

# BODY SHELL

If you look carefully through the current FIA Year Book, you'll see that now "Any kind of reinforcement is authorised" for Gp 2 and 4 (Art 261 - v), so what has been written before about not doing 'this and that' for Gp 2 no longer applies. Strengthening for Gp 1 is still not permitted, however.

If you intend building a Gp 2 car it is important that you read the FIA rules correctly as, for example, although body shell strengthening is free, you are not able to use turret kits and slipper type rear springs as you can on a Gp 4 car.

This is mentioned at the start of this chapter because it does clarify that body strengthening, essential if you're going stage rallying in an Escort, is now legal. Assuming you're starting with a basic Escort shell, what are the first things to do?

## 1.1. FIRST PRIORITY

Number one essential is to bring the car up to heavy duty (h/d) specification, as standard on RS produced vehicles. This beefs-up the front end and eliminates any weak spots on the strut mounts.

Part numbers and welding instructions are as follows:

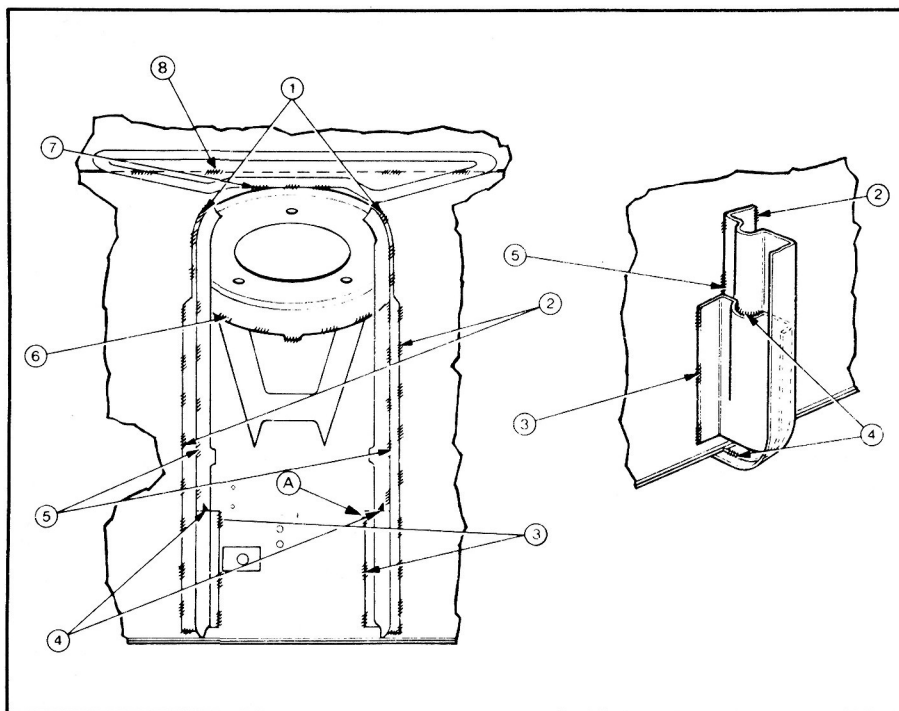
The parts, with finis code numbers for the Mk I Escort are:

Front Apron Reinforcement	R 1421040
" " "	L 1421041
Front Unit Stay "	R 1421038 (2 off)
" " " "	L 1421039 (2 off)
Upper Suspension "	R 1421044
" " "	L 1421045

In the case of the Mk II Escort, reinforcements are not as such specifically available, however, you can use the Mk I reinforcement panels as listed above, although this will only be necessary in the case of Standard Popular, 1100 or 1300cc body shells, since all Mk II Sport/Mexico and RS2000 shells have these reinforcements fitted as standard.

Below is a sketch with fitting and welding details:

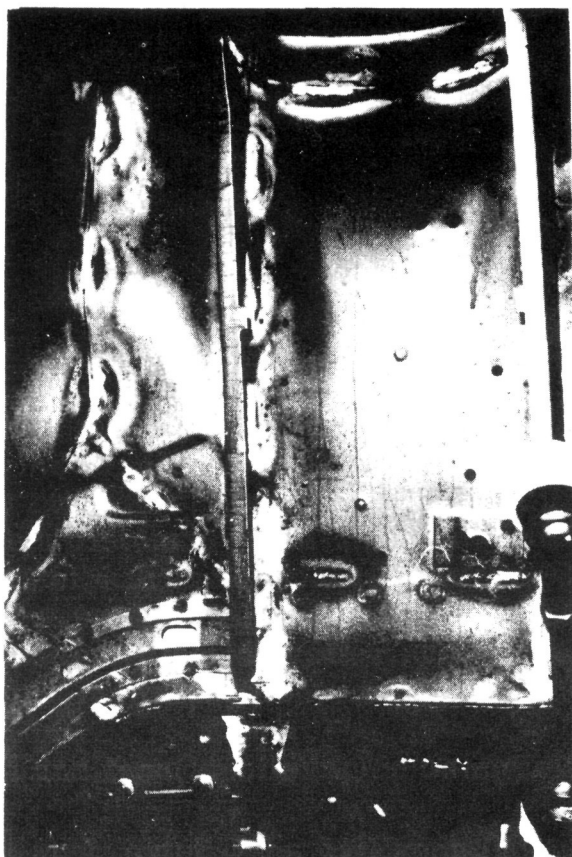
1. Six tack welds on suspension mounting plate supports to inner fender panel.
2. Tack welds.
3. Six tack welds on reinforcement angle to inner fender panel.
4. Four tack welds on reinforcement angles to support.
5. Ten tack welds on supports to inner fender panel.
6. Five tack welds on suspension mounting plate to fender stiffener panel.
7. Three tack welds on suspension mounting plate to fender stiffener panel to inner fender panel.



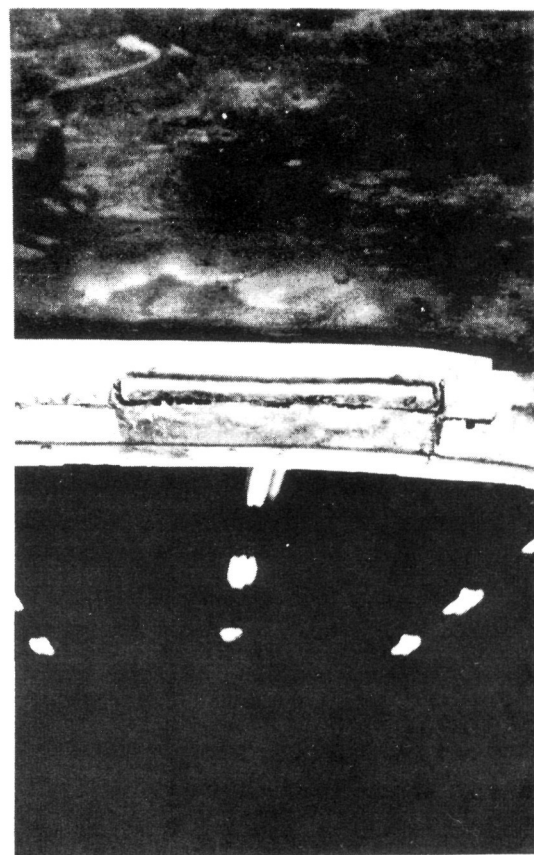
The h/d front end will take a great deal of the strain of rally use, but for stage driving and to extend shell life, you've got to go quite a bit further. A shell, prepared to works rally standard, will take quite a few hours work purely on strengthening. Here's what is involved: either nickel bronze or braze all the seams on the body with  $\frac{1}{2}$ " long tacks at  $1\frac{1}{2}$ " intervals. Remember the regular intervals though: there must be some flex left otherwise the body will shake itself silly. Next the glass opening seams - especially around the windscreen - again  $\frac{1}{2}$ " tacks all round. Fill in all the paint drain holes on the floor; either brazing a small plate, or stick down alloy washers with a good quality adhesive (Evostick or Bostick will do). The dashboard belt rail also needs attention from the brass where the corners meet the screen pillars, and along its length where it joins the bulkhead. Here regular  $\frac{1}{2}$ " long welds should be made and the bulkhead rolled over to ensure freedom at the back of the cam cover when ohc engines are used.



Works shell at Boreham awaiting painting.

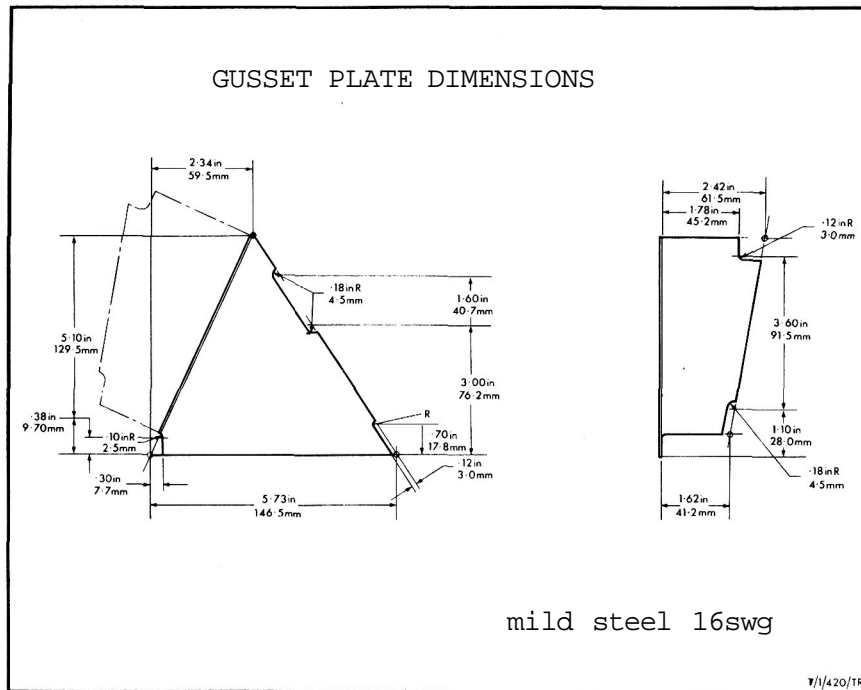


Outer wheel arch, front, on works car. Note extra welds where wheel arch meets inner wing panel, and sumpguard mounting bracket.



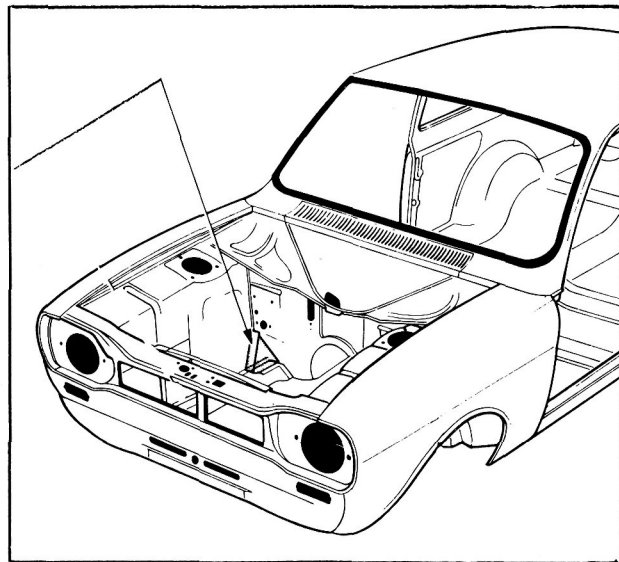
Body welding for grab handle bracket (see end of this chapter).

In addition, because everything is now so solid on the shell, a gusset plate for strengthening a known weak spot - where the side rails and base of bulk-head meet - can be made up. Exact size and measurements are shown below:



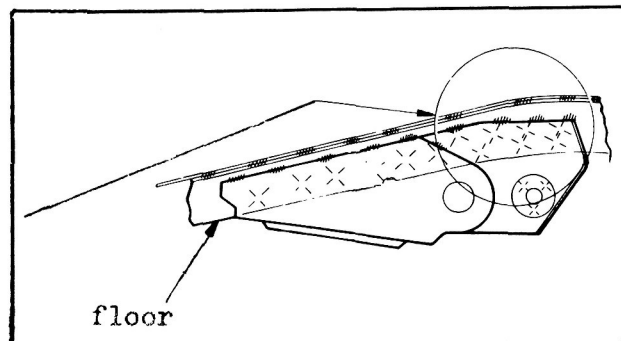
#### Gusset Plate fixing position

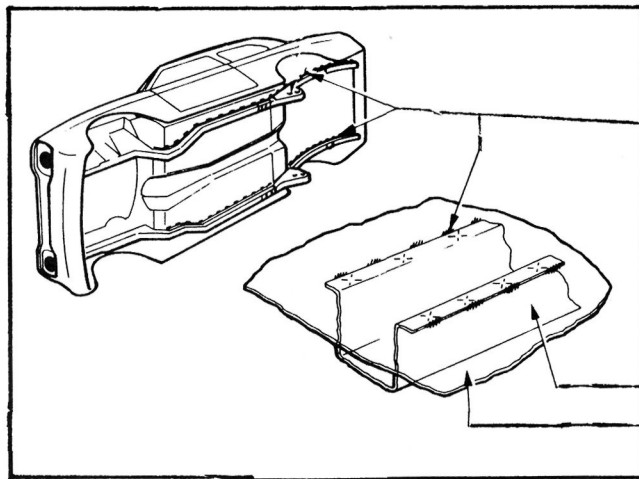
½" tack welds as shown fixing gusset plate to body shell, both sides of shell



#### Front Spring Hanger Bracket

welds in circle on outboard side of stiffener only

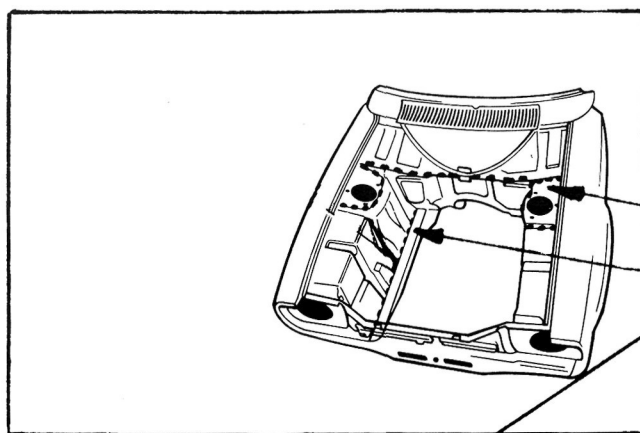




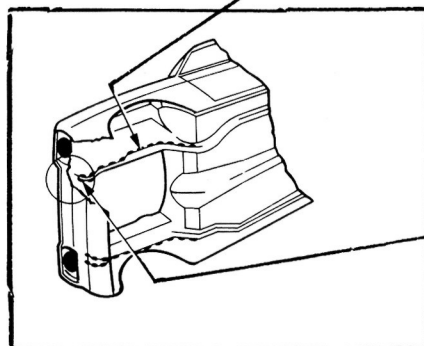
$\frac{1}{2}$ " tack welds,  $1\frac{1}{2}$ " apart  
on both flanges of the  
longitudinal stiffeners

longitudinal stiffener  
(chassis rail)

floor pan



$\frac{1}{2}$ " welds extending along  
this area, also on strut  
mounts and belt rail



welds in circle as above  
for long. stiffener -  
also weld to body lower  
front panel and inner  
face of stiffener.

At the back of the car, testing has shown that after rough road use, the rear arches have a nasty tendency of revealing The Queen's Highway from the inside compartment. For serious work, a rear turret kit must be fitted. This both strengthens the rear end and improves the handling.

The standard Escort I, with rear sub-frame, mounts the dampers at 45°. The so called 'pull-ahead' rear dampers, as fitted to all Mk II Escorts, but also on the late (post Nov '73) Mk I's, were at 15°, without a sub-frame. Although the 15° inclination is a great improvement, a turret kit is still necessary for serious work and with engines giving more than 180 bhp you won't get all the power down unless you have upright dampers. The inside of the wheel arch must be cut away, so the job is really for a skilled cutter/welder. The kit is available through RS Dealers (finis code 905 1643) and, of course, longer dampers have to be fitted. For more details on this kit, see rear suspension chapter.

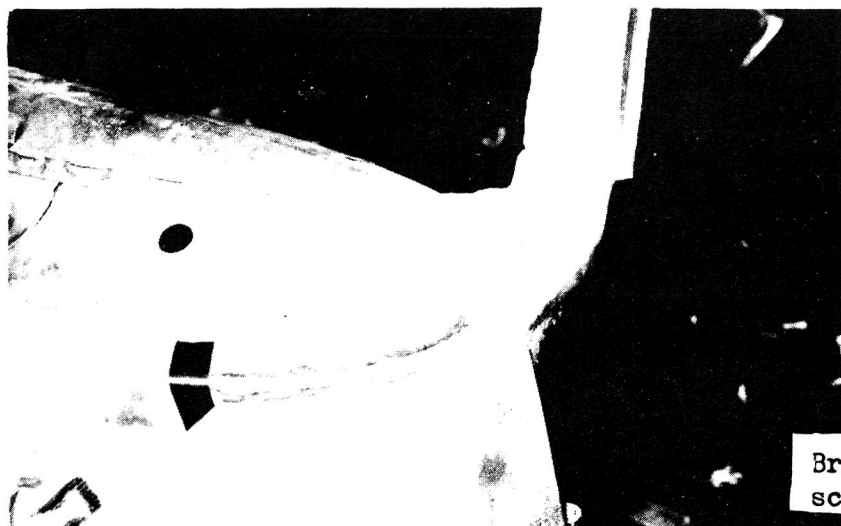
## 1.2. SEAM WELDING

With the freedom of new Gp 4 regs, there's quite a bit you can do to the basic Mk II shell. The same jobs as on the Mk I should be carried out to bring the shell up to h/d spec unless it's a new Mexico, RS1800 or RS2000 shell.

After a lot of stage pounding, one of the places on the shell that starts to go is the base of screen pillars. First of all the paint will start to break up, and then a slight kink will appear - mind you, there are many who say that a shell hasn't settled until these points are visible!

On the Mk II's, the top of the screen pillars also tend to kink (probably more than Mk I's).

One way to get over this is to beef up the whole area by either braze filling the gap between outer wing and screen base panel, or it has been known for club cars to have the area double skinned with the whole lot smoothed over with some body filler and painted. At the top an extra careful bit of welding where pillar meets the roof panel is called for. From the photo, you should be able to see some of the tack welding around the windscreen opening.

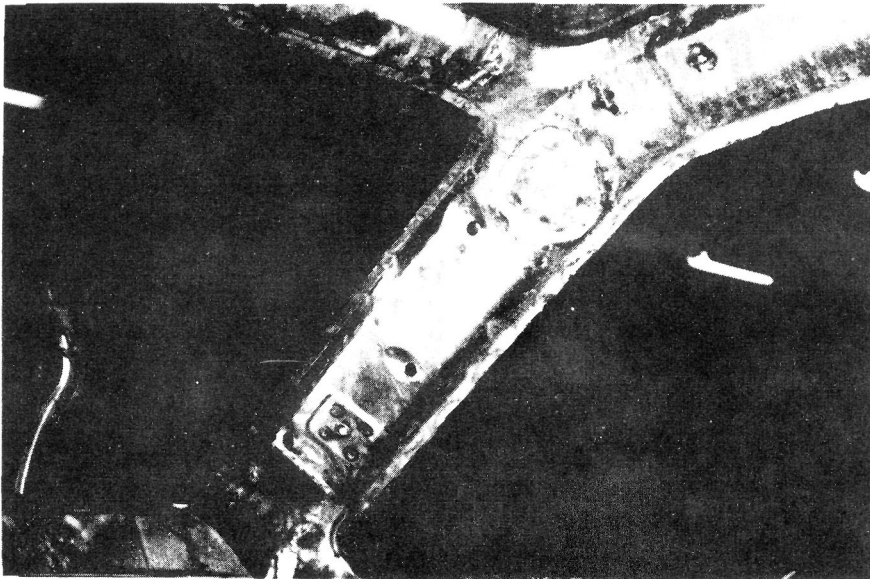


Braze filling of the  
screen base/wing joint

Another area on the Mk II's worth a tack weld is on the front wheel arch where the foot well meets the inside wing.

### 1.3. INSIDE ROOF

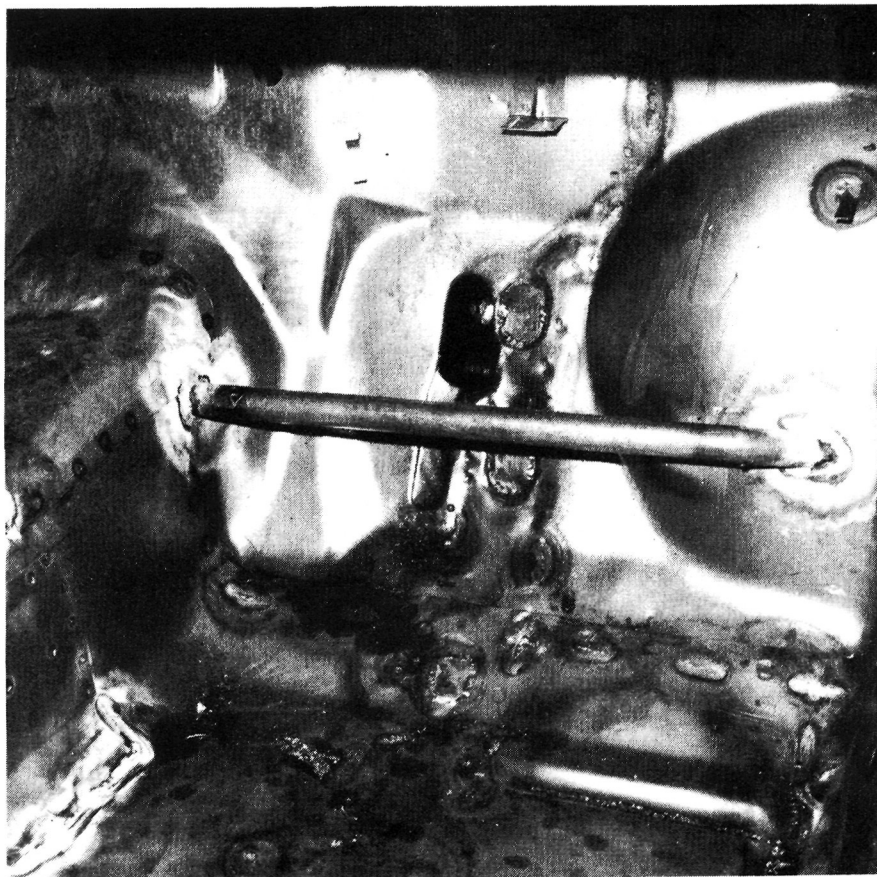
If you're being really serious there are one or two tips to pass on about what can be done if the car headlining is removed: At the back, the through-flow vent holes inside the top of the rear screen pillars can be blanked off with a circular plate brazed in place. At the base of these pillars, the other vent slots can also be blanked off. The central bracing across the roof should be brazed to the inside roof perimeter panel, but not necessarily to the roof itself. As another tweak, a strip of 2½" wide 16 swg can be bent into roughly an 'L' shape and brazed to the inside length above the door openings from central brace to screen pillars with the 'foot' of the 'L' just touching the roof. The tack welds should be along the inner roof perimeter panel at approx 1½" intervals. It's also a good idea to weld up all the overlapping joints on this perimeter panel for even more strength.



Brazing on inside  
'C'pillar

### 1.4. NAVIGATOR'S FOOT REST

As well as being a neat extra for the comfort of the other side of your rallying partnership, a good foot brace, properly welded to the floor can add strength to the shell. The photo shows a typical Boreham rest, made from 1/16th mild steel tube. Diameter is not critical, 1½"-2½" is ideal though. Note from the photograph that the wheel arch end of the tube lies almost flush with the arch face.



Positioning of navigators footrest tube - LHD

#### 1. 5. WHEELARCH EXTENSIONS - MK I

Now a topic where you can see the results of your toils actually make the car look different, and many people do fit arches purely for looks. If you want to run with anything wider than 6" rims, arches are essential to clear the bodywork, and if you do use 6" rims with standard arches, you will have to go to low profile tyres. Even then it may be necessary to squash back the inside flange of the rear arches, as factory tolerances usually mean the axle is slightly off-set from centre from new, and the tyres will just foul, especially if rear seat passengers are carried.

Arches are also necessary to house the h/d 'Atlas' axle, (although not the RS2000 GP I 'Narrow Atlas')

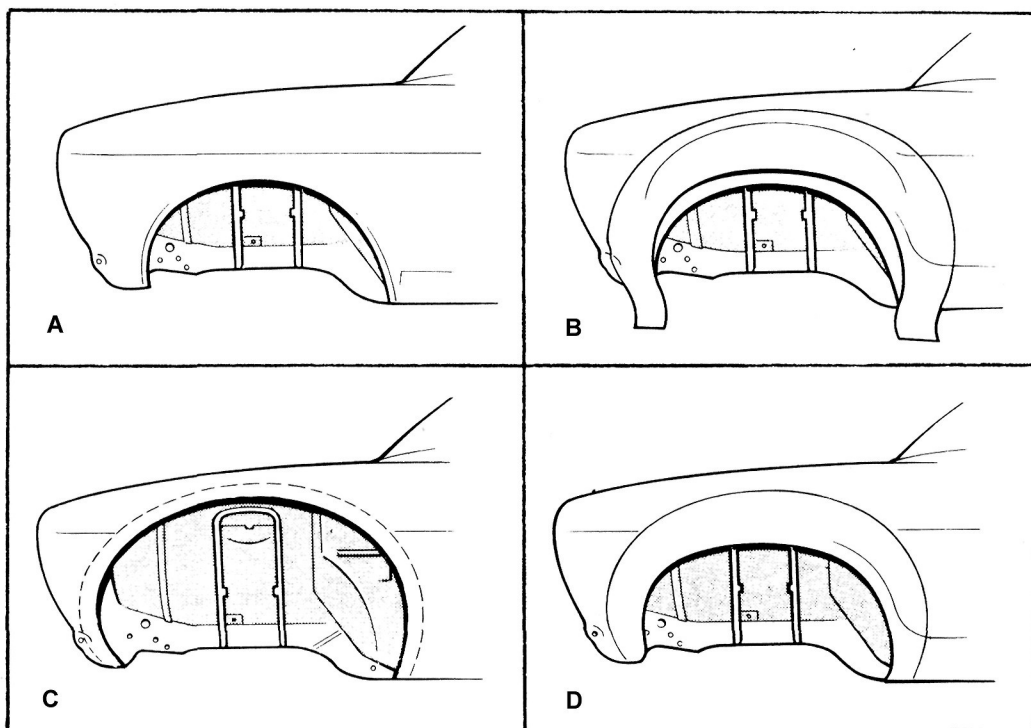
The Mk I arches are made in steel, finis code no 905 1699, and are designed to mate up with Mk I existing body lines. Boreham did use alloy arches which, although weight saving, were not offered as an RS Part. Arches can be attached either inside or outside the shell, and should be trimmed to leave a smooth 1½" lip for shell fixing.



### a) Front Fixings

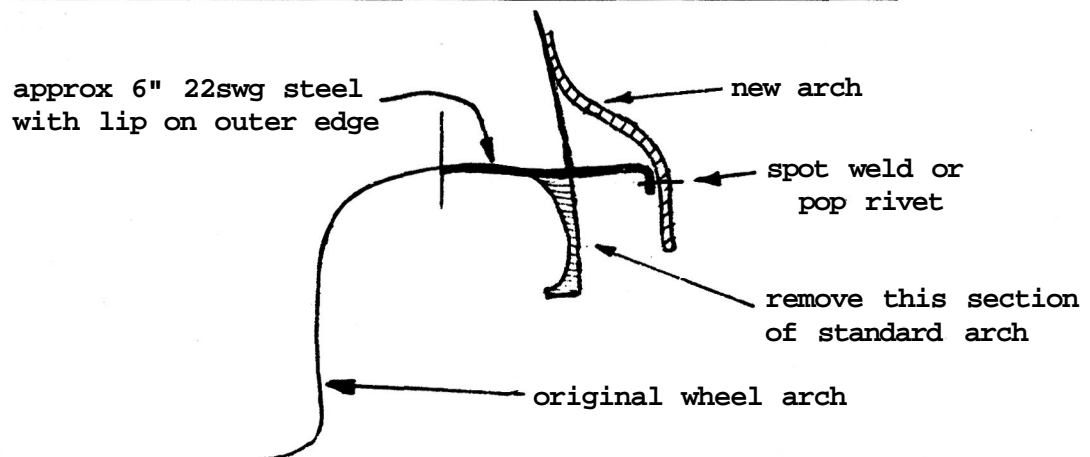
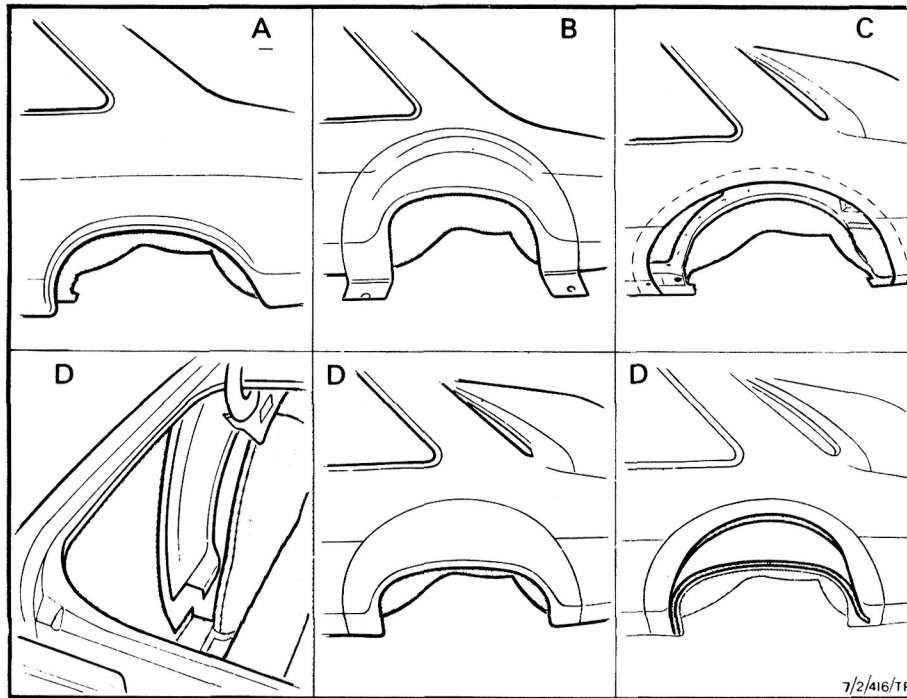
When you have trimmed the new arch, offer it up to the body, marking on the body around the extreme edge. Make sure it is spot on; there's no going back after the next stage. At the front the standard wing should be cut away  $1\frac{1}{2}$ " below the mark you've made. If you're using steel arches, they can then be spot welded, brazed or gas welded with  $\frac{1}{2}$ " tacks. Alloy arches should be pop-riveted and glued - remember to use plenty of rivets.

After cutting, clean off all the ragged edges and blend the arch into the bodywork with filler. This is a longer job than you think but do it properly, and you won't detect the join at all.



### b) Rear Fixings

The rear arches are a bit more aggro'. This time, the inner arch has to be cut, as well as the outside of the shell, and then extended out at  $90^\circ$  to the body for about 6". A piece of 22 gauge sheet steel should be used for this, and remember it tapers at front and rear the nearer it gets to the vertical. Once you've made this, which comes as part of the RS Parts kit, the arch can be offered up in the same way as the front ( $1\frac{1}{2}$ " clearance) and cut the body away. Your new inside arch should be lipped and riveted/welded to the new outer arch. Again, clean off, fill and paint.



## 1.6. WHEEL ARCH EXTENSIONS - MK II

Mk II arches provide more simple attachment than Mk I's, being manufactured in glass fibre and simply bolted to the body. You still have to cut away to within 1½" of a scribed fixing line of the arches, and the rear arch still requires a distance piece inserted - just as the Mk I's. RS Parts produce a kit of 4 arches, under finis code no 905 2880. Fixing bolts will have to be obtained separately. To preserve the life of the rear arches, a rubber protection gaiter can be bolted to the lower leading edge on each side. Any thick rubber will do.

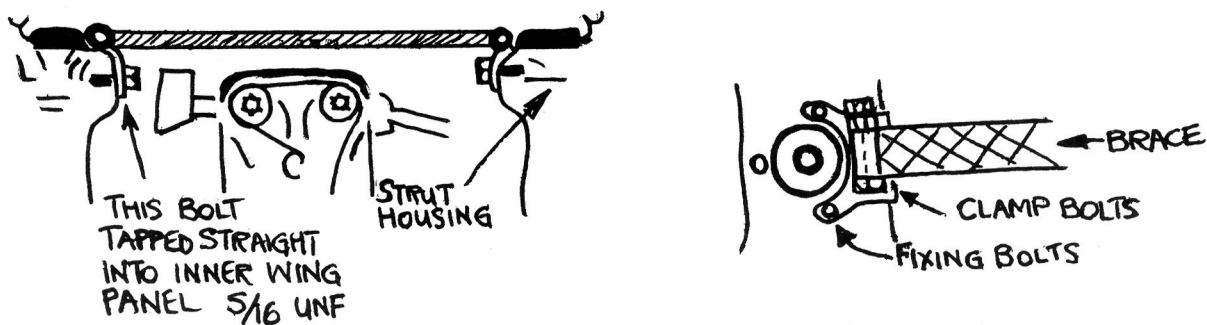
Aluminium arches and front spoilers are being used on the works cars.

Rubber type wheel arch extensions will soon be available from Ford Performance Parts, which will cure the stone damage problem on the existing rear wheel arches.

## 1.7. STRUT BRACE

This is a very useful piece of chassis strengthening as it adds support to the inner wing panels and spreads the shock loads from the front suspension. It is, of course, only suitable for use with engines which have side mounted carbs or a side mounted air cleaner.

The brace literally sits between the two turret housings. Its mounts use the two side locating bolts for the top of the strut with an additional 5/16" bolt mounted into the side of the inner wing.



The bar itself is obtained as a complete kit (Code No 905 0562) or can be made up. If you decide to make one, use 12/14 gauge tube x 1" seamless cold drawn steel. Make sure it is under NO tension when you fit it, and don't use any rubber bushes; these will allow the bar to move and do virtually nothing. One useful effect of fitting the bar is that you can even hang the engine from it, should the cross member have to come out.

To give you an idea of the extra strength a turret brace will give the front end, Competitions Department don't usually bother to fit one for UK forest or tarmac events - they make the car unnecessarily stiff.

Incidentally, if you use the RS bar on a Mk II shell, it is advisable to weld two mounting tubes at the ends of the bar underneath the existing tubes, to effectively increase clearance between engine and brace bar, alternatively, you can make your own brackets as shown in the photo'.



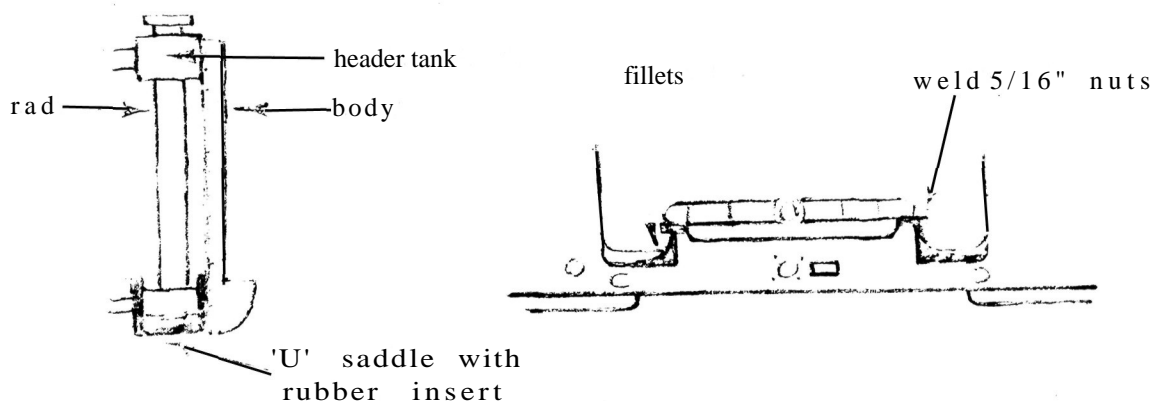
Strut brace fitted to works shell. Note simplicity, with mounting bracket in front of strut mount.

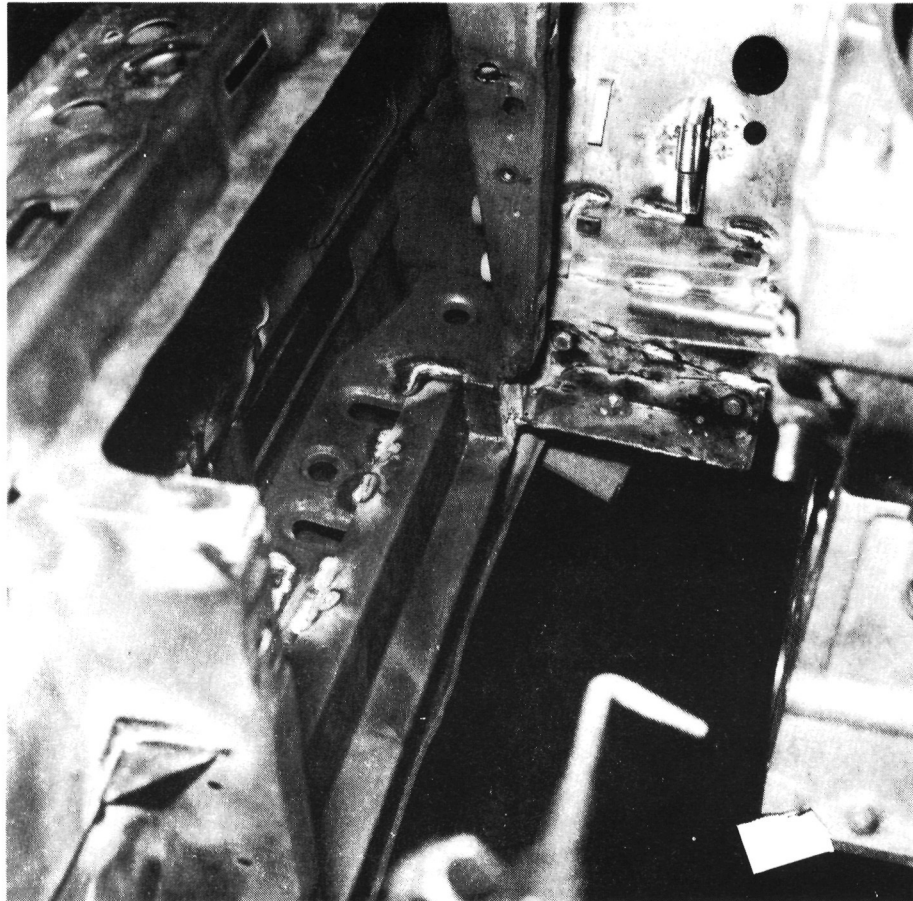
## 1.8. STRENGTHENED RADIATOR MOUNTS

At the front end, the radiator supports take a hell of a bashing on rough events - so here are a few tips.

At the top of the rad, brazing 2 small fillets, one either side, will triangulate the top support and add a great deal of strength. A 'U' section support underneath lined with soft rubber can be brazed or welded across the body to give even more support - remember not to try and weld with the rubber insert in position:

Another tweak is to sling out the 4 self tapping bolts which actually locate the rad and replace them with 5/16 UNC bolts with the nuts welded onto the back of the mounts - the self tapping ones will usually work their way loose.





Cut-away of inside front apron forming cradle to accept large rod. Note roll bar mounting welded and bolted in position. Fillet for rad. support is visible in bottom left of picture.

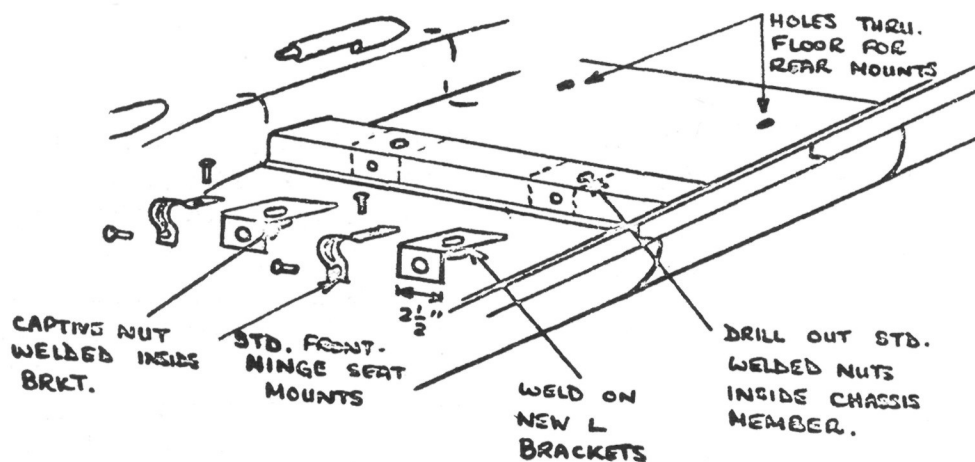
## 1.9. SEAT MOUNTS

It can happen to the best co-drivers: That means break your seat mountings. Seriously, remember to thoroughly check both of your seat frames, runners and mountings before each event. Most of you will know that even for Gp 2 Internationals, a rear seat is not needed and this space can do very well for all sorts of things, but not heavy spares such as wheels.

There are too many types of seat to go into details of runners, etc - and as you are usually the only person to drive, why bother with runners at all? So, to quickly talk about Boreham floor mounts.

Use the early Mk I Escort type of front pivot mount, where the entire seat used to tip to allow rear compartment access, before safety regulations in vehicle construction dictated that seats must be mounted direct to the floor. Do, of course, still bolt down seats solidly.

As shown below, the standard spot welded captive nut on the inside of the transverse chassis support (which, said nut, usually breaks its weld under rally type stress) is cut away and replaced by a 16 swg 2½" wide 'L' bracket with 2 x 3/16" captive nuts strongly welded in position inside the 'L'. This bracket is duplicated and welded onto the chassis stiffener at the outside extremities of the seat front bar. The standard Ford front brackets then attach the seat front bar to the chassis via 4 3/16 bolts, to give a good strong front mount taking downward, as well as fore and aft movement. Depending upon where you want to weld your new 'L' bracket mounts, it will be necessary to drill the captive nuts and allow the locating bolts to pass through.



Reinforced seat mounting arrangement

At the back of the seat, life is very simple to ensure a good solid mount. All you do is weld a small square locating plate to each rear foot of the seat and drill a hole through it and the floor. This then allows a good size bolt to pass through which, with a big, fat washer either side to spread the load, a nylock nut underneath and no unnecessary bolt length under the car to get knocked, will locate the rear of the seat as strongly as the front.