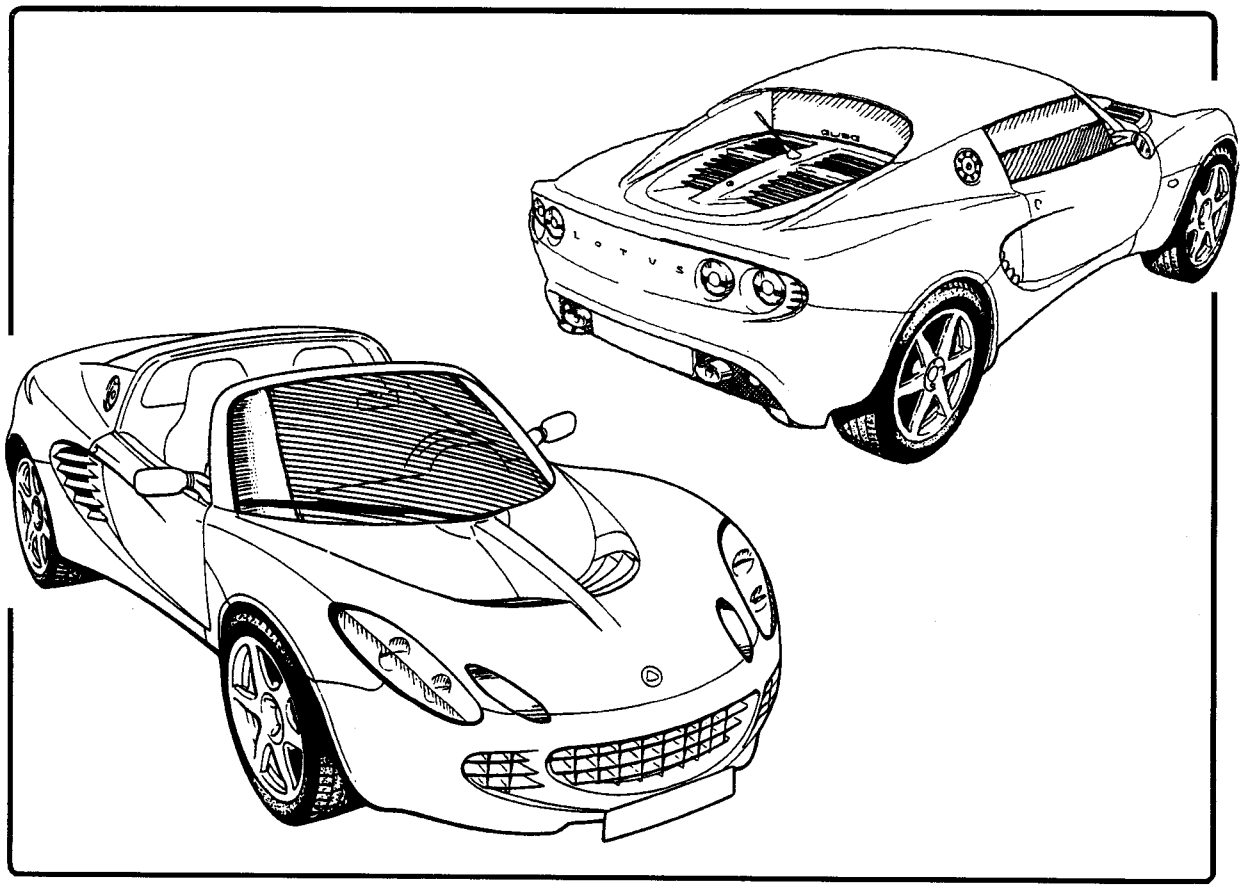
SERVICE NOTES

ELISE

2001 Model Year Onwards



LOTUS CARS LTD

Norwich, Norfolk, NR14 8EZ, England. Telephone: 01953 608000 Telefax: 01953 608300

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This publication has been designed for use by Lotus Dealers familiar with general workshop safety procedures and practices. Take all appropriate action to guard against injury to persons or damage to property.

Lotus policy is one of continuous product improvement, and the right is reserved to alter specifications at any time without notice.

Whilst every care has been taken to ensure correctness of information, it is impossible to guarantee complete freedom from errors or omissions, or to accept liability arising from such errors or omissions, but nothing herein contained shall affect your statutory rights.

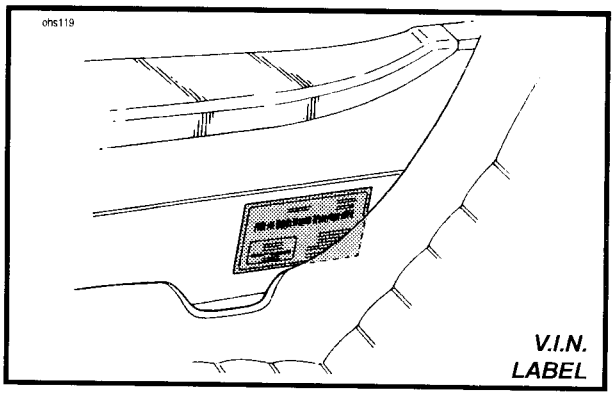
CONTENTS

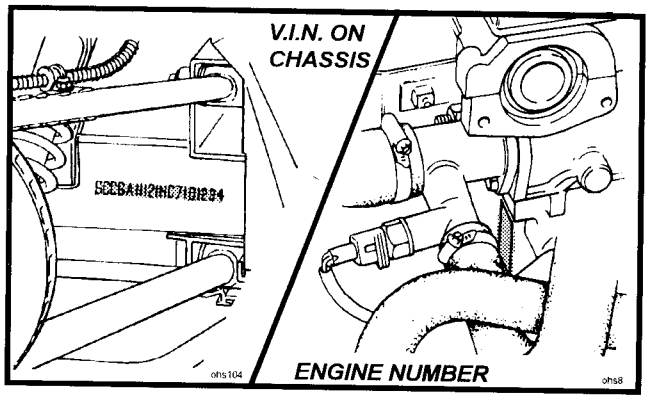
ELISE 2001 M.Y. Onwards

VEHICLE IDENTIFICATION NUMBER & ENGINE NUMBER

The Vehicle Identification Number (V.I.N.) is stamped on the chassis in the right hand front wheelarch area, viewable with the front wheels turned to right full lock, and is also printed on a label stuck to the inside of the chassis sideframe alongside the driver's seat. The engine number is marked on a vertical patch at the left hand end of the forward face of the cylinder block, and is most easily viewed using a mirror.

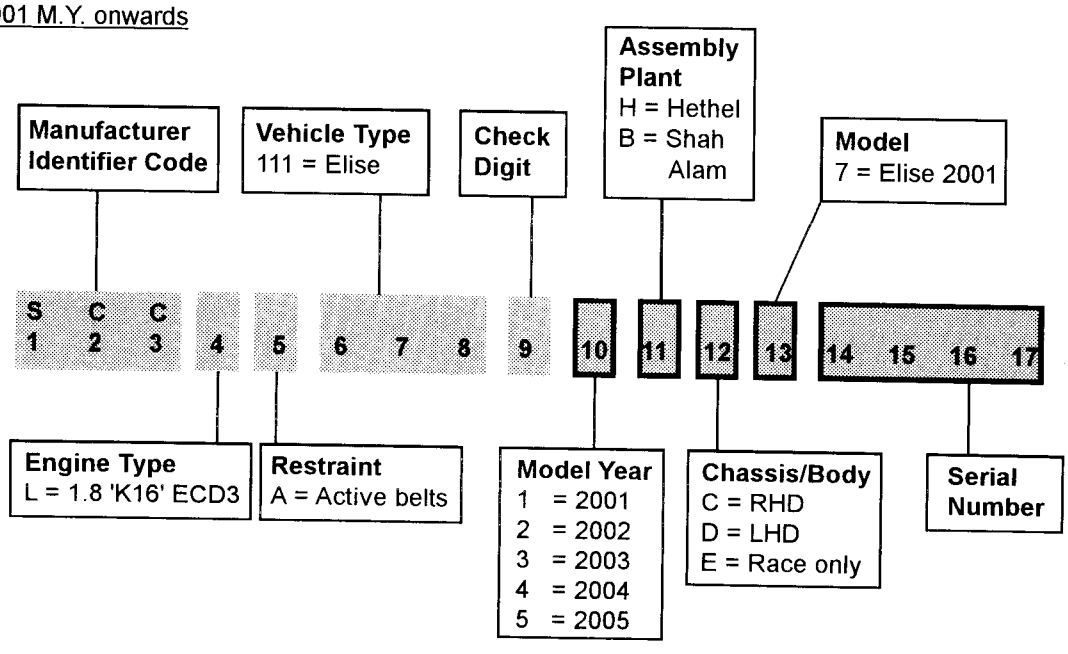
Both numbers should always be quoted with any vehicle enquiries, as Factory records are filed against V.I.N., and specification change points are identified by V.I.N. or engine number. The vehicle licence number may not accurately reflect vehicle age, may also be changed during the car's life, and is an unreliable method of vehicle identification.





The V.I.N. comprises 17 characters, coded in accordance with European Economic Community (EEC) directives. For change point identification in Service Notes, Service Bulletins and Service Parts Lists, normally, only characters 10 to 17 will be quoted.

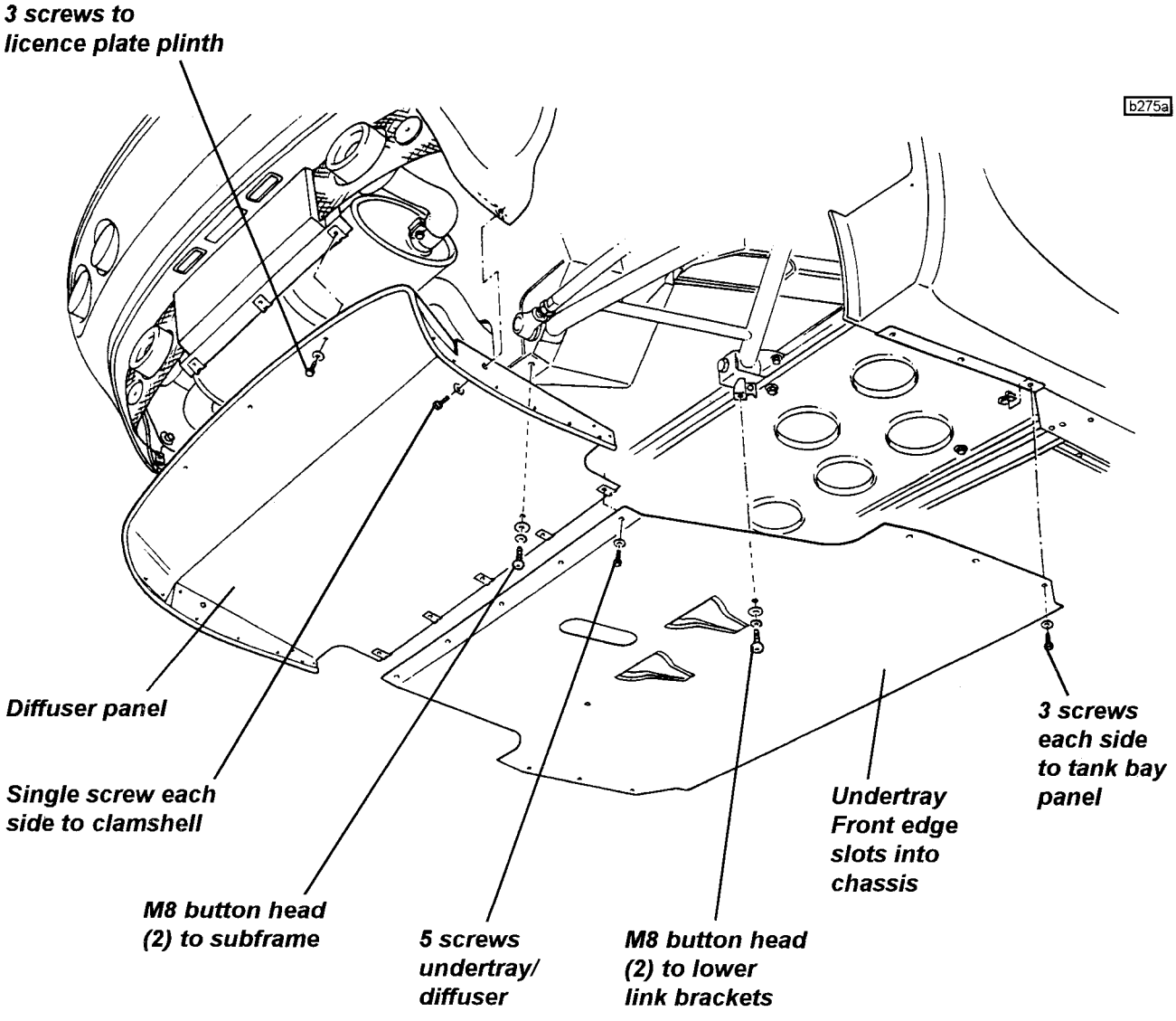
'2001 M.Y. onwards



ENGINE BAY UNDERTRAY/DIFFUSER

For certain service operations, it may by necessary to remove the engine bay undertray and/or diffuser panel. The panels are retained by:

- Four M8 button head fixings needing a 5mm hexagonal key;
- Sixteen hex. head screws.



JACKING POINTS

Care must be taken when using a lifting jack or hoist only to position the device in one of the the areas shown in the illustration, with a suitable rubber or timber pad protecting the chassis from surface damage. If a 4-point lift is to be used, the engine bay undertray/diffuser panel (if fitted) must first be removed. When using a 4-point lift, it is strongly recommended that for optimum stability and safety, positions B and D are used.

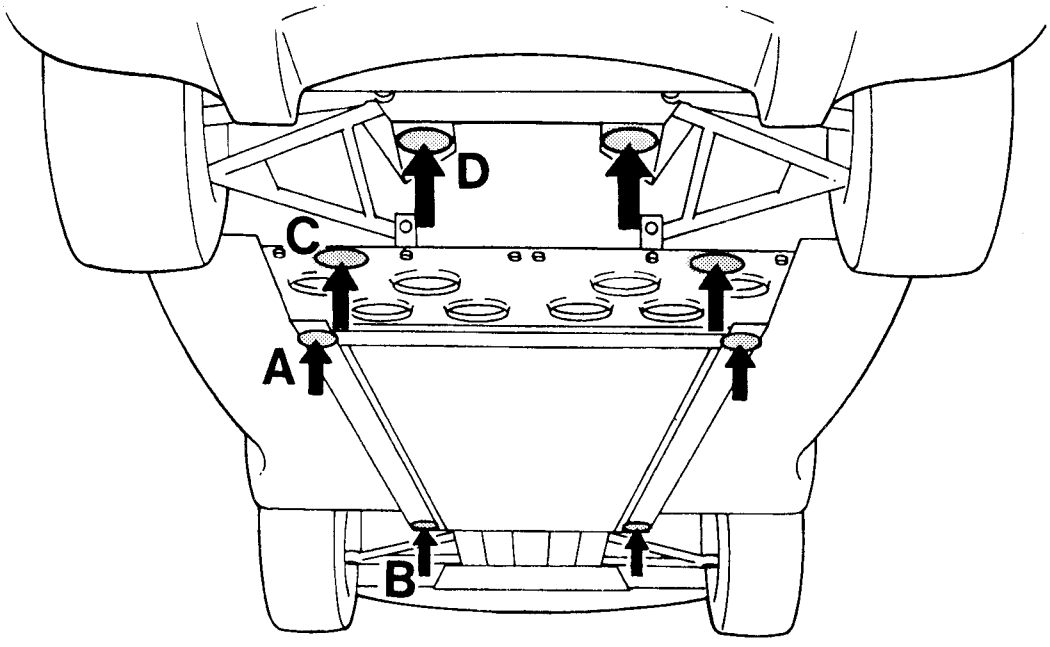
A; Identified by a blue sticker. Beneath crossmember ahead of fuel tank bay. To be used one side at a time for wheel changing - lifts both wheels on one side. *Do not use with a four point garage lift.*

B; Beneath the front end of the right or left hand main chassis rail, behind the front wheelarch. Garage use with 4-point lift in conjunction with (C).

C; *The engine undertray/diffuser panel must first be removed.* Beneath the outboard end of the chassis crossmember ahead of the rear wheelarches. Take care to position the jack between the fixing screws for the fuel tank bay perforated undershield. Garage use with 4-point lift in conjuction with (B).

D; *The engine undertray/diffuser panel must first be removed.* Beneath the rear subframe, close to the lower wishbone rearmost mountings.

Jacking at any other point may damage the chassis or body structure and/or jeopardise safety.



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TECHNICAL DATA - ENGINE

SECTION TDL - ELISE 2001 M.Y. Onwards

GENERAL

Type designation		K16 (18K4FL70)
Configuration & no. of cylinders		in-line 4
Capacity		1796 cm^3
Bore		80.00 mm
Stroke		89.30 mm
Valve actuation		Belt driven twin overhead camshafts with hydraulic tappets
Compression ratio		10.5:1 ± 0.5
Firing order		1,3,4,2
Spark plugs		Unipart GSP 66527
Spark plug gap		1.0 ± 0.5 mm
Maximum engine speed		6950 rpm
Idle speed		825 ± 50 rpm
Ignition system		Direct ignition using two double ended coils and 'wasted spark' principle
Fuel system		Fully sequential indirect fuel injection.
Fuel requirement		Unleaded 95 RON minimum
Max. net power (EEC)		89.7 kW (120 bhp; 122 PS) @ 5,600 rpm
Max. net torque (EEC)		168 Nm (124 lbf.ft) @ 4,500 rpm
Exhaust emissions	- CO	0.4089
	- HC	0.0776
	- NOX	0.0411
	- HC+NOX	0.1186

CYLINDER HEAD

Material		Aluminium alloy
Head face maximum warpage		0.05 mm
Cylinder head height	- new	118.95 to 119.05 mm
	- reface limit	0.20 mm

CAMSHAFTS & VALVE TIMING

Open duration	244° (at crankshaft)
Inlet valve opens	12° BTDC
Inlet valve closes	52° ABDC
Exhaust valve opens	52° BBDC
Exhaust valve closes	12° ATDC
Valve overlap	24°
Valve lift - inlet	8.8 mm
- exhaust	8.8 mm

VALVES

Angle of valve seats and faces			45°
Stem diameter	- inlet		5.952 - 5.967 mm
	- exhaust		5.947 - 5.962 mm
Stem clearance in guide	- inlet	- new	0.033 - 0.063 mm
		- service limit	0.070 mm
	- exhaust	- new	0.038 - 0.078 mm
		- service limit	0.110 mm
Valve clearance			Hydraulically controlled.
Valve stem fitted height	- new		38.93 - 39.84 mm
	- service limit		40.10 mm

VALVE GUIDES		
Inside diameter		6.000 - 6.025 mm
Fitted height		6.0 mm
VALVE SEATS		
Seat face angle		45°
VALVE SPRINGS		
Free length		50.0 mm
Fitted length		37.0 mm
Load at fitted length		250 ± 12 N
Load at full lift		450 ± 18 N
CRANKSHAFT		
Crankshaft endfloat	- new	0.10 - 0.25 mm
	- service limit	0.34 mm
Thrust washer thickness		2.61 - 2.65 mm
Main journal diameter		47.979 - 48.007 mm (for grading see Section EE)
Maximum out of round		0.010 mm
Big end journal diameter		47.986 - 48.007 mm (for grading see Section EE)
Maximum out of round		0.010 mm
Big end clearance		0.021 - 0.049 mm
PISTON RINGS		
New ring to groove clearance	- top compression	0.040 - 0.072 mm
	- second compression	0.030 - 0.062 mm
	- oil control	0.010 - 0.180 mm
New ring gap, 20mm from bore top	- top compression	0.20 - 0.35 mm
	- second compression	0.28 - 0.48 mm
	- oil control	0.15 - 0.40 mm
PISTON		
Piston diameter (8mm from bottom, 90° to pin)	- grade A	79.975 - 79.990 mm
	- grade B	79.991 - 80.005 mm
Clearance in bore (20mm from bottom of bore)		0.01 - 0.04 mm
CYLINDER BLOCK		
Cylinder liner bore (65mm from top)	- red grade A	80.000 - 80.015 mm
	- blue grade B	80.016 - 80.030 mm
OIL PUMP		
Outer rotor to housing clearance		0.28 - 0.36 mm
Inner rotor tip clearance		0.05 - 0.13 mm
Rotor end float		0.02 - 0.06 mm
COOLANT THERMOSTAT		
Nominal setting		85 - 91°C
Thermostat starts opening		88°C
Thermostat fully open		100°C

TECHNICAL DATA - VEHICLE

SECTION TDO - ELISE 2001 M.Y. Onwards

DIMENSIONS

Overall length		3785 mm
Overall width	- exc. mirrors	1719 mm
	- inc. mirrors	1850 mm (approx.)
Overall height (at kerb weight)		1117 mm
Wheelbase		2300 mm
Track	- front	1457 mm
	- rear	1503 mm
Ground clearance (mid-laden)		130 mm
Front overhang		783 mm
Rear overhang		702 mm
Approach angle (at kerb)		13.5°
Departure angle (at kerb)		23°
Unladen weight	- total	774 kg >
	- front	294 kg > inc.full fuel tank
	- rear	480 kg >
Max. weight	- total	1044 kg }
	- front	406 kg } inc. occupants & luggage
	- rear	638 kg }
Trailer towing		Not permissible

CAPACITIES

Engine oil	- dry	5.0 litre (8.8 imp. pt)
	- refill inc. filter	4.5 litre (7.9 imp. pt)
High/low dipstick mark difference		1.0 litre (1.8 imp. pt)
Transmission oil	- dry	2.4 litre (4.2 imp. pt)
	- refill	2.1 litre (3.7 imp. pt)
Fuel tank		32 litre (7.0 imp.gall)
Coolant		8.0 litre (14.1 imp. pt)

WHEELS & TYRES (normal use)

Wheel type		Rimstock alloy, 4-bolt fixing
Wheel size	- front	5.5J x 16 ET 31.3
	- rear	7.5J x 17 ET 17.75
Wheel bolt torque		105 Nm (77 lbf.ft)
Tyre type		Bridgestone Potenza RE040
Size	- front	175/55 R16
	- rear	225/45 R17
Pressure (cold)	- front	1.8 bar (26 lb/in²)
	- rear	1.9 bar (27.5 lb/in²)

WINTER WHEELS & TYRES

Wheel type		Rimstock alloy 6-spoke. 4-bolt fixing
Wheel size	- front	5.5J x 15 ET 31.3
	- rear	7J x 16 ET 17.75
Wheel bolt torque		105 Nm (77 lbf.ft)
Tyre type		Bridgestone LM22
Size	- front	185/55 R15
	- rear	205/55 R16
Pressure (cold)	- front	TBA
	- rear	TBA
Studding		Not permitted
Tyre chains		Pewag Neon X3-NX369
		fitted only on rear winter wheels/tyres

FRONT SUSPENSION

Type	Independent. Upper and lower wishbone; co-axial coil spring/telescopic damper unit; anti-roll bar.
Geometry check ride height (2 persons, ½ tank fuel)	
- front	130 mm below front end of chassis siderail
- rear	130 mm below rear end of chassis siderail
Alignment	0.2 mm toe-out overall; + 0.2, - 0 mm (0.03° toe-out overall; + 0.03°, - 0°)
Camber	- 0.1°; + 0.1°, - 0.2°. Max side/side; 0.2°
Castor	+ 3.8°; ± 0.2°. Max. side/side; 0.2°
Steering axis inclination	12° nominal

REAR SUSPENSION

Type	Independent. Upper and lower wishbone; co-axial coil spring/telescopic damper.
Geometry check ride height (2 persons, ½ tank fuel)	
- front	130 mm below front end of chassis siderail
- rear	130 mm below rear end of chassis siderail
Alignment	1.2 mm toe-in each side; + 0.2, - 0 mm (0.18° toe-in each side; + 0.03°, - 0°) Max. difference side/side; 0.2 mm (0.03°)
Camber	- 1.8°; ± 0.2°. Max. side/side; 0.2°

ELECTRICAL

Light Bulbs	*Wattage*	*Type*
Headlamps	55	H1 & H7
Driving lamps	55	H3
Front side/parking lamps	5	W5W
Side repeater lamps	5	W5W amber
Front turn indicators	21	PY21w amber
Rear turn indicators	21	H21
Stop/Tail lamps	4/21	P21/4w
Tail lamps	5	R5W
High mounted stop lamp	2.5	16 x LED
Fog/Tail lamps	4/21	P21/4w
Reversing lamp	21	H21
Licence plate lamps	5	C5W
Interior lamp	5	W5W

System voltage/polarity	12V negative earth
Alternator	85A
Battery - type	Tungstone 006
- cranking power	300A (SAE)
- reserve capacity	50 minutes

TRANSMISSION

Type: 5 speed manual transaxle. Bevel gear differential.

Gear	*Ratio*	*Final Drive*	*mph(km/h)/1000 rpm*
First	2.92 : 1	)	5.8 (9.3)
Second	1.75 : 1	)	9.9 (15.9)
Third	1.31 : 1	) 4.20 : 1	13.1 (21.1)
Fourth	1.03 : 1	)	16.7 (25.7)
Fifth	0.85 : 1	)	19.4 (31.2)
Reverse	3.00 : 1	)	

CLUTCH

Type		Single dry plate. Diaphragm spring cover. Hydraulic release.
Friction plate diameter		215 mm
Diaphragm finger clearance		1.00 mm
Diaphragm finger height	- new	37.5 - 32.1 mm
	- service limit	42.75 mm
Friction plate thickness	- new	7.4 - 6.9 mm
	- service limit	5.6 mm
Rivet depth	- new	1.00 mm
	- service limit	0.20 mm
Friction plate run-out	- new	0.80 mm
	- service limit	1.00 mm
Pressure plate warp	- service limit	0.15 mm

BRAKES

Type	Ventilated front & rear discs. Opposed piston alloy front calipers. Single piston sliding rear calipers.
Disc type	Cast iron, curved vane ventilated. Cross-drilled option.
Disc size - front & rear	288 mm
Operation	Tandem master cylinder
Parking brake	Cable operation of rear calipers, self adjusting for pad wear.

STEERING

Type	Rack and pinion
Turns, lock to lock	2.8
Gear ratio	15.8:1
Rack height plate	7 notch

FUEL CONSUMPTION

93/116/EC	- urban	10.1 l/100 km (28.0 mpg)
	- extra urban	6.2 l/100 km (45.6 mpg)
	- combined	7.7 l/100 km (36.7 mpg)
	- CO_2	183 g/km

CHASSIS

SECTION AG - ELISE 2001 M.Y. Onwards

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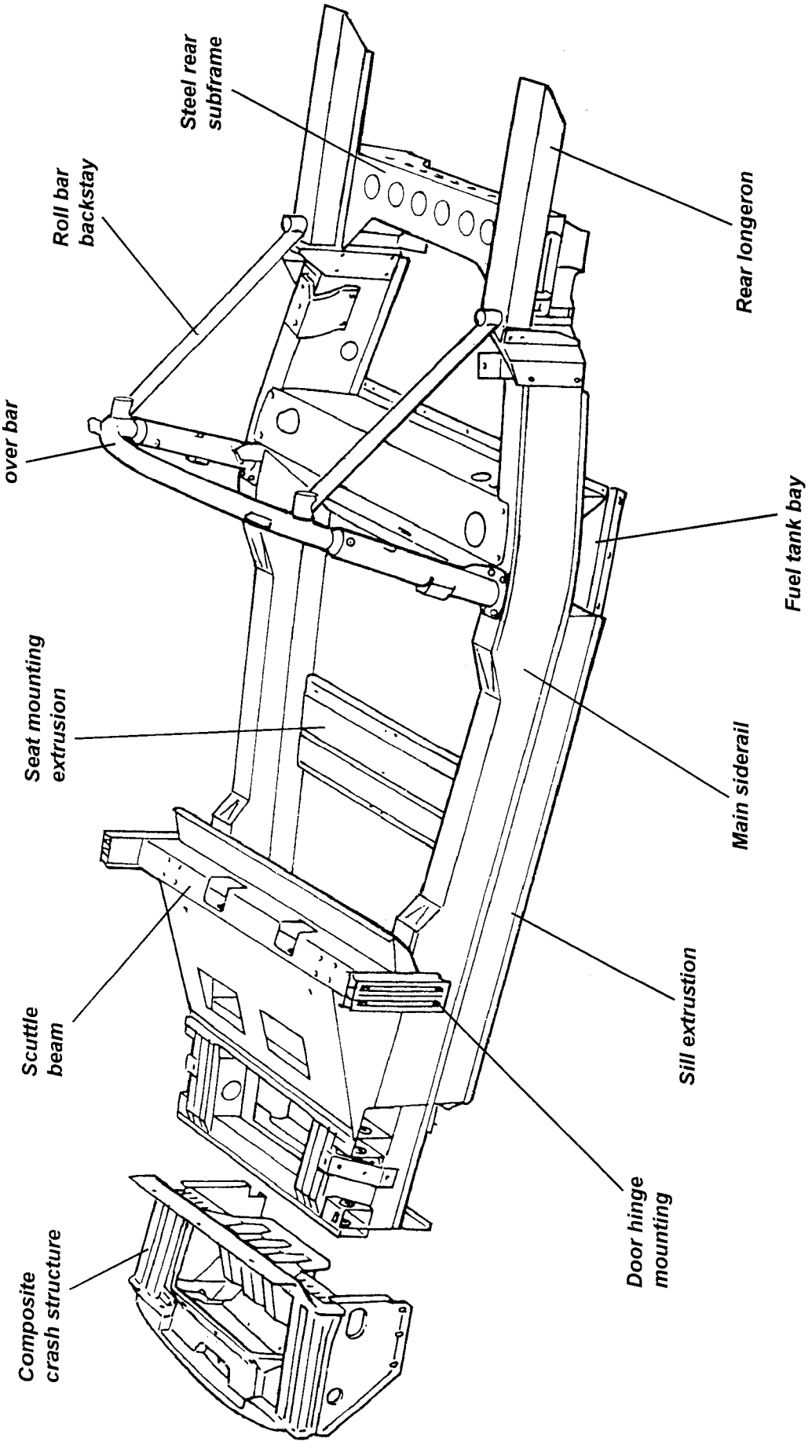
ELISE CHASSIS UNIT



AG.1 - GENERAL DESCRIPTION

The chassis frame of the Lotus Elise is constructed primarily from aluminium alloy extrusions and formed alloy sheet, with the various sections bonded together using an epoxy adhesive with secondary drive-in fasteners. The basic chassis unit includes the passenger cell, front suspension mountings, fuel tank housing, and mid mounted engine bay, with a fabricated sheet steel rear crossmember bolting to the rear of the engine bay to provide rear suspension mountings and rear body support, and a tubular steel roll over bar bolted to the top of the chassis structure for additional occupant protection. The cabin rear bulkhead, body sills (inc. 'B' posts), front energy absorbing crash structure and scuttle/windscreen mounting frame, are all constructed from glass fibre composite and are bonded to the chassis structure using an elastomeric adhesive. The front and rear body sections are each single piece composite mouldings, fixed to the chassis structure with threaded fasteners.

Two main chassis siderail extrusions, 210mm deep and 100mm wide, run along each side of the passenger compartment between the front and rear suspension mountings, splaying outwards towards the rear before curving inwards around the fuel tank bay and terminating at each side of the engine bay to provide platforms for the engine mountings. To enhance cockpit access, the height of the siderails is reduced in the door area, and internal reinforcement added in order to retain torsional rigidity.

Running along the underside of the siderails from the front suspension crossmember to the fuel tank bay are sill extrusions which carry the cockpit floor panel. The single skin floor panel is swaged for stiffness, and is reinforced by a ribbed transverse extrusion running across the inside of the tub, which also provides for the seat mountings. Behind the passenger cell, the siderails are linked by a pair of transverse crossmembers which are used to form an open bottomed fuel tank cell with a detachable, screw fixed, closing panel with swaged lightening holes. Note that this panel contributes to the structural integrity of the chassis, such that the vehicle should not be operated without it fitted.

The rear ends of the siderails are joined behind the engine bay by a galvanised sheet steel fabricated subframe which provides mountings for the rear suspension pivots, engine rear stabiliser and exhaust muffler. Onto each top side of the subframe is bonded and rivetted a box section extrunded alloy longeron, which extends rearwards to provide rear body support. Enhanced stiffness of the chassis rear section and additional occupant protection is provided by a tubular steel roll over bar which bolts to the top of the siderails alongside the fuel tank bay, with bracing struts running down to the rear ends of the siderails.

At the front of the passenger compartment, four transverse extrusion beams are used to provide mountings for the front suspension pivots, and house the steering rack, with an upright section used each side to anchor the top of the spring/damper unit. Five interlinked extruded floor sections are used to reinforce this area, with the open topped space between the front ends of the siderails housing the heater/a.c. unit and washer bottle. An extruded scuttle beam links the tops of the siderails, and is reinforced by a panel extending to the steering rack crossmember. These elements are used to mount the steering column and pedal box, with a vertical extrusion fixed to each end of the scuttle beam to carry the door hinge pillar.

To the front end of the chassis is bonded a glass fibre composite 'crash structure' which incorporates tubular sections designed to dissipate collision energy and control the rate of deceleration sustained by the occupants. Ducting and mountings for the horizontally positioned engine cooling radiator are also incorporated in this structure.

The bonded and rivetted alloy chassis structure described above is considered a non-serviceable jig built unit to which no structural repairs are approved. Superficial, cosmetic, or non-structural localised damage may be repaired as necessary, but in the case of accident damage resulting in significant bending, tearing or distortion of the aluminium chassis, such that the specified suspension geometry cannot be achieved by the standard range of suspension adjustment provided, the recommended repair is to renew the partial body assembly, which comprises the chassis and roll over bar together with jig bonded composite rear bulkhead, body sills, windscreen frame and crash structure, and the radiator feed and return pipes, heater pipes, battery cable and clutch pipe which are all routed within the sill panels.

AF.2 - CHASSIS STRAIGHTNESS CHECK

In the absence of visual damage, the chassis may be checked for twist or distortion by utilising the tooling holes in the underside of the main side rails. If computer processed laser measuring equipment is not available, manual checks can be made with reference to an accurately level ground plane, e.g. an accurately set and maintained suspension geometry ramp/lift. Position the car on the lift, and proceed as follows:

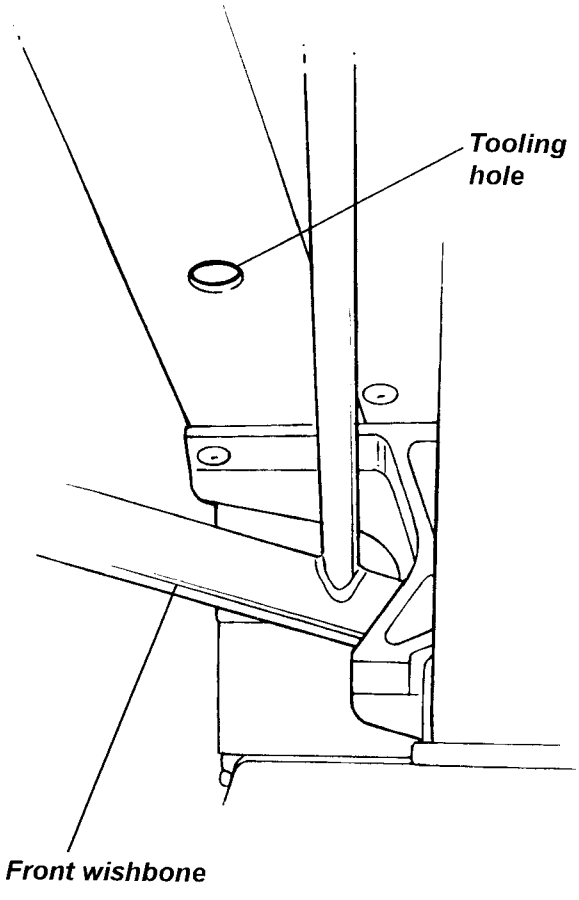
1. Identify the tooling holes in the lower surface of each chassis main side rail. At the front end, between the suspension wishbone pivots, and at the extreme rear end of each rail.

2. Measure the height of each tooling hole above the reference plane and use jacks to adjust the height of the chassis in order to equalise any three of these dimensions.

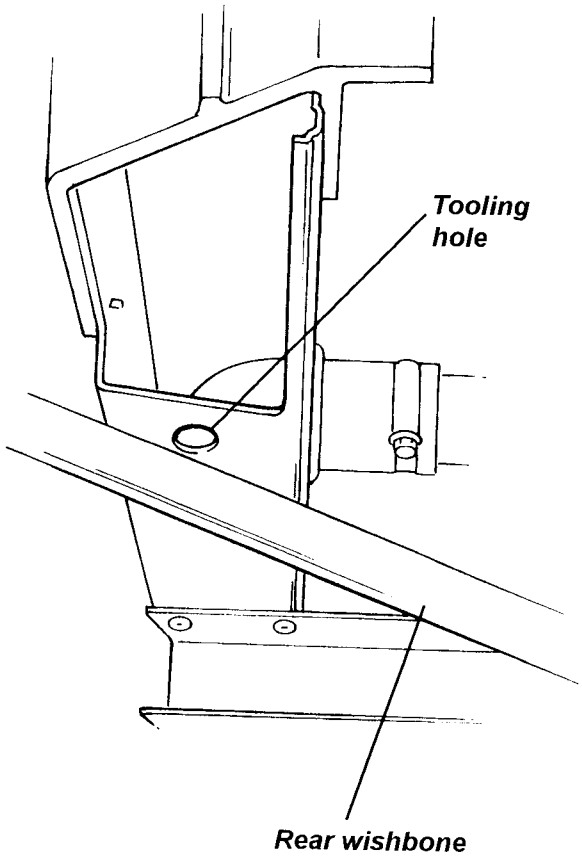
3. Measure the deviation of the fourth dimension from the other three.
   Maximum service deviation = ± 2.0 mm.

4. Repeat operations (2) and (3) for each combination of corners to result in four values for the 'fourth' dimension deviation. If any one of these exceeds the service specification, the chassis should be considered damaged and replaced by a partial body assembly.

FRONT



REAR



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AF.3 - REAR SUBFRAME & LONGERONS

The rear ends of the chassis siderails are linked by a fabricated sheet steel subframe which provides rear suspension mountings, and an anchor point for the engine rear steady bar. At each side, an extruded box section 'longeron' is rivetted and bonded to the top surface of the subframe, and extends rearwards to provide rear body support. A heat sheild is fixed between the longerons, to protect the clamshell bootbox from exhaust heat.

To remove rear subframe assy.

1. Remove the rear clamshell (see section BP).

2. Remove exhaust catalytic converter and muffler, drill out the rivets and remove the exhaust heatshield.

3. Disconnect the parking brake cables and rear brake hydraulics, and remove both rear suspension assemblies complete with driveshafts.

4. Release the engine rear steady arm from the subframe.

5. Release the roll over bar stays from the damper top mount tapping block, and remove the two bolts each side securing the subframe to the chassis flange. Withdraw the subframe and longerons as an assembly from the car.

Note that it is not generally possible to separate a rear longeron from the subframe without damage to one or both components. If a longeron is damaged but the subframe is to be re-used, the longeron must be cut from the subframe.

Fitting rear subframe

When bolting the subframe at each side to the chassis rail rear flange, ensure that the anti-corrosion shim plate is interposed. The lower fixing bolts should be inserted from the rear, and the upper bolts from the front. Torque tighten the bolts to 45 Nm.

If longerons are already fitted to the subframe, fit the rear damper mount tapping block to the chassis before fitting the subframe and after bolting up the subframe, secure the roll over bar stays using the M10 caphead screw and washer at each side to pass through the longeron and into the damper mount tapping block. Torque tighten to 45 Nm.

If no longerons are fitted to the subframe, fit the subframe to the chassis, and then fit the longerons to the subframe as follows:

Fitting rear longerons

1. Ensure that at each side, the top surface of the subframe is free of zinc flashing, including the outside top lip of the subframe. Dry fit the longeron to ensure that the channel in the extrusion fits onto the outside edge of the subframe, with the longeron lying flat on the subframe top surface. The damper mounting tapping blocks may be fitted before the longerons for easier access, or alternatively, to ease fitment of the longerons, the tapping blocks may be fitted afterwards by feeding down the inside of the longeron.

2. Clean the mating surfaces on the subframe and longeron using Betawipe VP 04604 (A082B6150V) as directed in section BO.

3. Prime the whole of the mating faces of the subframe and longeron with Betaprime 5404 (A082B6337V) as directed in section BO.

4. Apply a 'zig-zag' bead of Betaseal 1701 (A082B6281F) or Betamate E2400 (A082B8415V) to the primed surface of the subframe as detailed in section BO.

5. Hook the longeron over the edge of the subframe and onto the adhesive and slide fully forward until aligned with the rivet holes and roll over bar brace fixing hole in the tapping block. Insert three 6.4 mm (1/4") rivets each side to secure the longeron to the subframe. Fit the M10 caphead screw and washer to secure the roll over bar stay and longeron to the damper mounting tapping block.

6. Fit the exhaust heatshield and other components in reverse order to removal.