

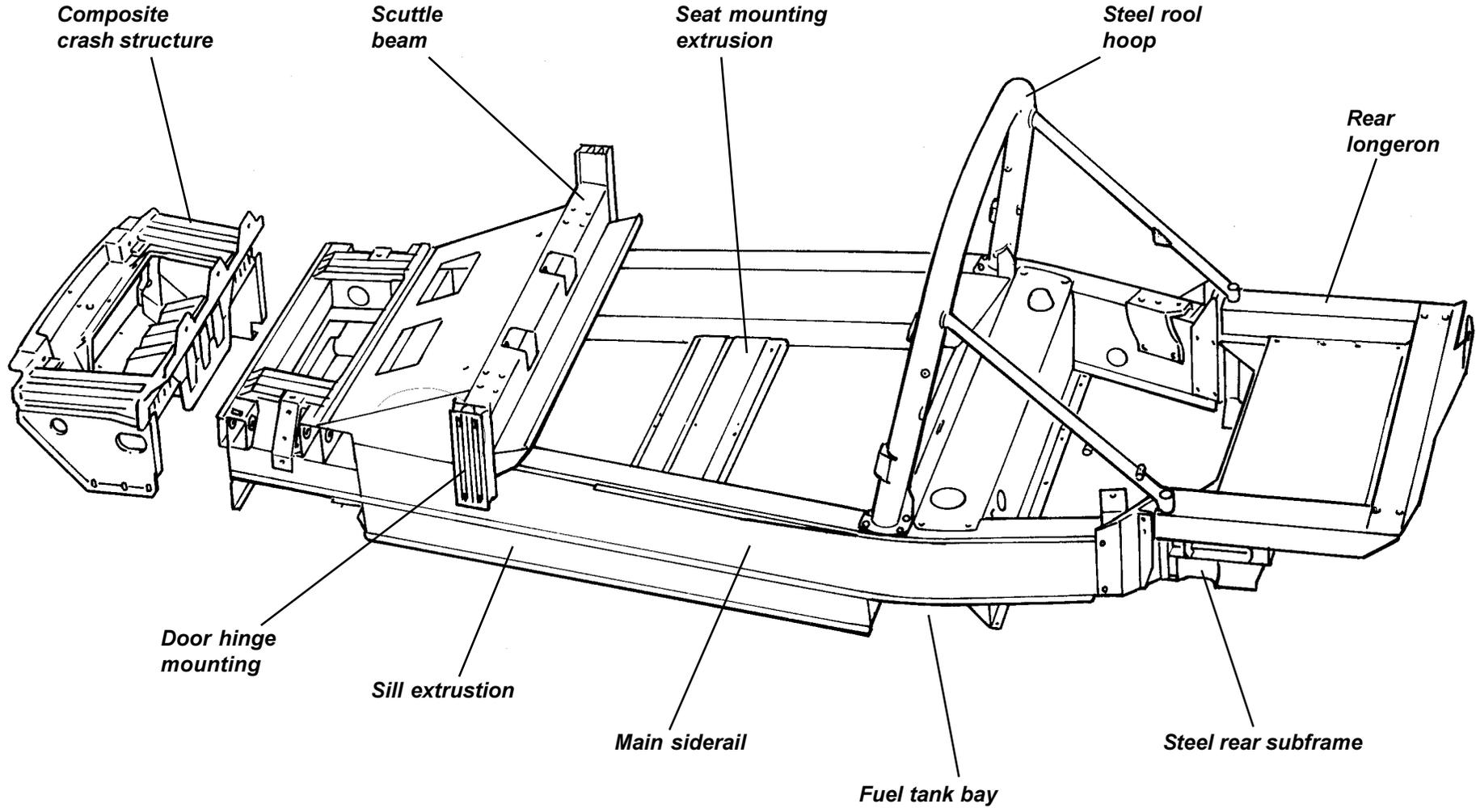


CHASSIS

SECTION AF - M111

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**ELISE CHASSIS UNIT**





## AF.1 - GENERAL DESCRIPTION

The chassis frame of the Lotus type M111 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. 'A' and '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 until the fuel tank crossmember behind the passenger cell. At this point, the siderails curve inwards around each side of the engine bay to provide platforms for the engine mountings. The passenger cell is further stiffened by sill extrusions secured beneath the siderails, with the flat floor panel reinforced with ribbed transverse channel sections running across the inside of the tub, which also provide seat mountings. At the rear of the passenger cell, an open bottomed crossmember uses a detachable, swaged, closing panel to house the steel fuel tank, with a further extruded crossmember joining the bottom of the siderails at the rear of the fuel tank bay, and providing pick up points for the front pivots of the rear lower wishbones. Note that the fuel tank bay closing panel contributes to the structural integrity of the chassis, such that the vehicle should not be operated without the panel fitted.

The rear ends of the siderails are joined behind the engine bay with 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 extruded 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 from each top corner of the bar 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. A extruded floor section is used to reinforce this area, with the space between the front ends of the siderails housing the heater unit and battery. An extruded scuttle beam links the tops of the siderails, mounts the steering column, and is reinforced by a panel joining this beam with the steering rack crossmember, the panel also serving to mount the pedal box. Each end of the scuttle beam carries a vertical extrusion to mount 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.

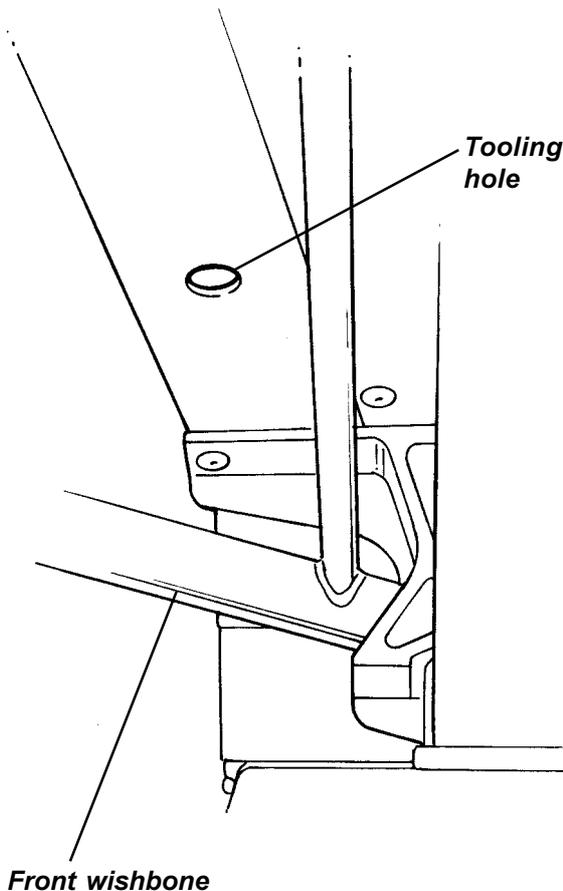


## AF.2 - CHASSIS STRAIGHTNESS CHECK

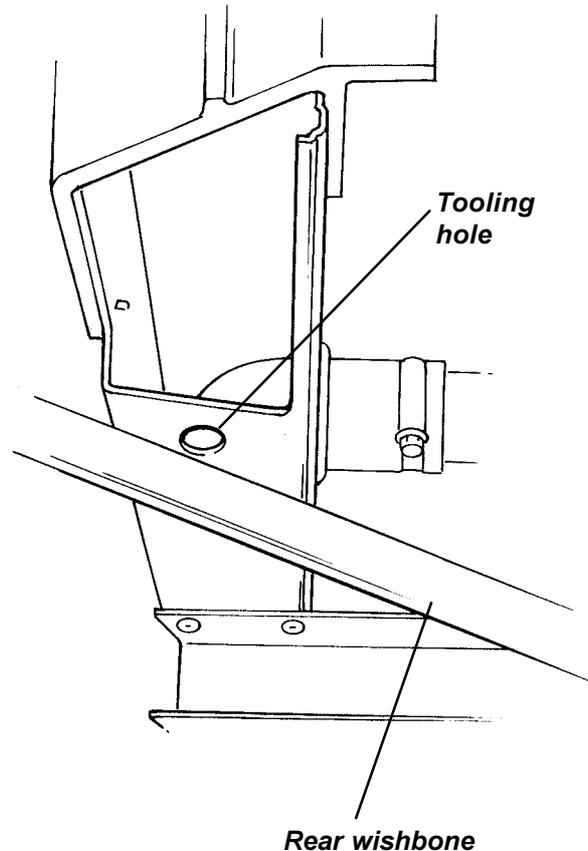
In the absence of visual damage, the chassis may be checked for twist or distortion by utilising the tooling holes in the underside of the main side rails. If computer processed laser measuring equipment is not available, manual checks can be made with reference to an accurately level ground plane, e.g. 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 =  $\pm 2.0$  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**





## 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. On cars built prior to September '98, an aluminium sheet floor is rivetted between the longerons, with a boot front bulkhead bolted to the front edge of the floor. On later cars, the floor panel and bulkhead are replaced by a 'boot box' moulded integrally with the rear clamshell.

### To remove rear subframe assy.

1. Remove the rear clamshell (see sub-section BN.5).
2. Remove exhaust catalytic converter and muffler, and if necessary, 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 electrical components mounting plate from the LH longeron.
5. Release the engine rear steady arm from the subframe.
6. 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, together with the floor panel on early cars.

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.

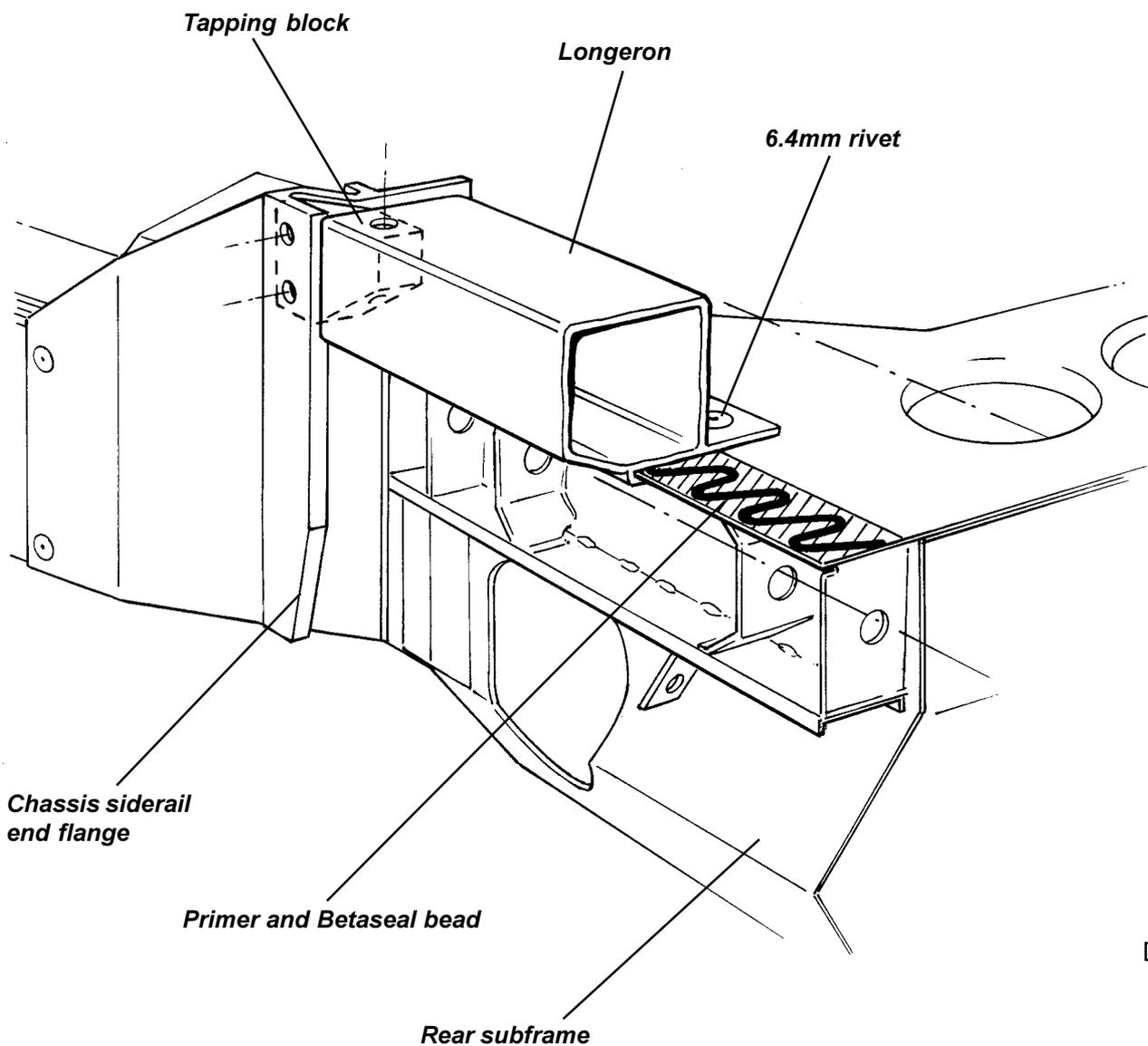
If no longerons are fitted to the subframe, fit the subframe to the chassis, and then fit the longerons to the subframe as follows:

### 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 sub-section BM.5.
3. Prime the whole of the mating faces of the subframe and longeron with Betaprime 5404 (A082B6337V) as directed in sub-section BM.5.
4. Apply a 'zig-zag' bead of Betaseal 1701 (A082B6281F) or Betamate E2400 (A082B8415V) to the primed surface of the subframe as detailed in sub-section BM.5.



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. If an aluminium boot floor is used (i.e. pre 'boot box'), fit the floor into position between the longerons before inserting the three 6.4 mm (1/4") rivets each side to secure the longeron (and boot floor if applicable) 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, electrical component plate and other components in reverse order to removal.



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