SAFETY

2.1. INTRODUCTION

Over the years Rallying has become an incredibly competitive sport, with a handful of seconds separating drivers over several miles of very demanding roads. The advent of racing tyres, compression strut and rose-jointed suspensions, fuel injection, and the like highlight the fact that drivers are scratching for the last few seconds of ultimate performance. In a word, present day rallying is a risky sport, and none of us wish to have to bemoan the injuries of fellow competitors. Besides, a driver will feel much more confident in his machine if he knows that everything has been done to protect him and his co-driver to the utmost. In this chapter, the legal safety requirements and, more specifically, the fitting of roll cages to works standard will be covered.

2.2. ROLL CAGES

The ultimate roll cage will, unfortunately, turn your four passenger touring car into strictly a two-seater with an interior boot, but it's worth the trouble and inconvenience. The full FIA cage consists of a hoop behind the driver, braced down to the inner rear wheel arches. All works drivers are in favour of the additional forward braces (now compulsory on International and many other events) which go from the transverse hoop forwards, and down the screen pillars to the floor, where they are mounted to the floor. Ironically enough, full roll cages are not compulsory on FIA run events for Group 1 cars, but those who saw photographs of Tony Fowkes' Mk II Escort after his accident on the 1977 Virgo Galaxy will realise that even an Escort with a full roll cage can end up looking like a 'bowl of porridge'! Besides, a proper roll cage will actually stiffen a unit constructed bodyshell by something like ten percent.

Making a roll bar is a very tricky job. It has to be a certain thickness (see table below), correctly measured up and designed to a stringent FIA pattern. In fact, we would discourage anyone from attempting to make their own - it's far easier to buy one from a reputable firm. Like a fire extinguisher, you hope you will never need to use it, but if you do, it pays to have the best.

FIA Minimum Thickness of Material Used in Bar Construction

	Closed Cars	
Groups 1-4	Up to 1200 kg	Over 1200 kg
Cold drawn seamless Carbon steel	38 mm 2.6 mm	48.3 mm outside dia. 2.6 mm thickness
	33.7 mm	
Alloy steel	2.3 mm	42.4 mm outside dia. 2.6 mm thickness

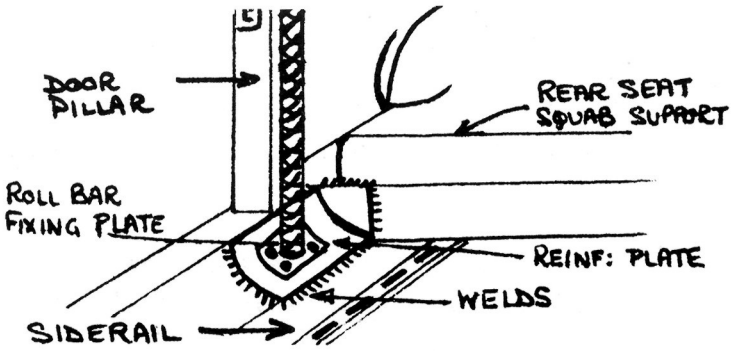
2.3. MK I ROLL CAGE

a) Even if you're working to a limited budget with a Clubbie car, it's worth spending a little more to have a complete cage - both for safety and strength. The F. A. V.O. Mk I marketed cage comes as either a rally (without diagonal, 9052295), race (with diagonal, 9052296) for the rear legs and hoop, and a complete front cage and top screen bar (9052297) including compulsory mounting plates and hardware.

Always assemble the complete cage inside the car before drilling all the bolt holes. The attachment points to the chassis are very important and these should be reinforced with steel plate of at least 2mm 1/8" thick and have a total surface area of at least 35 sq. cm. This is the smallest plate area permitted under the FIA regulations as in the FIA yellow book, but of course you can have more.

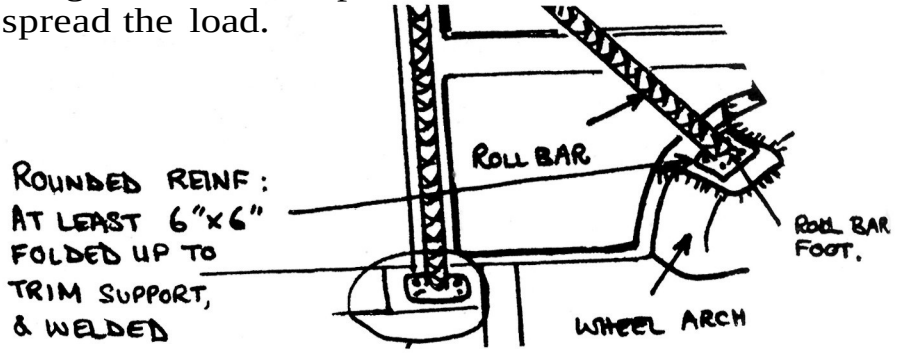
With the help of the following sketches, we will describe how Boreham attach the roll cage to the car.

The main hoop must have at least three bolts of a minimum 8mm. Four bolts is a better bet.



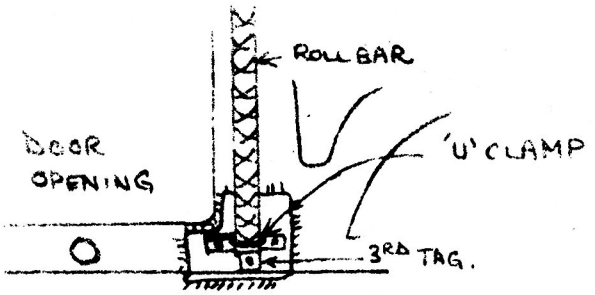
b) Rear Leg Fixing

Where the rear support bars run onto the wheel arch, the material is very thin (20 gauge) so a reinforcing plate should be very carefully cut and fitted as per the diagram. Again 2mm 1/8" plate should be welded to the wheel arch, which will spread the load.



c) Screen Pillar Fixing

A screen tweak is to attach the front legs of the roll cage to the screen pillars to give even more support. Weld a 1" tag to the roll cage hoop at a convenient spot between the top and the base of the screen pillars. Opposite this weld is a 5/16" UNC nut to a 1" x 2" x 1/8" plate, invited inside the pillar and the bar is then bolted direct to the pillar.



d) Front Leg Fixing

The attachment of the front legs of the cage is really an extension of the main hoop theme. The base of the front leg should be attached to a stiffening plate of the same area dimensions as the main hoop plate. Again, three bolts are used.

2.4. MK II ROLL CAGE

There's little difference in the safety preparation of the Escort II over the Escort I, except for the availability of a very special roll cage, which mounts via 14 attachment points.

The standard Mk II roll cage is a Safety Devices item, with a removable diagonal, available through RS dealers, under finis code No's:

9052788 (rear)

9052787 (front)

9052652 (cage sleeving kit)

The 14 point roll cage is available directly from Safety Devices in either Group I or Group II - Group IV form, the difference being in the rear wheel arch mounting points.

This roll cage should be fitted by Safety Devices themselves, and carries its own integral navigator's foot rest which bolts onto the side of the transmission tunnel. Incidentally, the Group I cage comes with its own Group I homologation certificate.

Boreham fit the bars as follows:

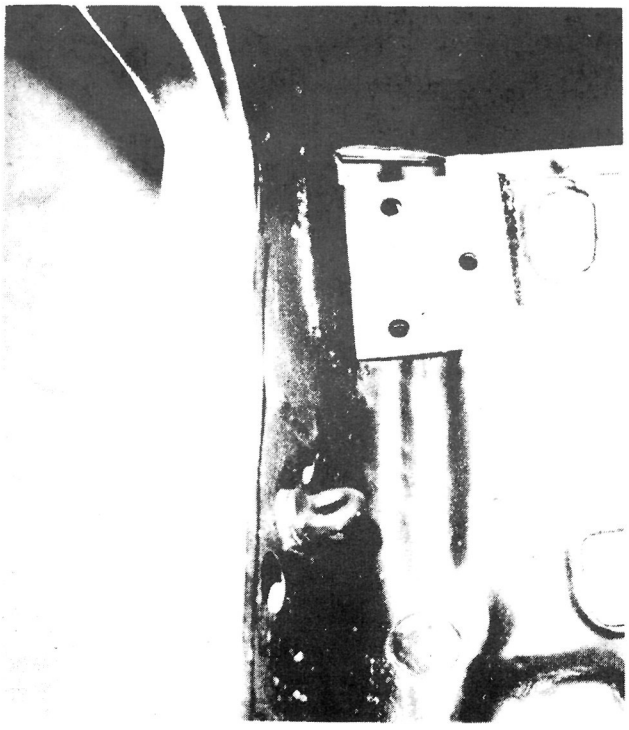
The standard main hoop floor mounts, using 3 bolts and backing foot plate properly welded to the floor take the main loads. Remember to mount the bar direct to floor - don't run the carpet, if fitted, between them.

The rear arms are fed directly into the top of the rear arches and turret top. A special 'L' bracket laid across the arch and drilled through the foot sits adjacent to a triangulation plate, also drilled, welded along the arch top. The bar sits neatly between the two with solid bolt mounting through the two holes. This means that in the event of a roll, all the stresses are fed into a very strong part of the shell.

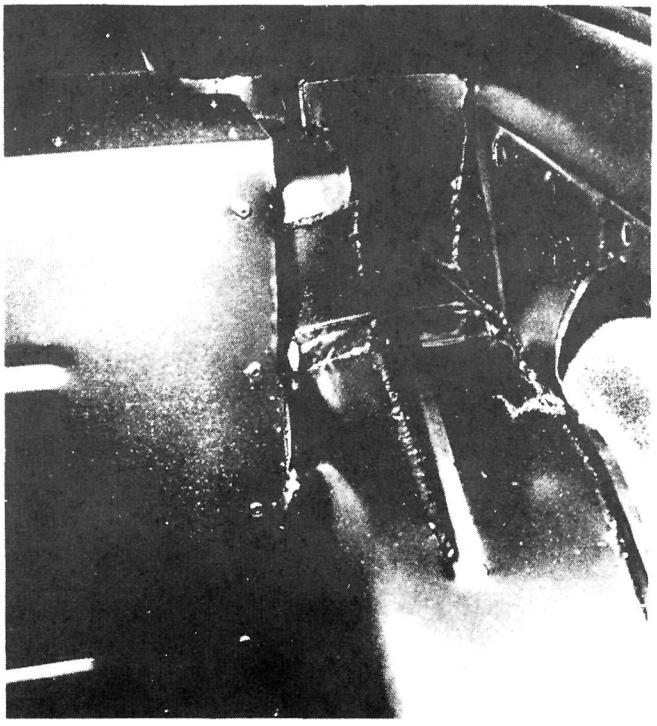
With the exception of the front feet, which mount, via a metal plate, welded to the floor (as the main hoop) and bolted down, the remaining mounts involve tags being welded to the cage and bolted to the body sides. In order to accept the bolts there obviously has to be a threaded plate or captive nut arrangement attached to the shell. What Boreham do is to weld 1"x2"x3/16" ready threaded plates to the body in the following places:

1. On inside roof perimeter panel 3" behind 'B' pillar above rear side window.
2. On 'B' pillar adjacent to bottom front corner of rear side window (to take main hoop).
3. On inside roof panel, 6" behind screen opening, above doors.
4. On front corner of dash board (to take front hoop).

These points will give 14 mounts in all, and will give you a good strong shell, as well as making it as safe as possible.



Base plate for main hoop, roll bar.



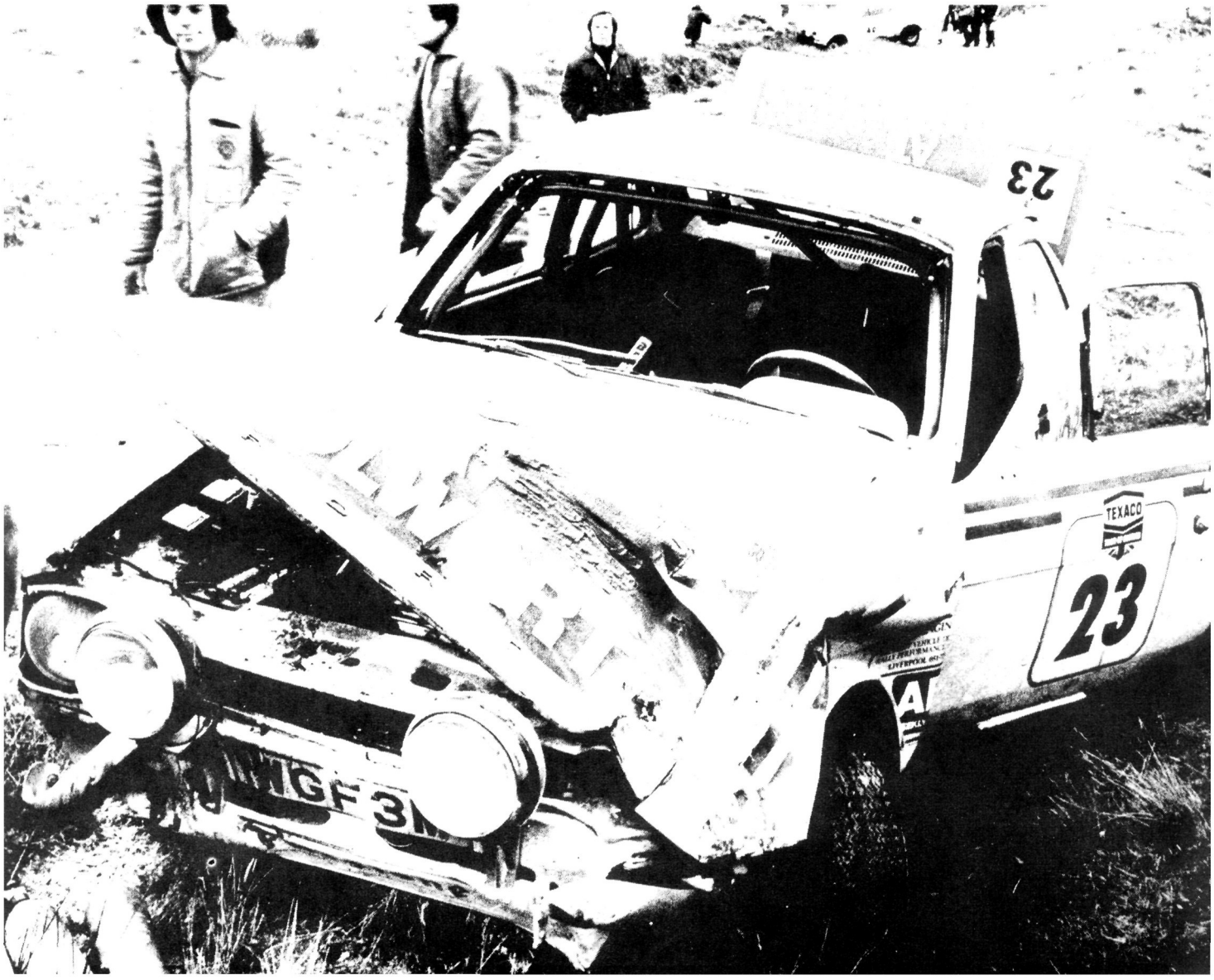
Mount for rear arm of roll bar on big tank Safari car.

2.5 FINISHING OFF

A navigator's grab handle can be fixed to the front roll cage, and for this a standard Capri plastic handle is quite adequate and readily obtainable from any Ford dealer.

2.6. ROLL BAR PADDING

You might note that there is a proper 'works' thick rubber padding kit for the Escort II roll cage. Finis code no is 9052652. It looks neat, and could save some angry utterances, alternatively, cover the roll cage with plumbers' central heating pipe lagging foam tube, which is the cheapest and neatest material you can get. It is also available in a variety of sizes; if you obtain a piece that is one size under the roll cage tube, it will fit tightly. Don't forget that the inspection holes for the scrutineers, one in each section of tube, must be visible, as must the makers specification label.



The end of the road for Inurietta's Mk.1 Escort in 1976. Note how roll cage has helped keep the crew compartment in tact.

2. 7. BACK BULKHEAD FIRE PROOFING

Regulations for any stage event demand the fitting of a fireproof bulkhead. As well as being a sensible requirement, the bulkhead also adds strength to the back of the body shell.

The easy and cheap way out is to retain the existing sheet metal panel, covering all holes with 18 gauge aluminium or sheet steel, sealing the whole bulkhead with glass-fibre and fire-proof resin. If you do this, remember to fill the gap between the outside of the wheel arch and the outer wings with glass-fibre.

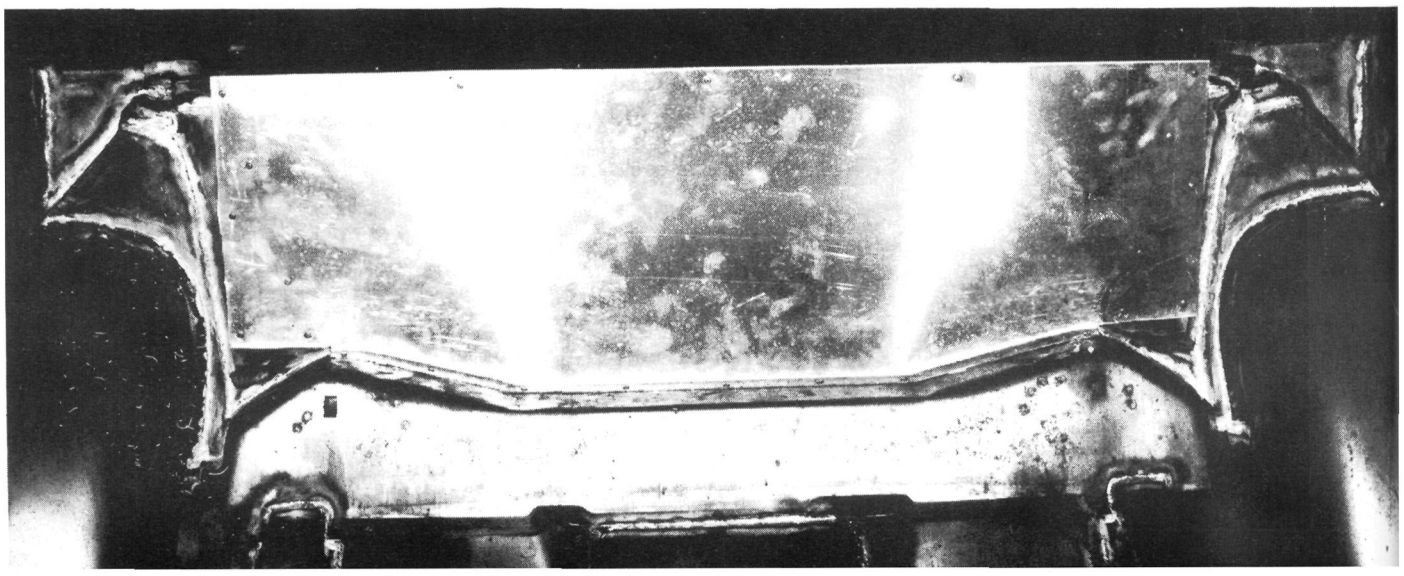
In the case of a full house Escort with 4 link axle and turrets, it is best to redesign the bulkhead, especially if you are fitting an alloy fuel tank.

The sides of the bulkhead, between the fuel tank and the inner wheel arches, should be made into a box section encircling the turrets, and thereby giving that area of the body shell some welcome extra strength, particularly in the case of the Mk II body shells.

You should then make up a sheet of 18 gauge soft dural, and fix it to the box sections and the parcel shelf with either Advel rivets (Aircraft), or an aircraft quality pop rivet at least 1/8" diameter. Again, once it's in place, remember the gap between the inner and outer wheel arches. The bulkhead is designed to prevent fuel entering the cockpit at all costs. Then the lot: wheel arches, diaphragm and ventilation system must be sealed around with petrol proof substance, usually fibre glass.

Ford RS Parts can supply a cut to size bulkhead kit complete. Finis code numbers are:

Mkl		Mk II	
Rear parcel shelf	9051812	Rear bulkhead	9052811
Rear seat bulkhead	9051811	Rear wing RH	9052812
		" " LH	9052813



Fully fireproofed bulkhead on Mk 2 Escort from inside cockpit, before painting.