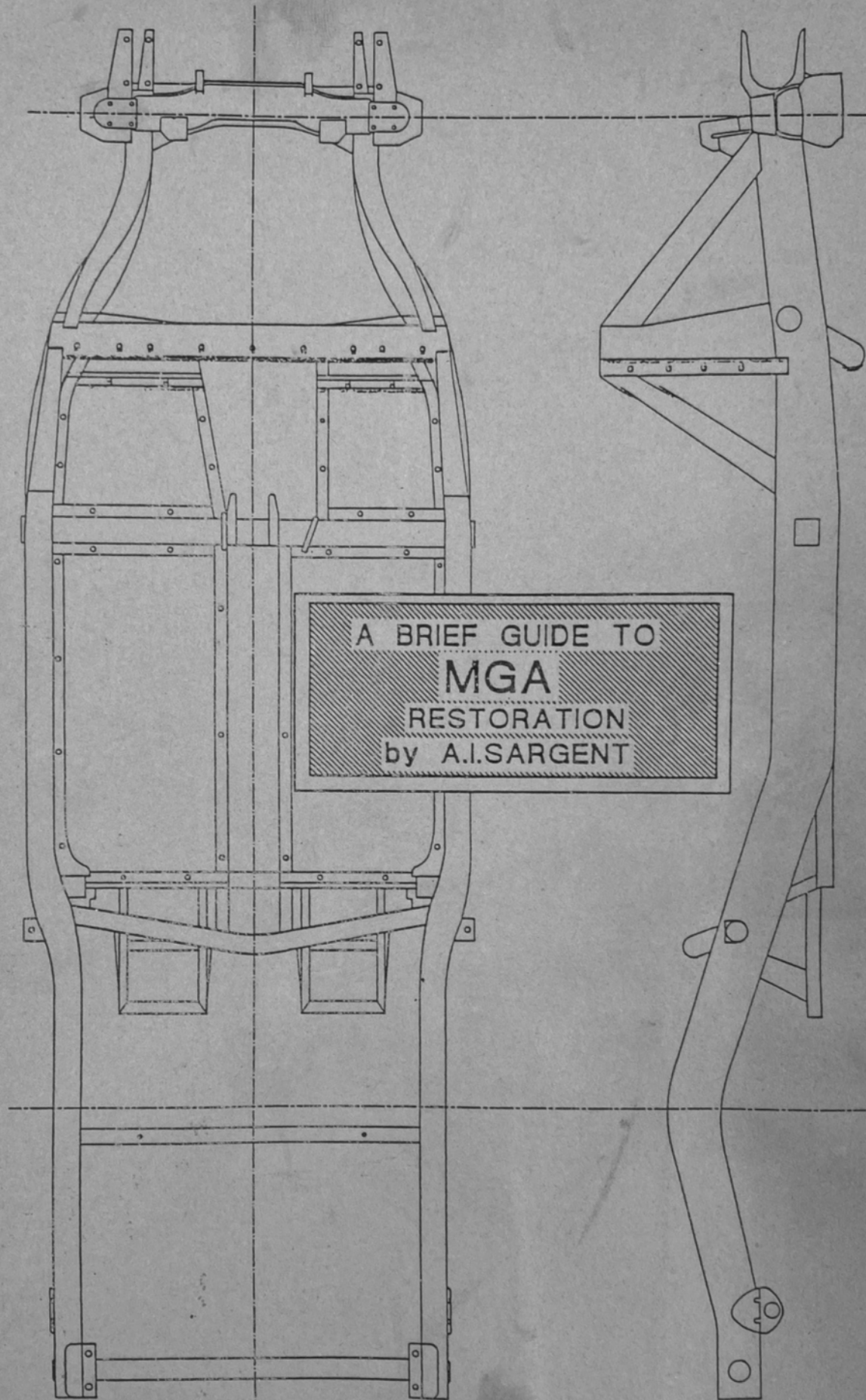




A BRIEF GUIDE TO
MGA
RESTORATION
by A.I.SARGENT

MGA REGISTER

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FINDING YOUR MGA

Buying an MGA can be quite an expensive and frustrating affair. I was lucky to come by mine almost by chance.

I was looking for a Frogeye Sprite thinking that I couldn't afford an MGA. The Frogeyes that I looked at were total heaps of junk considering the inflated prices that were being asked. I travelled a good seventy miles to see one example. When I got there, I found an elderly man outside the house cleaning his brand new Volvo. He said "he's just running round the block, he'll be back in a minute". Well, after about five minutes we suddenly heard a car coming up the road. It sounded not dissimilar to an old water pump as it came chugging up the road. I looked at the car just out of courtesy, knowing that it wasn't for me.

Browsing through Exchange and Mart, I spied an MGA for sale but no price quoted. Should I bother phoning, I probably couldn't afford it anyway, but what the hell. I spoke to the owner and to my surprise, he was asking well under half what the Frogeyes were going for. I had hardly put the phone down when I was on my way hoping to get there before anyone else. As it turned out, Mark Dollimore had got there before me and bought a second MGA that he had for sale. This car is now raced successfully by Mark in the standard MGA class. However, the car that I

2).

had phoned about was still there. It was parked in the corner of a pub car park which was at the bottom of the owner's garden. It had been standing for 18 months and certainly looked that way. Still, it didn't look too bad. I had convinced myself of that. Had I looked more closely I probably wouldn't have bought it but the price was right having knocked him down by another 20% and I'd never get another chance to get an MGA at this sort of price.

If I had looked at the car more closely I would have noticed that all four wings were fibre glass. To replace these nowadays, seven years later, would cost almost as much per wing as I paid for the whole car. Probing a little deeper, I should have seen that these wings were fastened to a strip of aluminium that was pop riveted along the side of the shroud. There were no captive nuts so 1/4" screws and nuts had been used. To repair the shroud would be a fairly major job welding in a new panel complete with all of the captive nuts to attach the wing. Moving towards the front of the car, I should have noticed that the large flat panel (duct panel) behind the grill was also made of aluminium.

The front of the shroud was cracked and had I looked inside I would have seen that it was badly dented. The rear of the shroud below the boot opening was much the same.

So far it wasn't too bad but what lurked underneath. If I had stuck my hand up behind the front wing just behind the wheel, I should have found a box section, the inner sill, but of course there was nothing there. When I had opened the door, if I had looked closer, I would have seen that the door hinge was bolted to an aluminium facsimile of a door post. One way of checking the door post is to open the door and lift it from the end opposite to the hinge. If the door moves look for movement in the doorpost, it could just be worn hinge pins. Judging by the amount of aluminium used in this car, I think one of the previous owners must have had shares in Alcan or worked in the aircraft industry. Connected to the door post was the outer sill. This was very suspicious as it was pop riveted along the top of the chassis side rail.

With the door pillar in this condition, what could I expect to find at the other end of the door. If I'd bothered to look closely up under the rear wing I would have seen that it too was

4).

screwed to a sheet of aluminium. This would have given some clue as to the condition of the catchposts.

By now. I should have been walking away giving this car up as a bad joke but I was blind with love. As it had been standing for 18 months I had accepted the fact that it couldn't be driven home.

The chassis seemed ok but then I hadn't really looked. If I'd pulled back the carpets along the chassis side rails, I would have seen the numerous holes in the side of the chassis. Had I looked up under the car, I would have spotted the makeshift angle iron floorboard rails. The petrol tank straps looked alright but had I pulled them with a bit more vigour, they probably would have fallen apart in my hands.

The engine ran pretty well. That's what I had convinced myself anyway. Actually, it had a misfire due to a burnt out exhaust valve. The engine bay was covered in oil and grime which was probably a good thing for the front half of the chassis. I hadn't checked the steering properly and later found some play in the ball joints which required re-shimming. I couldn't try the brakes and later found that I needed new discs as these were heavily pitted. It is possible to have these ground but you can

only take a few thousands of an inch off otherwise they get too thin.

The interior of the car should have given the game away. The carpets were a faded grey colour looking as though they'd been left out in the Arizona desert for a couple of years. The original competition seats were unfortunately cracked and ripped in a few places. The trim panels were sagging and had been repaired with some red insulating tape. The dashboard had a hole cut where the radio normally sits and a makeshift glovebox had been fitted. Very handy but a pain to bring back to standard.

I think by now you get the picture, I didn't know what I was looking for and what I did know I mentally passed off as being a few weeks work. As it turned out, a few weeks saw the car running with an MOT and the car gave us two years enjoyable motoring.

So now that we have an idea of what's in store, let's set to work on the restoration. By the way, for more details of what you should find under the skin of an MGA, study the diagrams later on in the book.

6).

Stripping the Car

I must start by saying that I am not an expert on MGA restoration. I have however served on the MG Car Club MGA Register Committee for five years and have recently restored my own MGA. It is these experiences I hope will be of some enlightenment to other would be MGA restorers.

My car, a 1959 1600 roadster, was built to order, being built on the 18th and 19th December and despatched from Abingdon on the 21st December 1959. It was ordered through Morris Garages in Oxford, colour black with red interior.

The owner had various options fitted including a fog light, radiator blind and competition seats. For the first five years it covered only 4,000 miles but the tables were turned when the second owner got hold of it. He did several tours of Scotland and in 1968 went to Venice on his Honeymoon.

In nine years he covered 137,000 miles, 82,000 of these are covered in the back of the original owners handbook, noting tyre changes and mechanical repairs etc. When only 28,000 miles into its life, my MGA had a serious argument with a Morris Minor and from then on was coloured Old English White.

When I bought the car it was in quite a bad state and having more success at growing mushrooms than I ever did. It had been standing for 18 months and looked very tatty. It had fibreglass wings all round and the front and rear shrouds were heavily disguised with body filler. The advantage of weight loss in the wings was probably made up again with the filler.

The seats were ripped and the trim was falling apart.

I trailored my new acquisition home and set to work to make him roadworthy. Two new brake discs, some repairs to the cylinder head, chassis and steering and he passed an MOT. We ran him for two years in this condition and then I decided to take the plunge and do a complete restoration.

During these two years we had moved house and I now had a single brick garage to work in which had the advantage of a gable roof. And so he was driven into my garage not to reappear again for three and a half years.

8).

There's not much I can tell you about stripping a car down as most of it is pretty straight forward. The first job was to remove all of the major fittings, i.e. bumpers, screen, wings, grill, floorboards etc. I next hauled the engine and gearbox out in one lump. Jacking the back of the car up a few feet should give you enough clearance to swing the gearbox clear of the cross member under the bulkhead. I hired a hydraulic lift overnight and an old pair of seat belts made the perfect lifting straps. I put the engine away in a corner and forgot it for two years.

With wings removed, I was beginning to realise the full extent of the damage. The duct panel, wing fixing flanges and door pillars had all been replaced with crude aluminium facsimiles. Picking at some of the filler, I found that the front and back of the car were badly dented. As expected, the inner sill was non existent and there wasn't a lot left of the panels behind the door pillars. I finished stripping the body to leave just the front and rear shrouds still bolted to the chassis. My theory is that if you repair the body before removing it from the chassis then you can guarantee it will fit back after you have repaired your chassis. Unfortunately, some people buy cars

in boxes in which case you are stuck with the job of finding your correct door gaps. This is not impossible but it does make life a little harder.

To finish the stripping process, I took the body back to bare metal, using a well known paint stripper and a lot of hard work. Another method is to sand or bead blast it but over do it and you could end up with nice wavy panels. Having stripped the paint, I could now see exactly what I was doing. I attacked the body in stages, the front shroud and duct panel, the door pillars and sills and the rear shroud. I'll cover these in detail in the following chapters.

Before I could start the body repairs I needed some decent wings with which to align the door gaps and shroud repairs. I was lucky to find some rear wings very cheap but in need of some major repairs. The front wings I bought from a well known MGA specialist for a reasonable price. All four were original factory wings, giving me a good chance of getting the shape of the car right.

The nearside rear wing was rotten at the bottom where it met the sill, (see fig 1). I decided to make my own repair to this

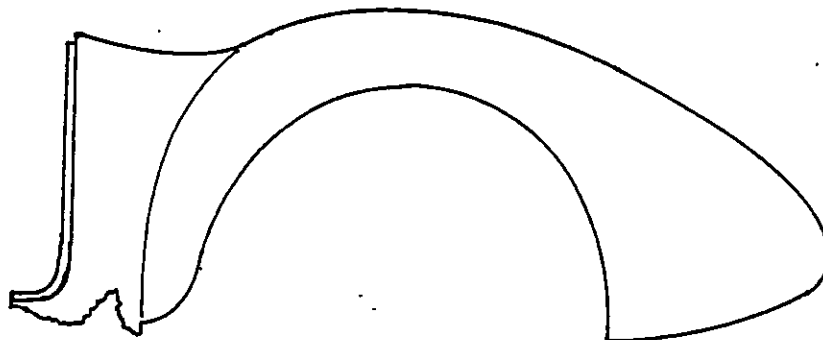


Fig. 1.

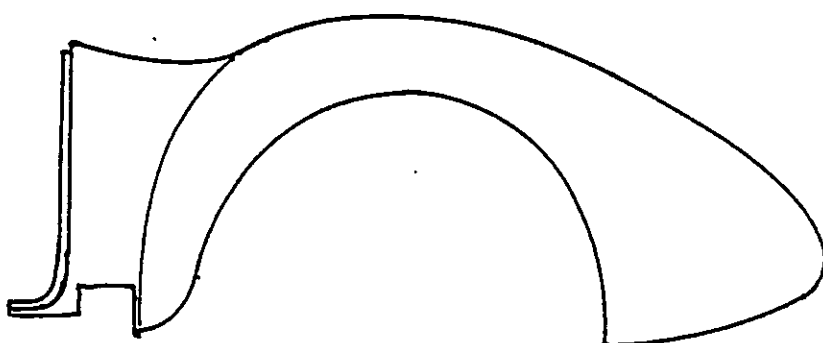


Fig. 2.

wing by first cutting out all of the ragged metal to leave a uniform shaped cut out (see fig 2). To make this a neat repair I made 45 degree cuts in the corners, (see fig 3) and formed a joggle around the cut out with some large mole grips. It is possible to buy a proper joggling tool but I found the mole grips perfectly adequate. I now cut out a repair piece from some 19 S.W.G. mild steel that was big enough to overlap the joggle. Using a flat faced hammer, I beat the repair piece on my trusty vice to achieve the desired curve. I clamped the repair piece into position and welded around the overlap to secure it. This is where the deep throat mole grips come in handy to clamp the farthest points of the repair. The weld was ground flush to finish. The repair still looked a bit rough and so I lead loaded it which I explain in a later chapter.

The offside wing was a lot worse as the whole front of the wing was missing (see fig 4). I was fortunate enough to be given an unwanted front of a wing very similar to one of the repair panels available (see fig 5). I decided to make the join halfway across the overlap of the two sections. I started by cutting across the rear half of the wing at this point (see fig 6). I laid this half over the front half and when I was happy with the overall shape and length of the wing, I clamped the two halves using some mole grips. I could now score along

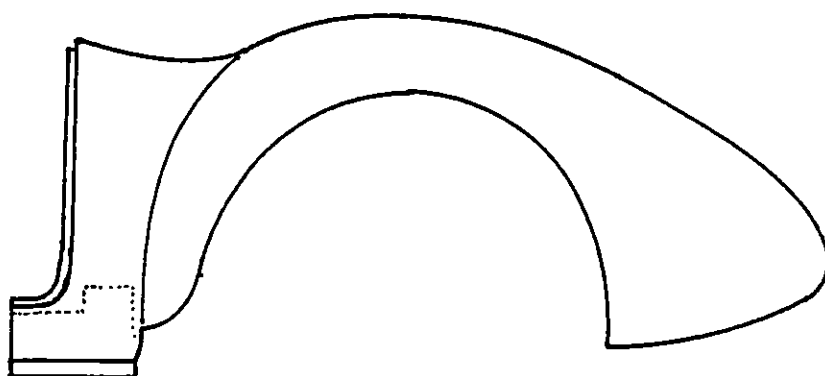
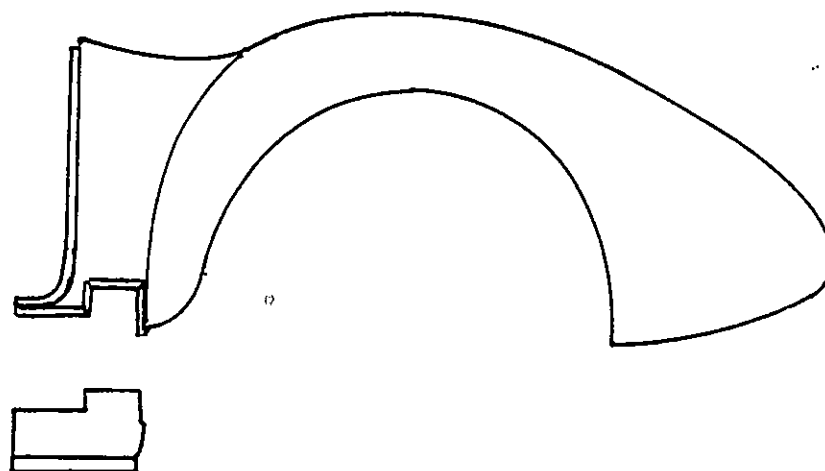


Fig.3.

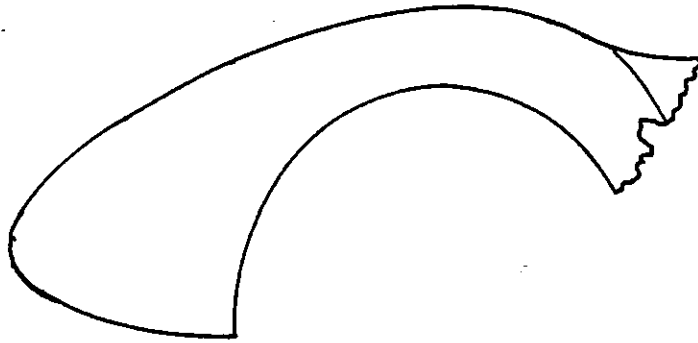


Fig.4.

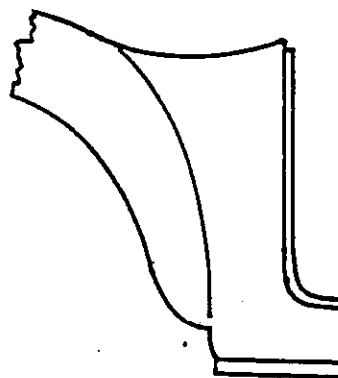


Fig.5.

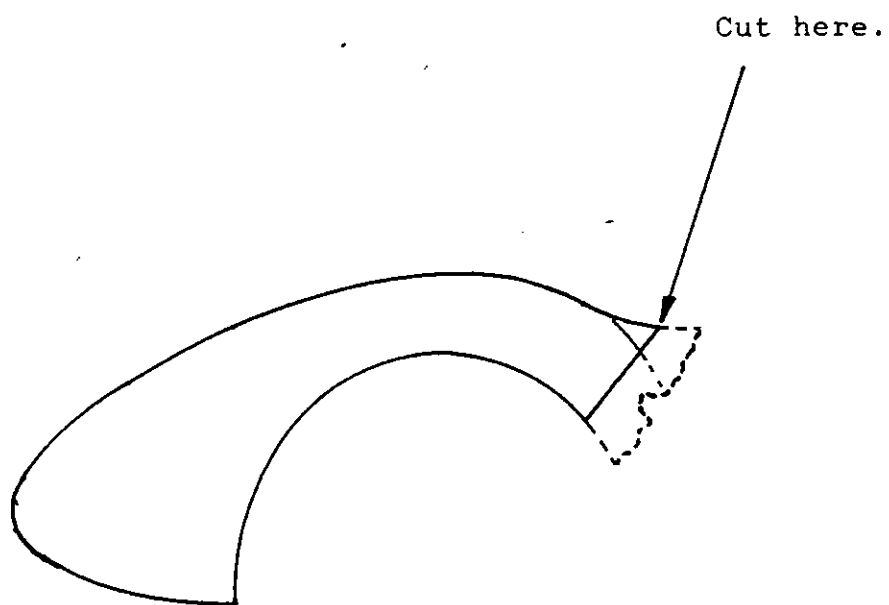


Fig.6.

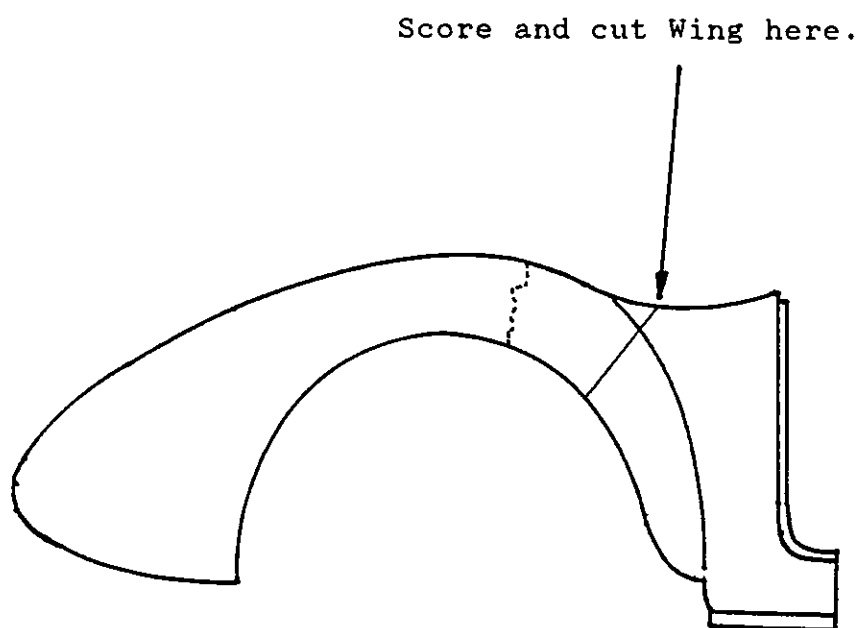


Fig.7.

the newly cut edge to mark the front half. Because of the amount of curve on the wing I thought it may be awkward to joggle it so I decided to try a butt joint and so cut the front half away along the score line (see fig 7). I clamped the two halves together and then to give the weld a bit more strength I lay a three quarter inch strip of mild steel along the back of the joint. This would stop the wire from just pushing holes through the joint when I welded it. I proceeded to weld along the join progressively clamping the three layers together as I went until I had a complete wing. This repair was also lead loaded on the outside and seam sealer used to cover the strip on the inside.

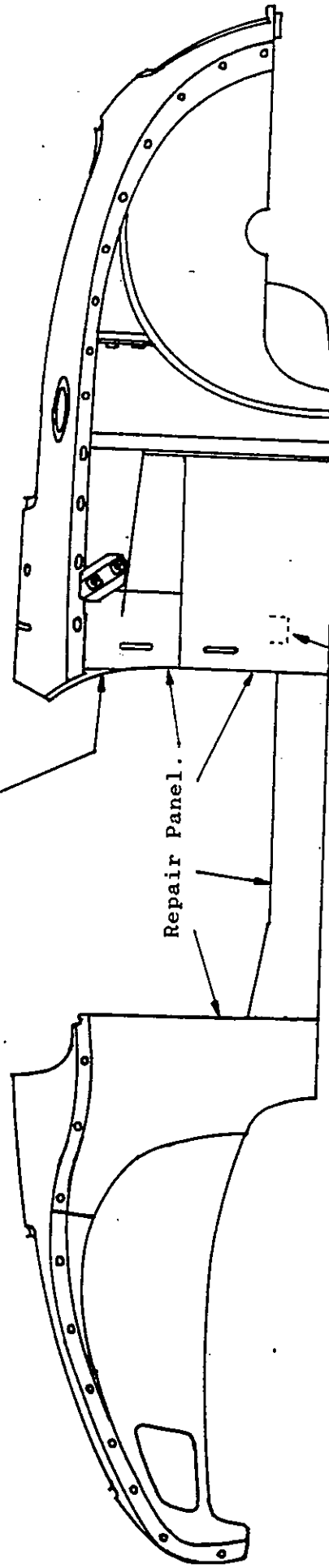
Now I had four good original steel wings and could get on with the main body repairs which I have covered in the following chapters.

CHAPTER 2The Goalposts

With the body completely stripped, The first job was to replace the goalpost or 'F' sections. I started by grinding away the remains of the door pillars, leaving only a slight witness to aid alignment of the new door pillar. I had bought repair panels for the lower half of the panel behind the door post but I found that I would have to replace some of the upper half also. I made detailed dimensional sketches of the area so that I could cut the slots for the hinge tapping plates in the correct position. When I was happy that I had enough details to rebuild the area, I cut out the rotten area which included the chassis pick-up and the angle that runs up the chassis rail. The new panel which comes complete with these features was clamped into position. I could now measure up, mark out and cut out my new repair piece. As this was the section behind the door pillar, I had to beat the fold and curve into it to match the curve on the inside of the door pillar. I put a joggle in this to overlap the lower repair piece and clamped this into position. By offering up the door pillar I could ascertain where to cut the slot for the hinge tapping plate. This was duly drilled and filed to shape. I now proceeded to assemble the repair panels and door pillar, clamping into position and then drilling and securing with self tapping screws. Points

A

in with curve in Front Shroud.



Check that Chassis Pick-up on repair panel lines up with
Captive Nut on top of Chassis.

Fig.8.

Side view of main Shroud.

Check that two hinge plate slots line up with the slots
in the back of the Door Pillar.

Finisher sits on top of Chassis here.

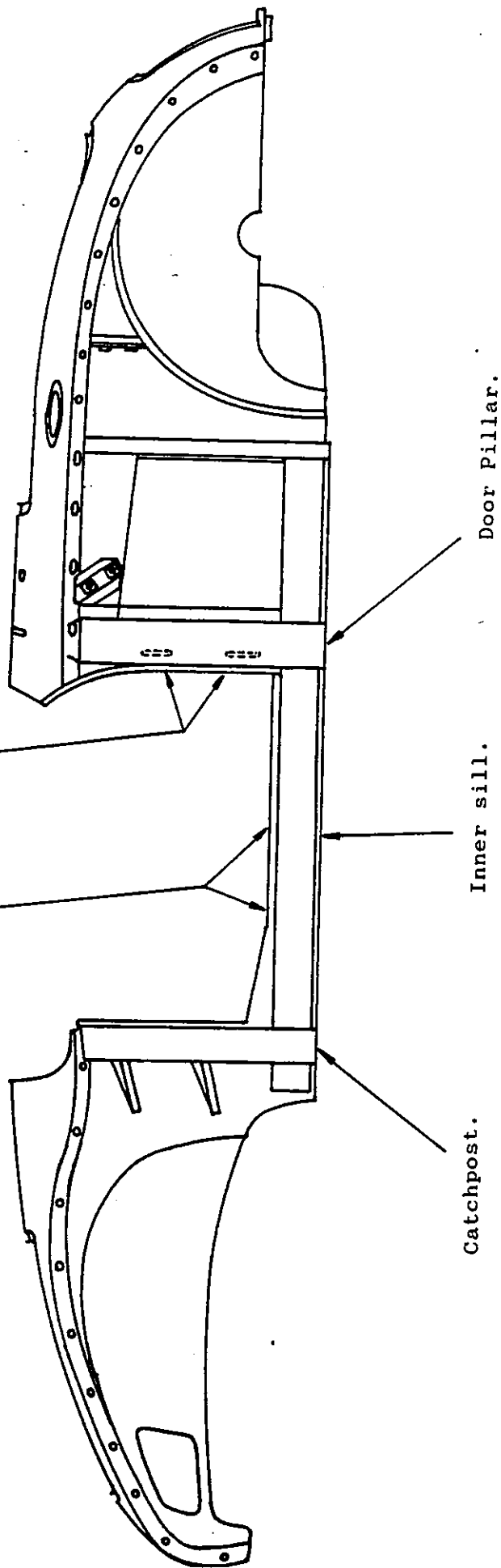
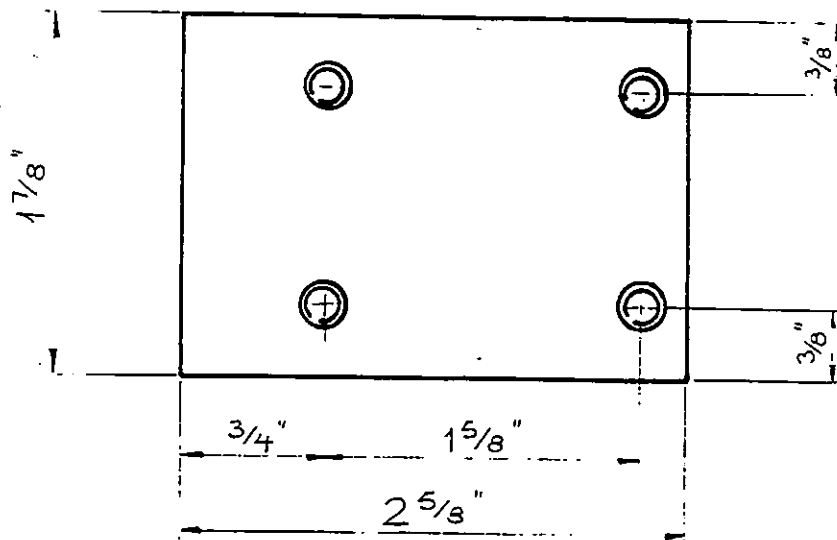


Fig.9.

Side view of main Shroud.



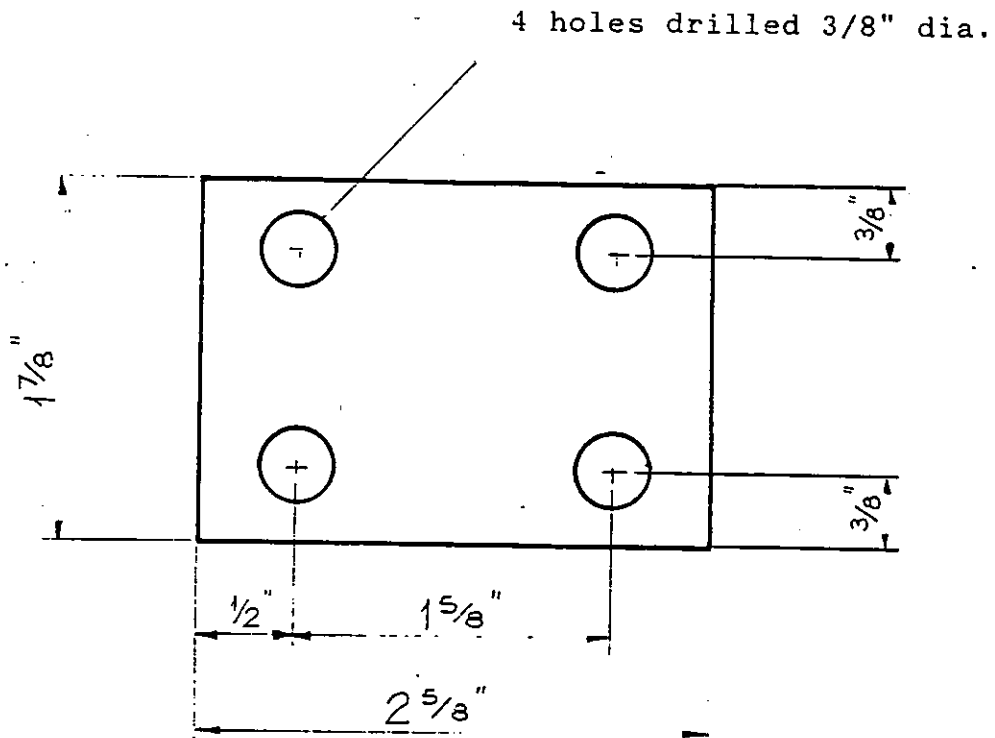
4 holes drilled 5.5 mm dia.
and tapped 1/4" U.N.F.



Material; 1/8" thick steel.

Fig.10.

Hinge Plate.



Material; Aluminium Sheet, thickness approx.1mm.

Fig.11.

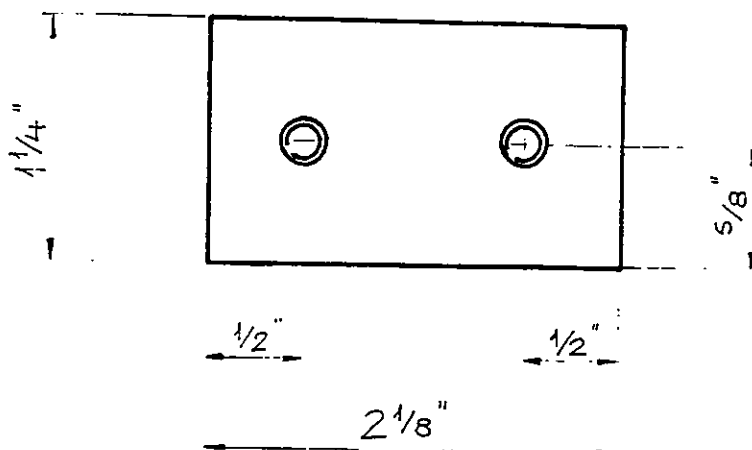
Door Hinge Shim.

to note on assembly were a). that the chassis pick-up lined up with the captive nut on the top of the chassis rail b). that the two hinge plate slots were at the correct distance apart and c). that the back of the repair panels created a nice straight line and ran into the curve at the top. The curve in the rear panel dictated the height of the door pillar. (See fig 8).

Before hanging the door, I made up the hinge tapping plates from some $1/8$ " steel plate (see fig 10). The hinge plates simply slide through the slots cut into the repair panels into the back of the pillar. I hung the door and front wing making sure that the front of the wing lined up with the existing front of the shroud. It was obvious that the door was going to foul the wing before I got it fully assembled so I noted how much out I was, disassembled everything and moved the door pillar accordingly. I had three attempts at this before I was happy. This is where it helps to have patience.

With the door hung correctly, I fitted the rear wing only to find a one inch door gap at the back. I repositioned the door pillars another two times until I was happy with the overall effect. I made a shim (see fig 11) to go between the upper hinge and pillar which brought the back of the door down a bit.

2 holes drilled 5.5mm dia.
and tapped 1/4" U.N.F.



Material; 1/8" thick steel.

Fig.12.

Door Catch Plate.

With the door now hung correctly, I started on the catchpost. As at the front the catchpost was fabricated from aluminium. I made notes of all important dimensions and then cut all of the rot out. The small corner panel that the battery cover rests on was also rotten so this was also cut out. I left the inner wheel arch and top of the shroud intact to give me a reliable datum. As with the front, I clamped the two repair panels into position and then secured them with self tapping screws. I next offered up the new catchpost paying attention to my notes and screwed it into position. I hung the rear wing and assembled the door catchplate with the door striker to check that the door would shut correctly. The striker is screwed into a similar tapping plate as the door hinge (see fig 12). I found that I could use the same $\frac{1}{4}$ " UNF countersunk screws for the floor boards, door hinge and strikers.

Now all that was left was the gap between the front and rear shrouds. I had purchased the inner sill box section but I first needed the inner sill backing plates and top finisher. I decided to make these as they were fairly basic. I used my outer sill, which was in good condition, to get the basic shape of this panel and the length was dictated by the gap between my front and rear repair panels. The finisher is the long thin strip that runs behind this plate along the top of the chassis.

24).

This is bent at 90 degrees along its length to mate with the backing plate. Because of the awkward curve at the back I made it in two sections. When assembled, this is the edge that the door draught strip sits on. I marked out and cut out all of the pieces and progressively clamped and screwed them together. At this point, I must point out that I hadn't welded anything so that if anything went wrong it could easily be corrected. The other side of the car was prepared in exactly the same manner.

I next moved to the front of the car to repair the shroud which I have covered in a separate chapter. When this repair was complete and I was happy with the overall shape of the car with doors and wings hung, I welded the 'F' sections and surrounding areas. I started by tacking everything so that I could still double check my door gaps. When I was satisfied I finished welding and grinding all of my repairs. If you are lucky enough to own a spot welder then most of these repairs can be spot welded in. Another way of doing it is to drill small holes at selected intervals and weld into the hole with the Mig to create a spot weld.

CHAPTER 3

Front and Rear Shroud Repair

In this chapter we cover the repair of the front and the rear of the main body shrouds. As my car required repairs to both of these areas, I will refer to my experiences as an example. The front of my car had some nasty cracks across the front shroud just over the grill. As I started to strip paint from this area I was able to chip off great chunks of filler. When I had finished stripping the front shroud, I discovered that the whole front had been pushed in at some time and had been roughly beaten back into shape. The edges of the shroud were missing and had been patched up with strips of aluminium pop riveted into position. The original duct panel had been cut out around the chassis pick up brackets and an aluminium sheet pop riveted in its place.

As the front of the shroud was so badly damaged, I decided to try and find a replacement front section. Complete front shroud repair panels are available but are quite expensive. I was lucky enough to find someone with a scrap front shroud that had a reasonable front. The edges were ragged but the basic shape was there.

Plan view of Front Shroud showing damaged area.

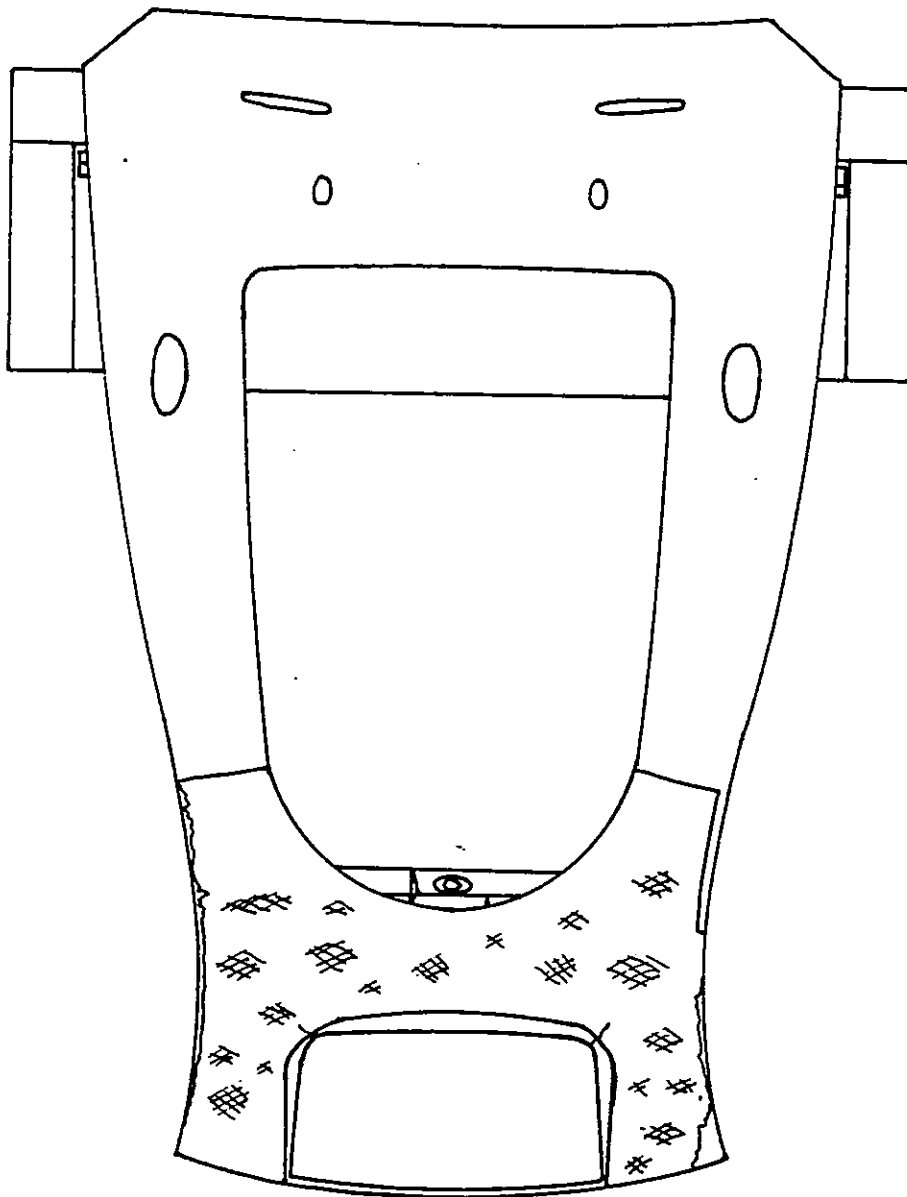


Fig.13.

Before ripping all of the damaged parts out, I sat down and carefully planned how I was going to tackle the job. I then made detailed sketches of various parts of the front taking as many measurements as possible. It's too late once you've taken it all apart and then find you've forgotten the position of a vital panel. To do this could mean that all that time you spent lining your new door pillars up was completely wasted when the wing lines up with the shroud but fouls the door.

It is very important to keep checking wing and door fits as you progress with your repairs. Now that I had made my plans, I started by removing the front wings. I could now drill out the pop rivets along the front of the shroud and from the aluminium repairs up the side. I next scored a line across the top of the shroud a few inches above the damage. I could bring this line down toward the front of the nearside as there was some of the original side strip left. Using an angle grinder with a cutting wheel, I cut across my marks carefully finishing off with a hacksaw so as to leave the strengthening ribs and bonnet catch bracket undisturbed. I could now remove the front of the shroud and drill out the rivets holding the makeshift duct panel in

Plan view of Front Shroud showing new Duct Panel in position.

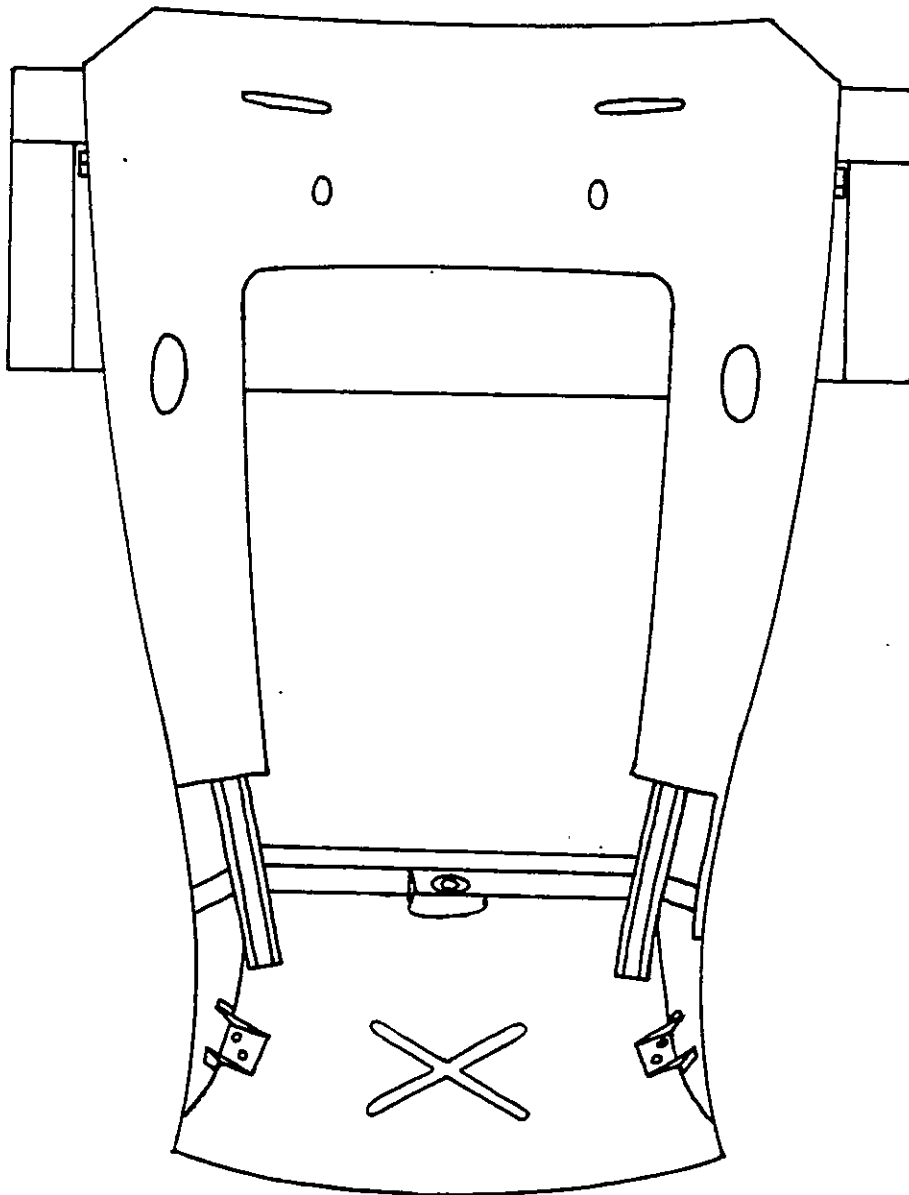


Fig.14.

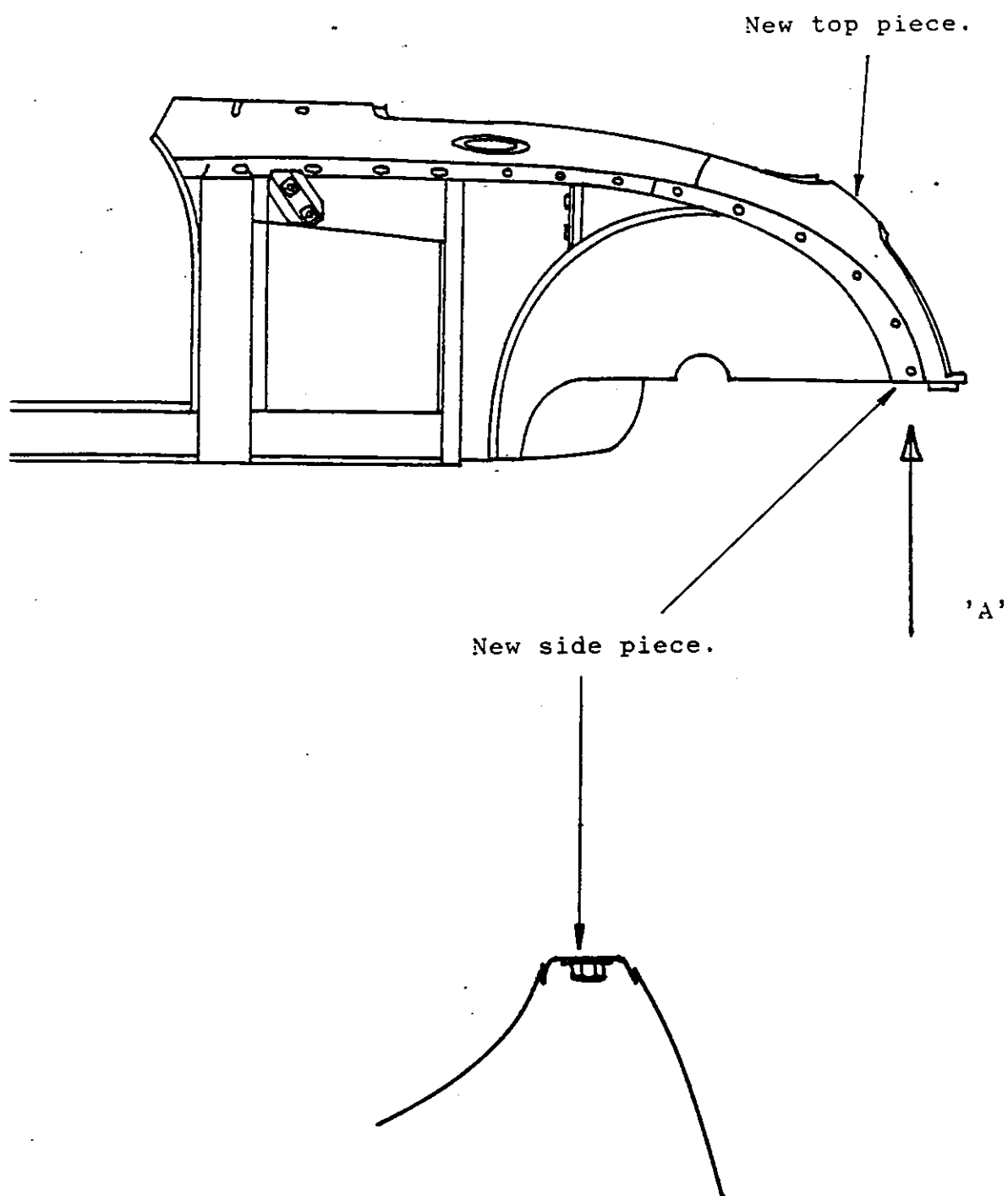


Fig.15.

30).

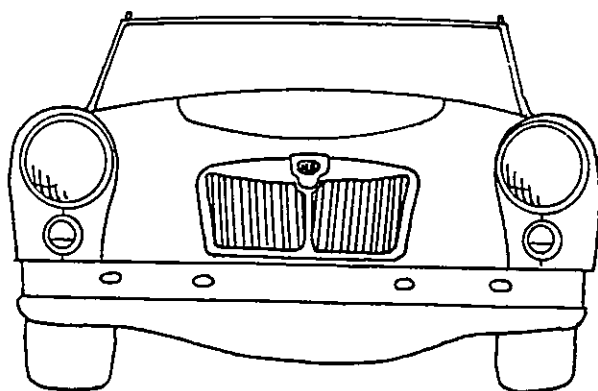
position. I removed the duct panel and ground away what was left of the chassis pick up brackets. As there was nothing left of the duct panel to repair, I decided to buy a factored replacement panel which came complete with the rim across the front where the valance is attached.

Now that the front of the car was completely stripped, I could see that the first job would be to make repairs to the front corners of the inner wheel arches. This was simply done by cutting and trimming small pieces of sheet metal to the correct shape and then beating them to fit the gaps. I clamped these into position with mole grips and welded them to secure.

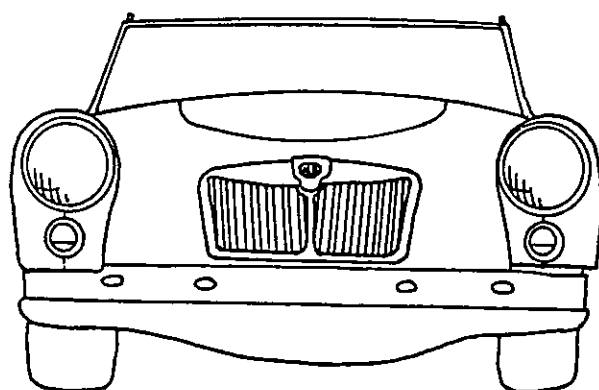
My next problem was to make the new side plates with the captive wing fixing nuts. I laid the new duct panel in position, making sure that the four chassis fixing bolt holes lined up with the holes in the chassis. I then clamped the inner wheel arches to the duct panel using mole grips. To hold the assembly together, I drilled a few small holes through the mating parts and secured them with self tapping screws. I next made a new pair of duct panel corner brackets using what was left of the old ones as patterns. These I positioned over the chassis pick up holes and secured the whole lot to the chassis with four nuts and bolts. I secured the backs of the brackets to the inner wheel arches

with self tappers. I could now tackle the side plates. I had kept the old aluminium plates that had been riveted down the sides and used these as a basic pattern. I scribed around these onto a sheet of steel and then scribed a second line along the top or outer curve so as to leave enough to fold over.

This will give me a ledge for the shroud to lap over. I cut the shape out with a pair of shears and then gradually formed the curved rim using a hammer and bench vice. I positioned the new plates with mole grips and then secured them with self tappers. I could now hang the front wings using the rear bolt holes and clamping the front of the wing to the shroud. I scribed around the holes inside the wing to ascertain the position of the wing fixing nuts. After removing the wings and side plates, I drilled the wing fixing holes in the new plates to 5/16" clearance size. I made my captive nuts by first welding the nut to a washer and then the washer and nut onto the back of the new plates. I reassembled the side plates and wings to the car enabling me to offer up the front shroud repair and check the alignment of the wings, bonnet, shroud and duct panel. I scribed across the top end of the shroud repair piece leaving a half inch overlap over the remains of the existing shroud and then cut the repair piece to length.



Should be straight line.



wing incorrectly fitted.

Fig.16.

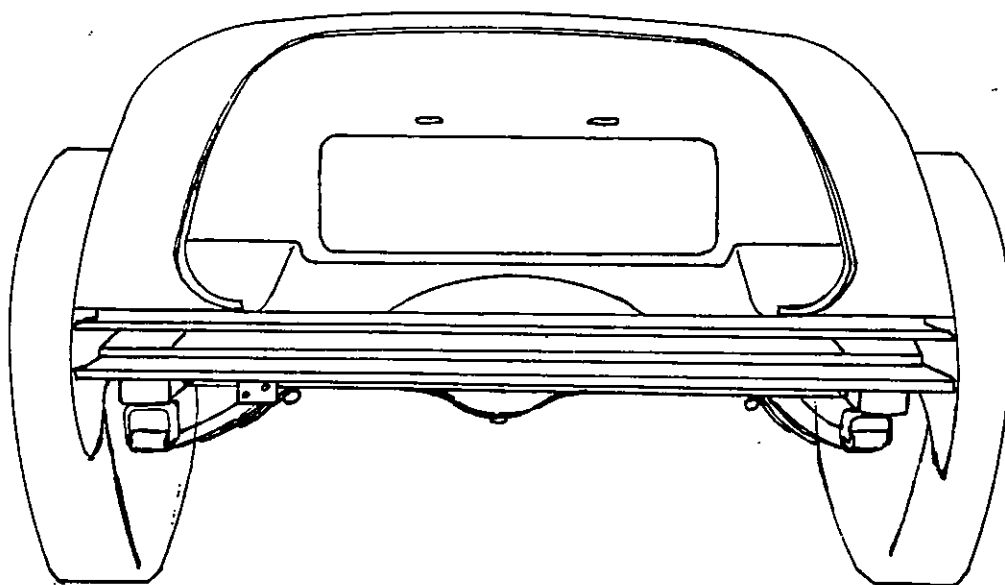
To achieve a nice smooth finish on top of the shroud, I formed a joggle across the front edge of the existing shroud so that the top of the repair section would be flush with the existing shroud. A lap joint is also easier to weld. The next job was to clamp the shroud repair section back into position and secure with self tapping screws. I now had a solid front section that I could bolt the front wings onto. I now made my final checks before welding. The bonnet laid in position had a nice even gap all around it. The bottoms of the wings lined up with the bottom of the front shroud presenting a nice straight line right across the front of the car under the grill aperture. The grill aperture was checked to the dimension that I had measured before disassembly.

Now that I was happy with the assembly, I disassembled the whole front again and then gradually reassembled and welded it, regularly checking fits and alignment as I went along. When I had finished welding all of the parts back into position, I fitted the wings to check the alignment again. I was a little unhappy about the curve running down the offside top of the shroud so I ground this out and made another repair. The edges were still a bit lumpy but this was cured by lead loading, of which I shall cover in another section.

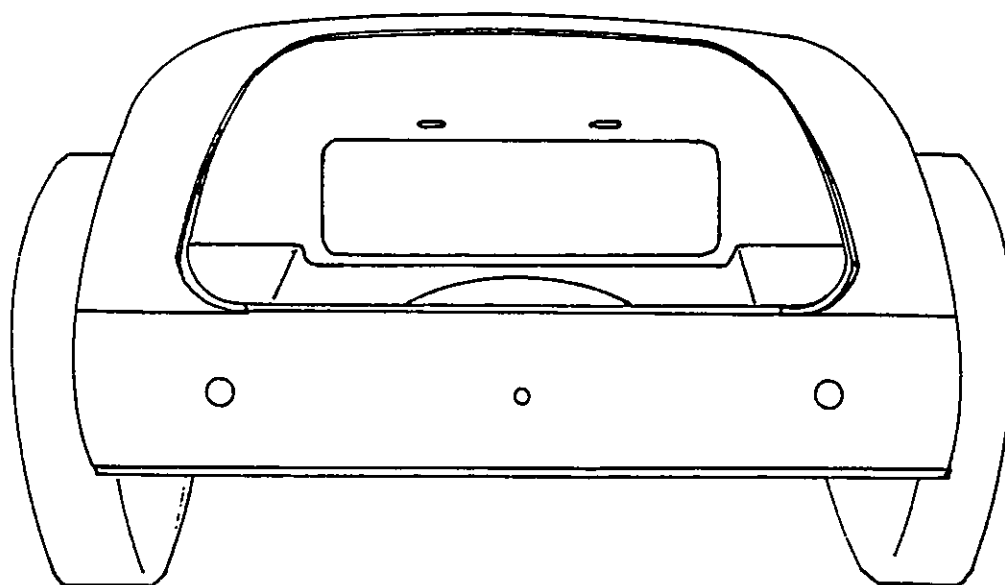
34).

I was now happy with the fit and decided to leave it at that. It is possible to buy the whole top of a front shroud, the fitting of which would be a similar operation to that just described, it all really depends on how badly your car has rotted.

We now move to the back of the car where again I found about three pounds of filler. My rear shroud had a nice ripple effect right across the back. I decided to go the whole way, cut off the back panel and replace it with a new repair section. Before starting any cutting I again sat down and made my plan of attack making dimensional sketches of the back. My first job was to repair the small curved plate which secures the back of the wing as this had rotted away. I made these quite simply by cutting the shape from a piece of steel and then welding in captive nuts using the same method as adopted on the front. I next welded these curved repair pieces into place using the existing line of the rear panel to position them. In the meantime, I had a rear repair panel made up including the straight section of boot rubber gutter and folded edges to weld to the side panels. I laid the repair panel over the existing damaged panel and scribed a line along the edge of the repair panel to mark its position. Using an angle grinder and hacksaw, I carefully cut off the back panel leaving the strengthening ribs and boot lock



Repair panel on rear Shroud.



Repair Panel.

Fig.17.

36).

bracket in position. I could now offer up the repair panel and file it until it was a good fit. Whilst the back of the boot was exposed, I took the opportunity of straightening the chassis pick up rail across the back and making some repairs to the boot floor. Using mole grips to clamp the edges of the new back panel, I now progressively welded the repair section into place.

It is worth checking that the bumper irons line up with the holes in the new panel. I forgot and had to file out the holes to get the bumper irons to line up. I finally hung the wings to check the alignment.

I have only covered one way of repairing the front and back of the shroud as this has been my only experience. Other methods of making repairs depend on the degree and type of damage. The main points to remember are to carefully plan your attack, take measurements and make sketches and keep checking wing fit etc.

With the body repairs all complete and the wings and doors hung, I load loaded all of my external repairs. This I have covered in a later chapter. I removed all of the wings and doors and bolted some angle iron across the door gaps to stop the body

distorting. In this state, the body isn't that heavy and my neighbour and I lifted the body off with no trouble, that was after we'd found all of the fixing bolts. The body was now lifted up onto the scaffolding to reveal a very rusty chassis. I must add that it took a few more of us to lift the body up onto the scaffolding.

CHAPTER 4

Lead Loading

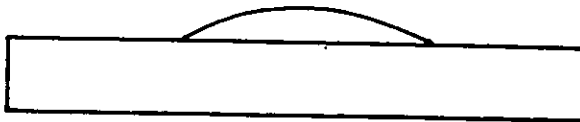
In this chapter we cover the age old skill of lead loading. I don't profess to be an expert at lead loading but I have carried it out successfully on my own car.

The first rule of loading is cleanliness. Solder will not adhere to or tin dirty or oily steel. Clean steel has a very low surface tension allowing the molton solder to collapse flat on the surface and adhere to it. If the steel is dirty or oily, the surface tension is increased which causes the solder to sit like a globule of water on a waxed car and of course it will not adhere. On a well tinned steel surface, the solder and steel eventually forms an intermetallic layer which increases the bond between the steel and solder. This is not to be confused with a weld where the two materials are actually fused together.

Although this process is called lead loading, the material used is not pure lead, it is a solder alloy of 20% tin, 80% lead. This type of solder is normally sold in 1 kg sticks, the four main brands being Abbey, Belfrey, Cloister and Carbody. The reason for using an alloy of 20%/80% tin/lead is that this ratio gives the largest pasty range. As the solder is heated up, it leaves its solid state at 180 degrees C and eventually becomes a

Solder Joint wetting

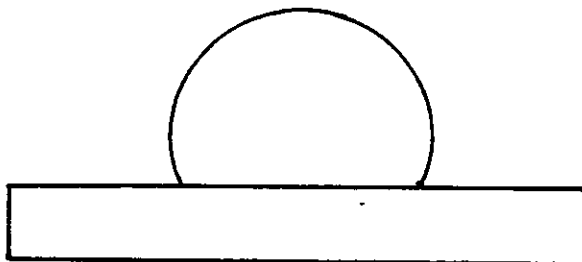
Perfect



Good



Bad



No Wetting

Fig.18.

°C

400

300

200

100

20

40

60

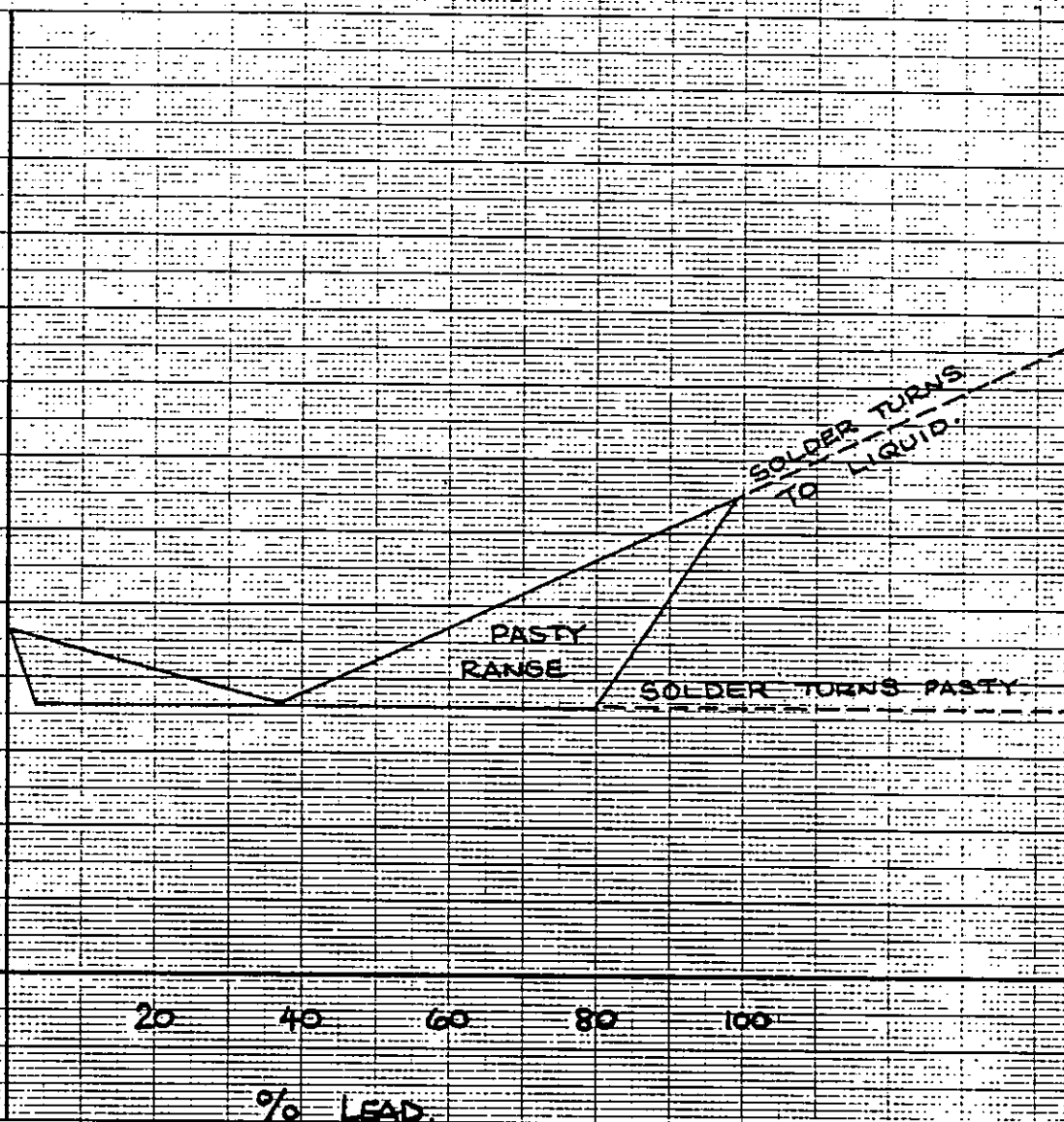
80

100

% LEAD

TIN/LEAD TEMP. EQUILIBRIUM DIAGRAM

Fig.19.



liquid at 266 degrees C, giving a pasty range of 83 degrees C. I used standard plumbers solder as it tends to be a bit cheaper. This has a higher tin content giving a slightly smaller pasty range.

Well, enough of the technicalities, let's get on with the leading.

Let's pretend that we are filling a dent in the top of a wing. I am assuming that as you are restoring your car, the body has been stripped of all its paint. If it hasn't been, then you'll have to be careful not to catch the paint in the local area alight. The first step is to thoroughly clean the dent and surrounding area. I found a sanding disc was best for this job. 40xt, using a clean cloth, wipe the area with methylated spirits to degrease it. Before we can apply the body lead we must tin the surface to be filled. This is to create a good key for the body lead. There are two methods of doing this, the first is to use a solder paste and the second a flux and solder.

1). Solder Paste Method

Brush the solder paste evenly all over the dent and surrounding area. Using a blow torch, carefully heat the area evenly. When the part starts to bubble remove the heat and wipe across the

42).

paste with a clean cloth. The paste will now appear as a smooth shiny silver surface. If there are any areas where the solder seems to recede and not tin then this area will have to be cleaned and re-tinned until the solder adheres.

2). Standard Solder Method

For this method you will require some Bakers Fluid and a roll of standard electrical solder, I used 40%/60% tin/lead. The Bakers Fluid is a highly corrosive flux which is brushed onto the area first to de-oxidise it. Next play the flame of the blow torch over the whole area and when the area is warm enough to melt the solder, flow it onto the wing. Wipe the solder over with a clean cloth to guarantee an even cover. If any areas are left untinned, then repeat the process on that area.

Now that the area is thoroughly tinned, re-heat the area to be repaired and at the same time wave the end of the stick of solder in the flame. Eventually, the end of the stick will become pasty and can be dabbed onto the dented area. When you have enough solder on the area, you can gradually smooth it out gently, waving the heat over it to maintain the pasty range. The ideal tool to smooth the solder is called a paddle.

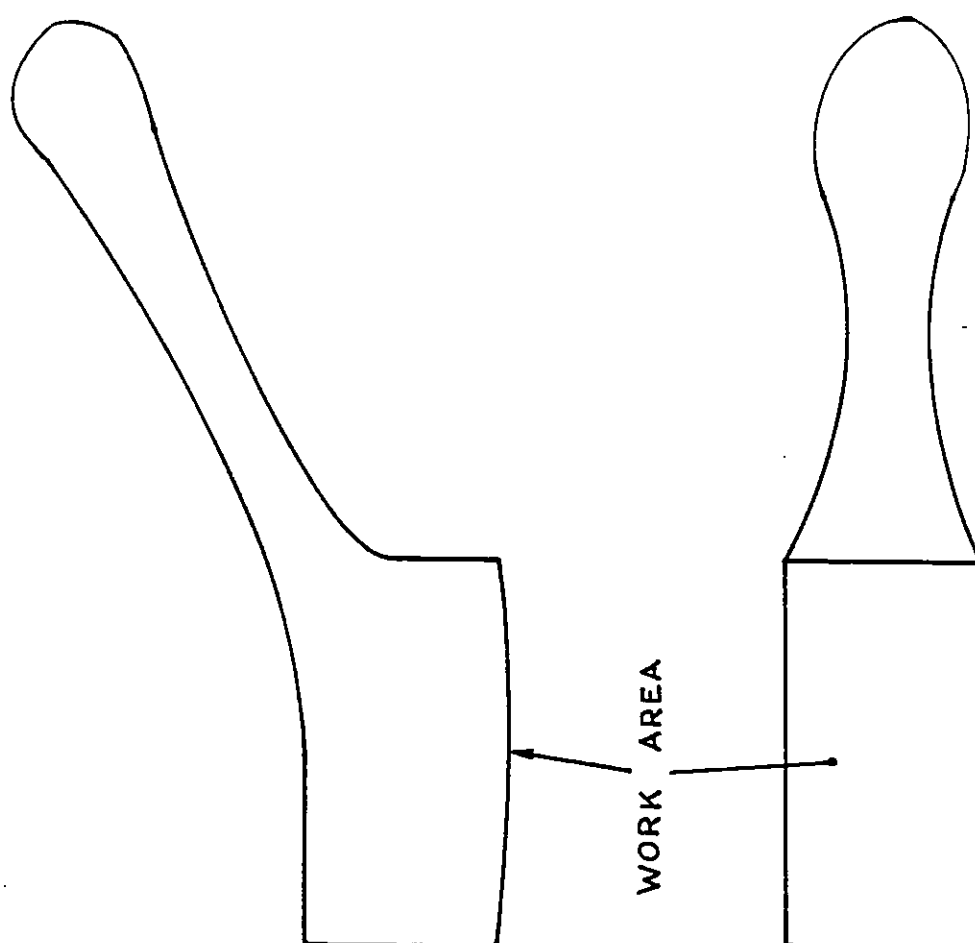


Fig.20.

LEADING PADDLE.

44).

The paddle is made of a hard wood as this will not deteriorate and burn so easily on the hot solder. (See figure 20). A wide spatula or cake slice could also be used, also smeared with grease to stop the solder from sticking. Keep spreading the solder until you have achieved the desired shape and then leave it to cool.

The next tool we need is a body file. This is a very course cut file which comes in various forms. I used a straight flat one which came with two counter sunk holes in it, through which I could pass two screws to secure it to a lump of wood. We now proceed to file the solder blending in with the steel wing. We can now finish off in the normal way with emery cloth and then finer grades of wet and dry. As you become more and more proficient, you'll find that you can even lead load vertical surfaces without the solder running everywhere.

Another use for lead loading is to cover up unwanted seams and to build up areas to, for instance, decrease a door gap. One such example of this on the MGA is the angled curve right at the back of the front shroud under the windscreen grab handle. This corner was lead loaded in the factory to create a respectable door fit. After I had leaded a few easy dents, I found this

quite easy and needed very little filing to achieve the correct shape.

The advantages of lead loading are that once a repair has been leaded, there should never be any signs of rust again, on the top at least. One good spot for this is where the wing joins the front shroud which normally rusts badly. The other main advantage is that lead, unlike normal filler, won't crack and I've never known a filler yet that doesn't crack and then allow rust to form underneath.

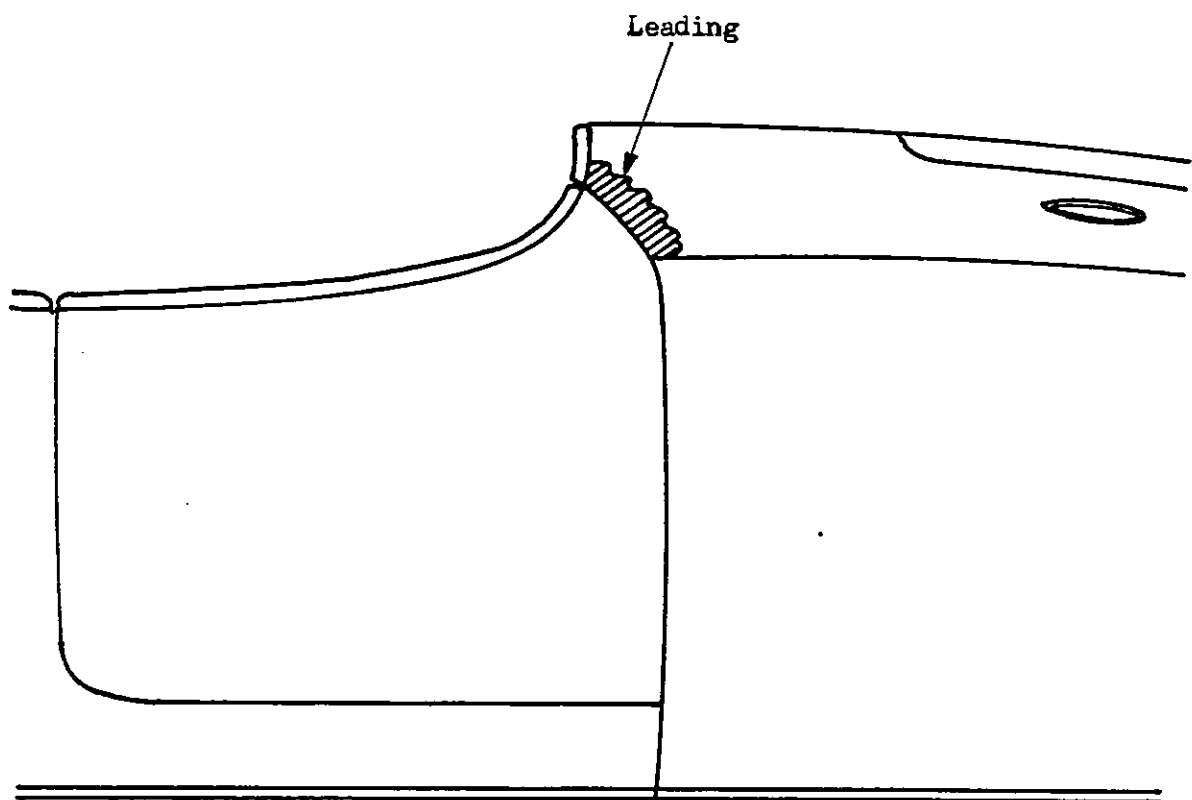


Fig.21.

CHAPTER 5

THE CHASSIS

When Syd Enever and his team designed the chassis of the MGA, they made one decision that was to be of a great help to us. That decision was to use a gauge of steel thicker than the design required. In restoring your chassis, you'll probably find a few holes but probe deeper and you'll find that the area around the hole is of far greater thickness than you could ever wish for. I made the mistake of cutting out a section of chassis with a hole in only to find just that.

Other than holes along the side rails, the main areas to check are the floor board rails, the battery cradles and hairline cracks in any area. One area that cracks have been found is at the top of the angled chassis member running up from the front suspension to the highest point of the chassis (see fig 22). Now let's cover these repairs in a little more detail.

The Floorboard Rails

When I lifted my body off to start on the chassis, I found it covered in rust, the tank straps were so bad that they disintegrated like a cornflake. The floorboard rails had been replaced with some fairly heavy gauge one inch angle which

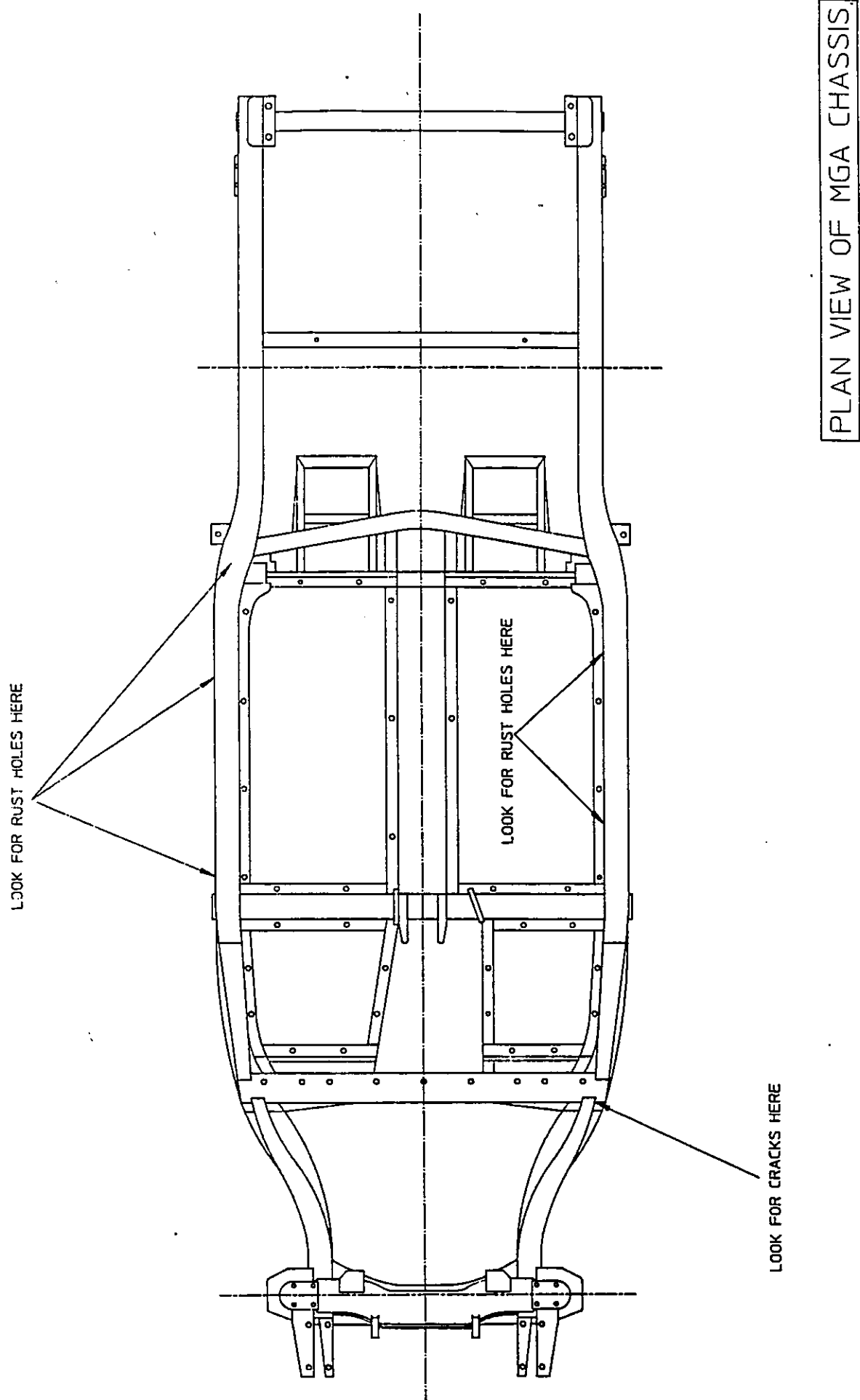


Fig.22.

48).

didn't take much effort to pull away from the chassis rails. The rails in front of the battery cradles were very weak and there were no captive nuts left.

The first thing to do was chisel and cut all of the old rotten rails out but making sure to note any important dimensions i.e. depth from top of chassis rail down to floorboard rail (see fig 23). Having removed the old rails, I ground all of the inside faces back to clean metal. I next made any repairs required which are covered in the next section, "General Chassis Repairs".

I bought a set of floorboard rails from one of the main MGA specialists. Unfortunately, this set didn't include the four short rails at either end of the floor which on my chassis were in the worst condition. I started by clamping the long side rails into position. Make sure that they are on the same level as the two long rails that the transmission tunnel was fitted to, which don't seem to rot. ('G' clamps or deep throated mole grips are perfect for this clamping set-up). When I was happy with their position, I ran tacks of weld along the top and bottom, alternating from top to bottom as I went. I finished off by welding between the tacks. The back of these rails has an angular shape (see fig 24) This I beat into a rough shape to

Cross section of Chassis and Floorboard Rail

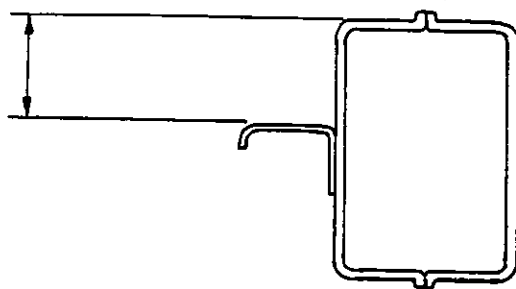


Fig.23.

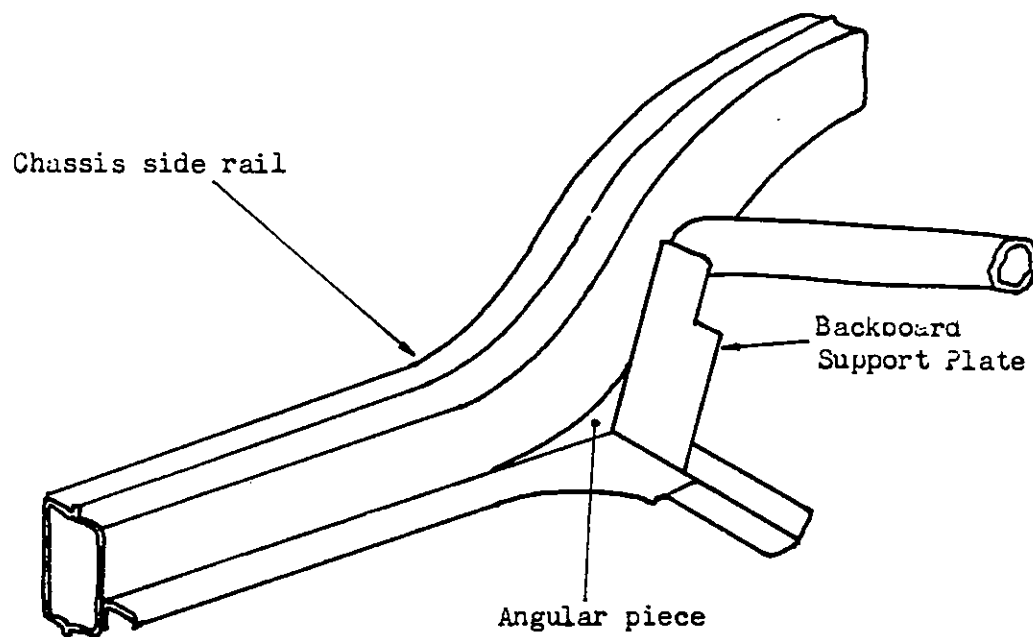


Fig.24.

50).

follow the contours of the chassis and then progressively welded it into position, clamping and welding each spot as I worked around it.

I haven't mentioned yet but I used a Mig welder although an oxy-acetylene welding kit would do just as well.

To finish the job off, I ground off any excess weld that may have obstructed the fitting of the floorboards or provided nice moisture traps.

Next job was to fit the four short rails across the front of the largest floorboard and the rear of the smaller floorboards using the same method as on the long rails. Only the two short rails at the rear remained to complete the main floor area. The rot at the back had also spread up the two flat plates that support the backboard behind the seats, (see fig 24) I decided to cut this plate out and make a new one. A good tip is to work on one side of the chassis at a time then you always have the other side to refer to. Having cut out all of the rusty metal I ground up the remaining surfaces to reveal clean metal. Be careful to leave as much of the battery cradle as possible. I was lucky as I had some 18 S.W.G. steel strips with a 90

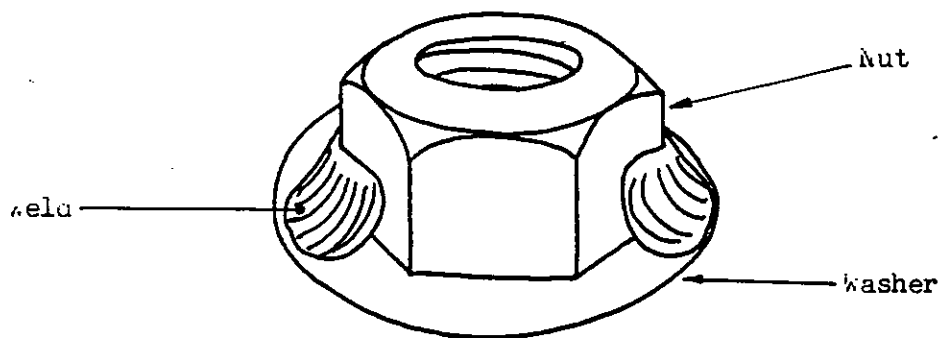


Fig. 25.

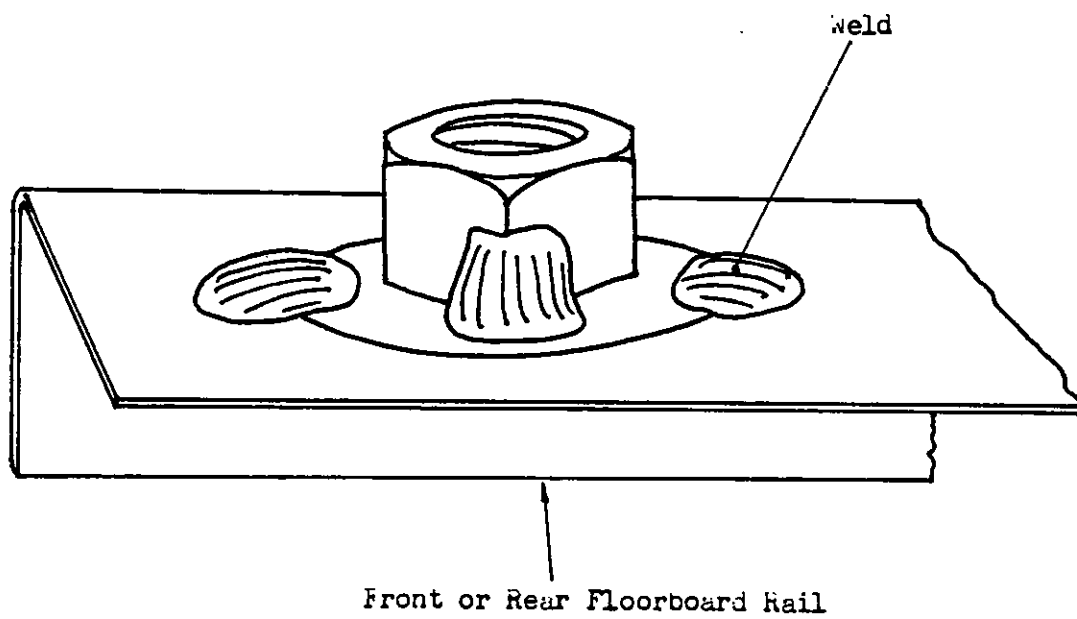


Fig. 26.

52).

degree angle along its length but it shouldn't be too hard to bend the angle in a good vice. These strips were perfect for my rear floorboard rails. When I'd cut my new rail to length, I clamped it into position and marked and drilled the clearance holes for the $\frac{1}{4}$ " UNF screws using the old floorboards as a guide. My next job was to make my captive nuts. I first welded some $\frac{1}{4}$ " UNF nuts to some $\frac{1}{4}$ " washers. I held the nut and washer between the jaws of my mole grips, clipped the Mig crocodile clip onto the handle of the mole grips and put a spot of weld each side of the nut. (see fig 25) I then clamped the nut and washer over the $\frac{1}{4}$ " clearance hole in the new rail and put two spots of weld at 90 degrees to the weld on the nut (see fig 26).

Using my notes, I marked out the shape of the plate shown in fig and cut it out with some tin snips. Again, using the old floorboard as a guide, I drilled the plate and fitted the captive nuts.

With my new plate and floorboard rail complete, I clamped them into position and made a few tack welds. I then finished off the welding. Remember to weld your battery cradle back onto the underside of the rail. To finish I ground all of my welds to make a neat job. The other side was repaired in the same

manner except that the battery cradle was replaced and this I have covered later.

The rear of the floor board area was now complete so I moved up to the toeboard area and the two short curved rails. These rails are supplied ready to weld in although mine did require some bashing to achieve the same curve as the chassis. I offered the rail up to the chassis, noted any gaps and using a good hammer and the top of my vice, I beat the offending areas until the curve of the rail and chassis were the same. I clamped the rails into position at the same height as the existing rails and welded them in the same manner as before. I found the best way to work on these rails was with the chassis on its side so that I could get to the top and bottom of the rails easily. The two rails across the front of this area were made and fitted in the same manner as the two at the back.

One small detail that wasn't fitted to my floorboard rails was the small 'U' brackets that hold the fuel and brake pipes on the offside of the chassis. I simply cut out a few strips of steel about a $1\frac{1}{2}$ " by $2\frac{1}{2}$ " and formed them into a 'U' shape to fit into the underside of the long side rails. I then spot welded these about a foot apart under the offside rails, see fig 27 and 28.

Cross section of offside Chassis side rail
showing pipe clip.

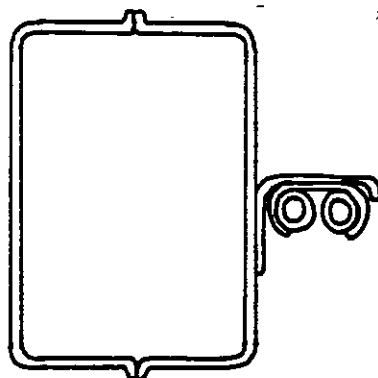
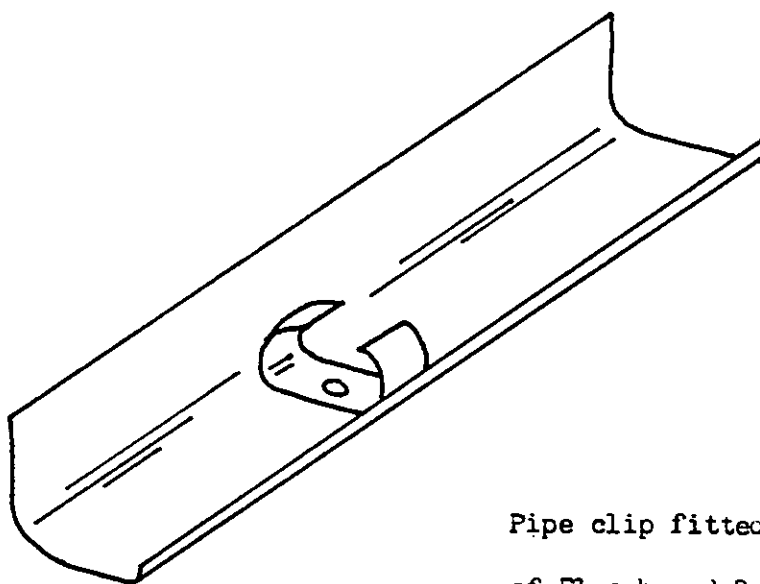


Fig.27.



Pipe clip fitted to underside
of Floorboard Rail.

Fig.28.

General Chassis Repairs

Having removed all of the old floorboard rails, you'll undoubtedly find a few holes dotted along the inside and outside of the main side chassis rails, see fig 22. Thanks to the poor oil seals of the early 'B' series engine, the front part of the chassis is normally in fairly good shape. Clean off the oily grime and you'll probably find original paint or nice clean steel. As mentioned before, cracks can appear at the top of the angled struts running up from the front suspension area (see fig 22) Another area that seems to suffer from holes is on the top of the main side rails running up over the axle (see fig 22)

When first exposed, the holes in the side rails of my chassis looked horrific and as I previously mentioned I decided to replace a whole section. A friend of mine had had some steel formed to the same cross sectional shape as half of the chassis side rail, (see fig 29) and having finished his car, gave me his surplus. Using an angle grinder with a cutting wheel, I neatly cut out half of the chassis section along the offending area (see fig 29) By only cutting half away you maintain your chassis strength and original dimensions. As I examined the

Chassis side rail

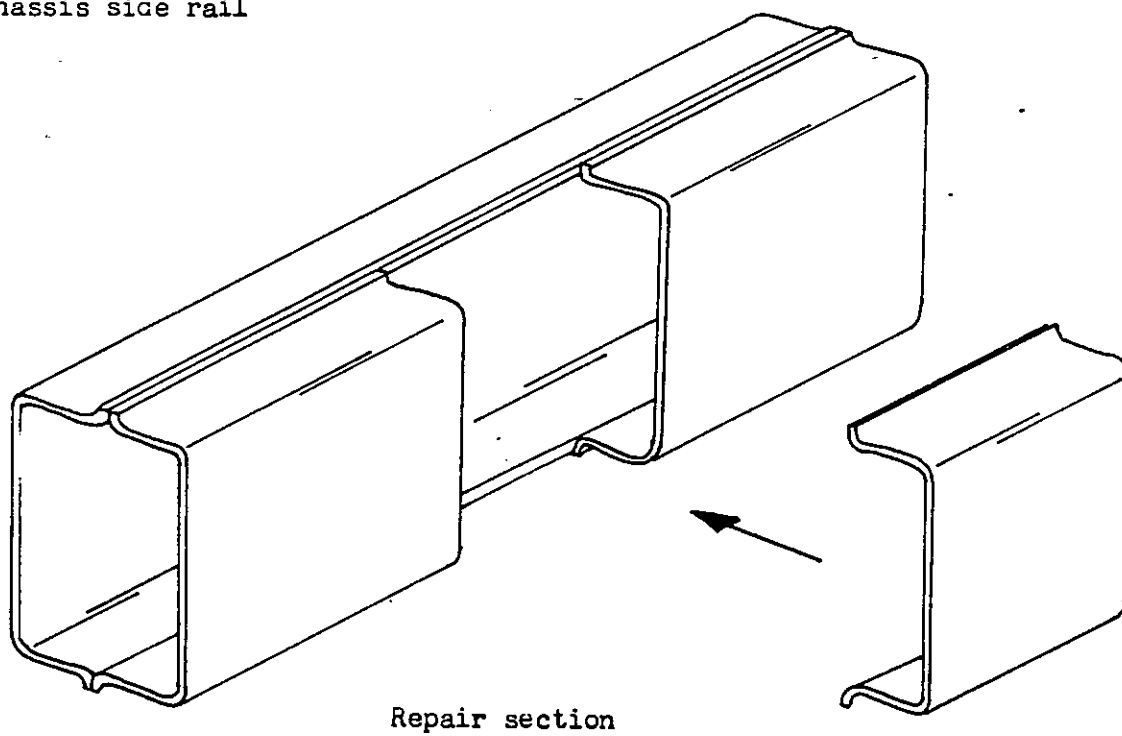


Fig.29.



Cross section of hole



Repair plate in position



Weld



Grind

Fig.30.

piece I had just cut out, I found that the holes were the only damage and the rest of the section was good clean solid steel. Having found this I decided to plate the rest of the holes. First, I had to replace the section that I had first cut out. I trimmed the new section until it was a good fit in the gap in the chassis. When I was pleased with the fit I clamped it into position and carefully welded down all sides. Being of a heavy gauge material, this didn't cause too much of a problem. I finally ground off all of the excess weld.

Having decided to plate the remaining holes I started by preparing the area around each hole. I first ground the area to show clean bare steel and then beat the surrounding area so that the repair patch would lay flush with the rest of the chassis (see fig 30) . I cut my repair patches out from some sheet steel that I had scrounged. This was of a slightly heavier gauge than the steel used on the body repairs, approximately 16 S.W.G. I clamped each patch over its representative hole and welded all the way around. In some instances it was necessary to clamp and tack as I went to make sure that the plate lay flat. As always, I ground off the excess to make a neat job (see fig 30).

Battery Cradle Repair

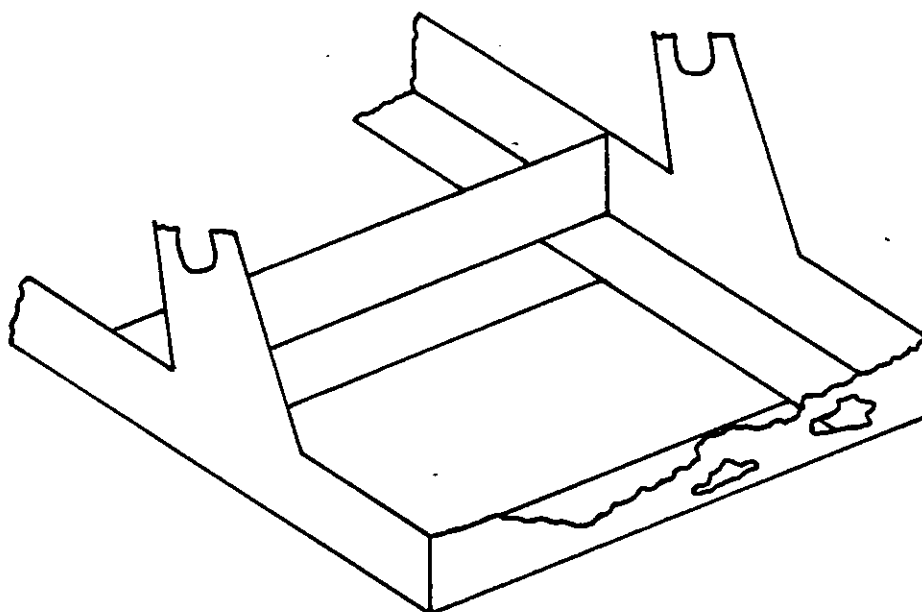


Fig. 31.

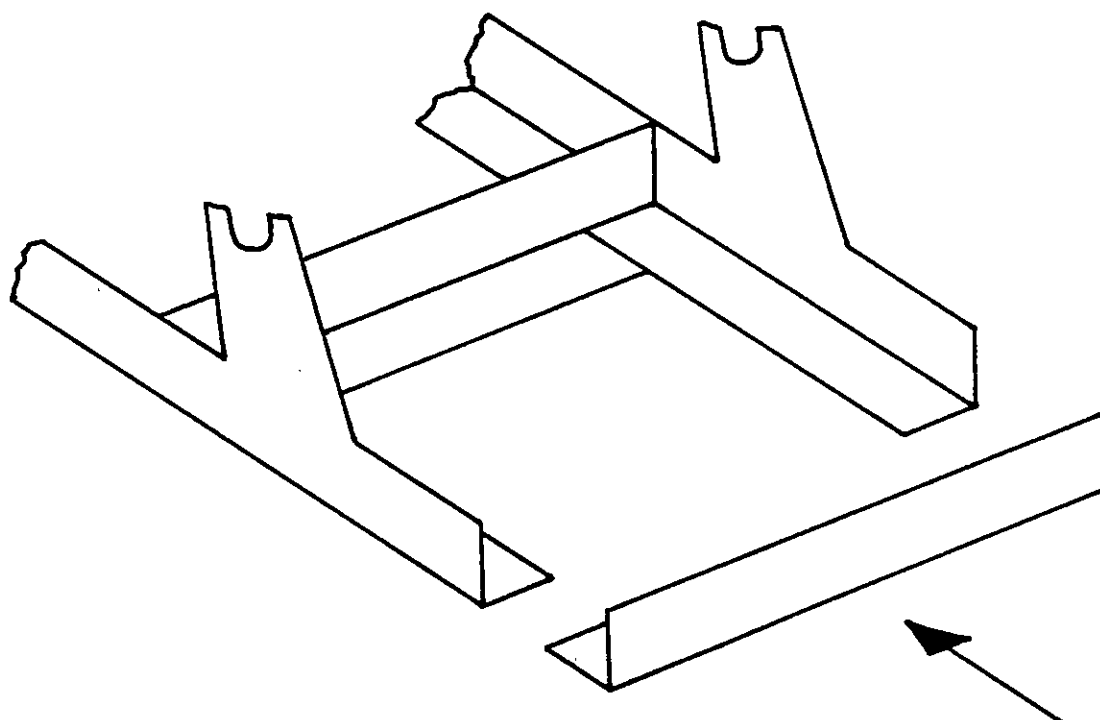


Fig. 32.

Battery Cradles

When restoring your MGA, you'll more than likely find that one or both of your battery cradles are partially or totally rotten. My offside cradle required a small repair to one of the battery support members but the nearside had been repaired with some inch wide steel plate. As this one was too far gone I decided to replace it with a complete new cradle. As usual, I first made a dimensional sketch of the position of the old cradle, of course I still had the other cradle to compare it with. Satisfied that I had enough information I ground off the cradle leaving just a trace of it around the tubular cross member. This would help me position the new one. Because of its awkward shape I could clamp only the bottom of the cradle to my new rear floorboard rail. I pulled the top off the cradle up to the tubular crossmember with some fairly thick wire. The cradle could now be welded and ground.

The other cradle wasn't too bad and only required a minor repair across the back, see fig 31) I cut the damaged section out leaving the side rails complete (see fig 32). To make my repair section, I cut a strip from some 18 S.W.G. steel sheet and then folded it in my vice to make an angle section. Finally, I clamped

60).

and welded the repair section into position, (see fig 32) and then ground off to finish.

Finishing The Chassis

Having finished the battery cradles, all that was left was to clean and paint the chassis. If you have access to some transport and can afford it, the most effective way to clean your chassis is to have it sand blasted. After this process your chassis will return to you rust free but be careful, if you have left any weak points unrepaired or the blaster over does it a bit on the lighter gauge sections, you could have your chassis returned with more holes in it or with some distortion.

I took the harder route, using an angle grinder with a wire brush and an electric drill with a carbide sanding disc. This method took a lot longer but if you can't get your chassis blasted, it's the only way.

Everybody I speak to has their own pet favourites for the correct chassis paint to use and they'll all tell you of good and bad points of each paint. I actually read some good reports on the materials that I used so it was heartening to hear that my choice wasn't all that bad. I found that the best way to

paint the chassis was with it stood up on its side. This way I could get to a good ninety percent of the chassis. I started with a coat of beige Finnegans No 1 primer and left it to dry overnight. The following evening I turned the chassis on its other side and finished the first coat. The following two evenings I gave it a second coat of No 1 primer but this time using the dark brown to guarantee a complete coverage. At this point I decided to treat the chassis to a litre of Tex Super Seam Sealant which I painted over every weld, seam or any other orifice that might harbour moisture. I finished the chassis with three coats of household gloss paint, the first and last coats being black with a second coat of a lighter colour again to guarantee that I didn't miss any spots.

To finish the chassis off, I decided to fill it with Waxoyl. By doing it at this stage I could turn it over to swill the Waxoyl around inside the chassis rails. Rather than drill them, I punched three holes along each side rail, one just behind the passengers, one in line with their knees and one at their feet.

The reason for punching the holes was so as not to leave swarf inside the chassis that could turn to rust. I finally sprayed as much Waxoyl as I could through the six holes and swilled it around to try and cover as much of the inside as possible..

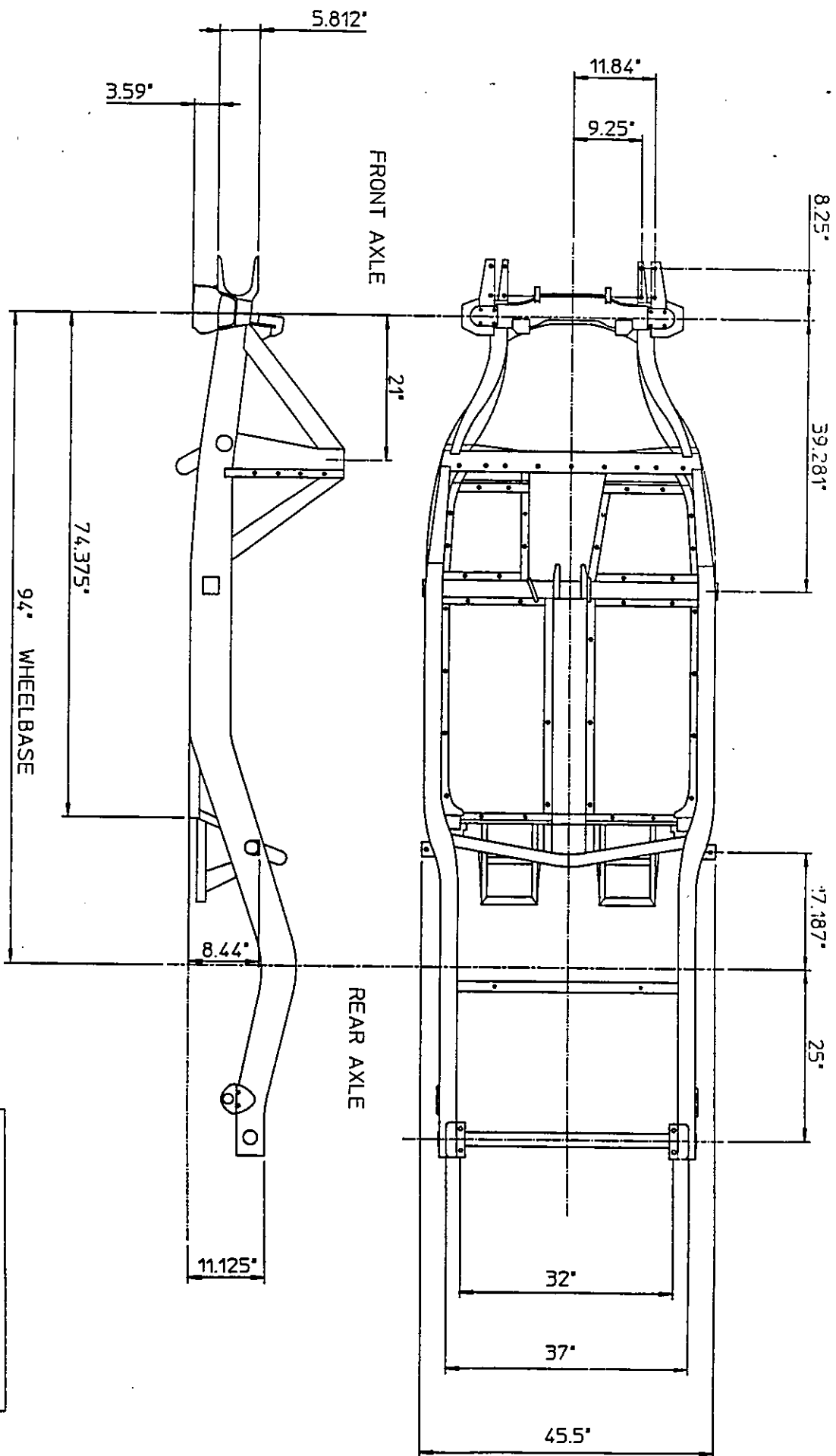


Fig. 33.

MGA CHASSIS

CHAPTER 6THE FINISHING TOUCHES

With the body repaired and the chassis painted, all that was left was to reassemble the car. This, as they say in all good books, is a reversal of the disassembly. I found the Parts Manual a most invaluable book to have in my possession. This book lists every part used in the MGA and includes exploded views of all sub-assemblies.

I first completely assembled the chassis back until it was almost drivable. I won't go into the rebuilding of the engine etc as this is adequately covered in any good MGA Workshop Manual. I will however try and enlighten you with some of my experiences appertaining mainly to an MGA restoration.

Floorboards

I cut my floorboards from an 8' by 4' sheet of 9mm. exterior plywood. By laying the old boards onto the sheet I could see the most economical way of cutting my boards out. I actually had a sheet 2' by 4' left over., I drew around the old boards with a felt tip pen and then cut out each shape with my electric jigsaw. I dropped each board into it's relevant position in the

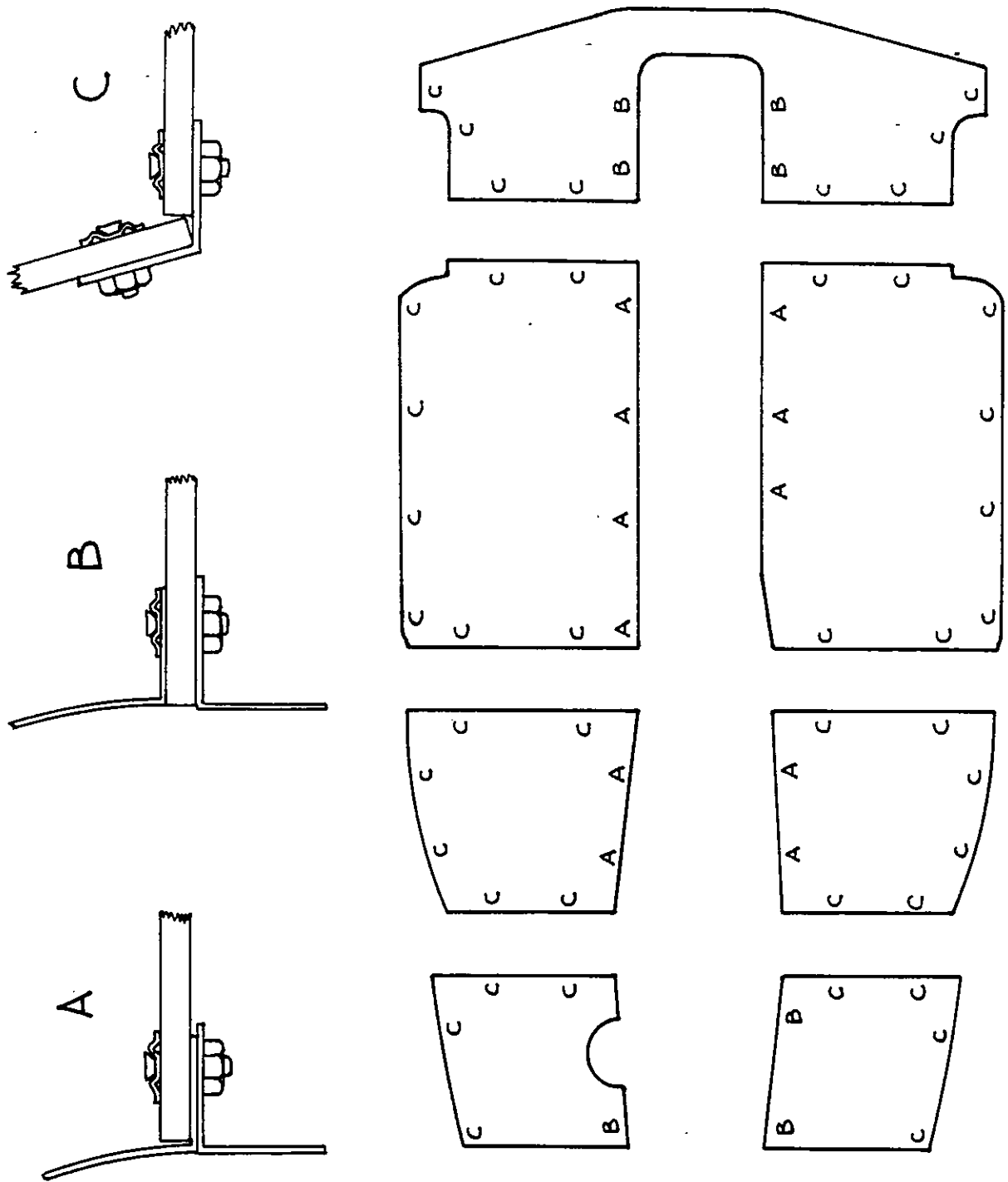


Fig. 34.

chassis to make sure of the fit and made any necessary adjustments. When this was done I lay all of the boards in the chassis and spotted up through each captive nut to make the fixing hole positions. These were duly drilled as slightly oversize clearance holes to allow for any positional error. To protect the boards I started with two coats of clear Cuprinol, three coats of yacht varnish and finished them off with two coats of blackboard paint. There are several methods of fixing the floorboards depending which part of the chassis they are attached, (see fig 34). I fitted all of the boards except for the two main large ones under the seats which gave me a bit more room later on in the assembly. Before assembling each board, I ran a bead of caulking sealant around the frame to make a weather tight seal. Don't use the silicone type sealants with a citric acid base as I believe these can do some damage. I heard a story of someone who sealed a windscreen down onto the body of a Frogeye Sprite and when he later removed the screen there was a series of holes right across the top of the body. The screws and special washers can be bought in sets but I just purchased a hundred of each which gave me enough screws for the door hinges, hood frame etc.

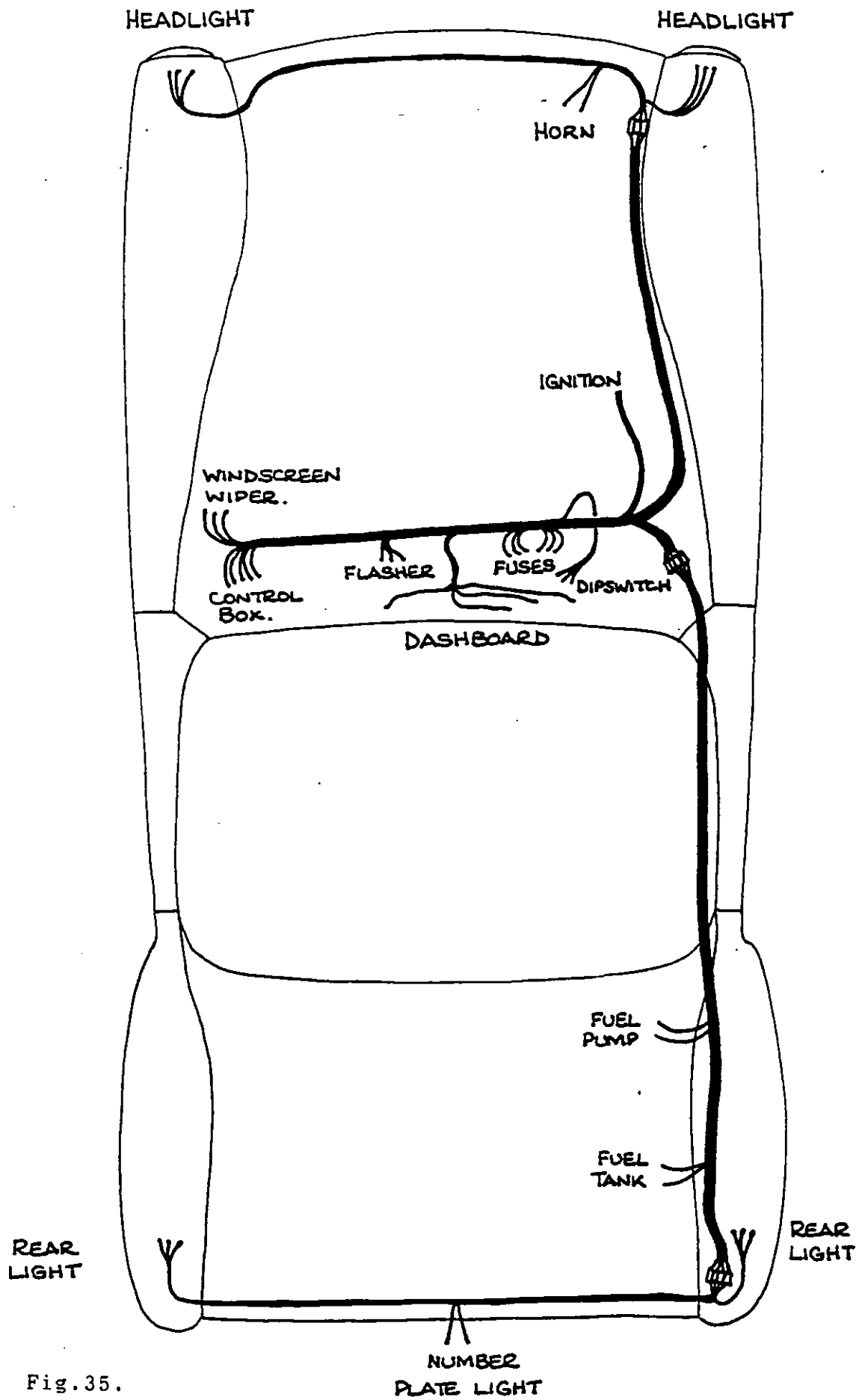


Fig.35.

Wiring Loom

I bought a brand new wiring loom which came complete with most of the connections and main panel lights, however I did have to salvage a lot of bullet connectors from my old loom. When I first took the loom from its polythene bag it was just a jumble of coloured wires, however I decided to sort it out methodically. I lay the loom out on the living room floor in roughly the shape that it would run in the car, (see fig 35) and then using the circuit diagram I labelled each wire end up with its destination ie offside headlight main beam, nearside front indicator etc. Once I had labelled the loom, I fitted the bulk of it to the chassis leaving the parts that went to items on the bodywork, until that was fitted. The loom was supplied in four main pieces which are connected together by groups of bullet connectors, 1). feeds rear lights 2). runs from rear lights to bulkhead, 3). runs from bulkhead to front lights and 4). feeds the front lights. I fitted sections 1, and 2 to the chassis at this stage.

Before doing anything else, I thought I ought to start the engine just in case there were any problems. I connected the radiator and loosely secured it to the chassis with some wire.

68).

I next connected the tachometer and oil pressure gauge as I thought these to be the most important. The water temperature sender hole was plugged with the old sender unit and then the water system filled. I lastly wired in a simple circuit as shown in fig 36. and connected an old 12 volt battery. The great moment had arrived. After a few turns, it fired up and to my horror there was a knocking coming from inside the engine. After a great deal of investigation, I discovered a very loose rocker. With this adjusted correctly, it ran as sweet as a nut with good oil pressure.

Fitting the Body

With the body still up on the scaffolding, I thoroughly cleaned it and then sprayed all of the inside areas with two coats of Ault and Wiborg APS 1 primer. I then covered all of the seams and moisture traps with seam sealer and finished with a final coat of APS 1. I had had some Chariot Red cellulose mixed up which I sprayed three good coats all over the primed areas. I do not profess to be an expert on spraying so I won't cover this in detail and there are plenty of good books around covering this subject.

As I had repaired the body on the chassis, it was no surprise that we had no problems in putting it back on again. One tip is to lower the fuel tank and then bring its spout back up through the boot floor when the body is in position. I found that expanded foam pipe insulation made a good substitute for the rubber strip that runs between the body and the chassis side rails. I used rubberised cork on the chassis pick up and the large area across the top of the chassis.

With the body now back on the chassis I fitted the doors and loosely hung the wings using only a couple of bolts. This would allow the overspray to get down the gap between the wing and shroud. I had the car sprayed professionally as I didn't think I could do as good a job as someone who sprayed cars every day. I also had the misfortune of only having a single garage with about 3' to spare with the car to one side of the garage.

Three weeks later my car was back at home clothed in gleaming Chariot Red twin pack. This was a real turning point, the car looked almost complete. Certainly an improvement on the rusting hulk that had stood there two and a half years before. From here on was a simple assembly process but I will cover a few of the operations that are more common to an MGA restoration.

70).

When fitting your wings, it is a good idea to get the wing beading warm by soaking in a bowl of hot water or by other means. When warm it will stretch and sit nice and flat and not kink. I used a caulking sealant either side of the beading to give a weather tight seal. As mentioned before, don't use the silicone one with the acetic acid base. The easiest way to tell is by its strong vinegary smell. This is where all of your hard work pays off when your wing should go on with a nice even door gap and you should have a nice straight line across the front above the bumper, see fig 16. Another little tip is not to over tighten your wing bolts as this will distort the top of the wing where it meets the shroud. Before I fitted my wings, I pumped Waxoyl into all of the areas that would be inaccessible once the wing was in place.

When I had fitted all of the ancillaries, master cylinder, control box, windscreen, wiper motor etc. I ran in the rest of the wiring loom, (see fig 35) and assembled the dashboard.

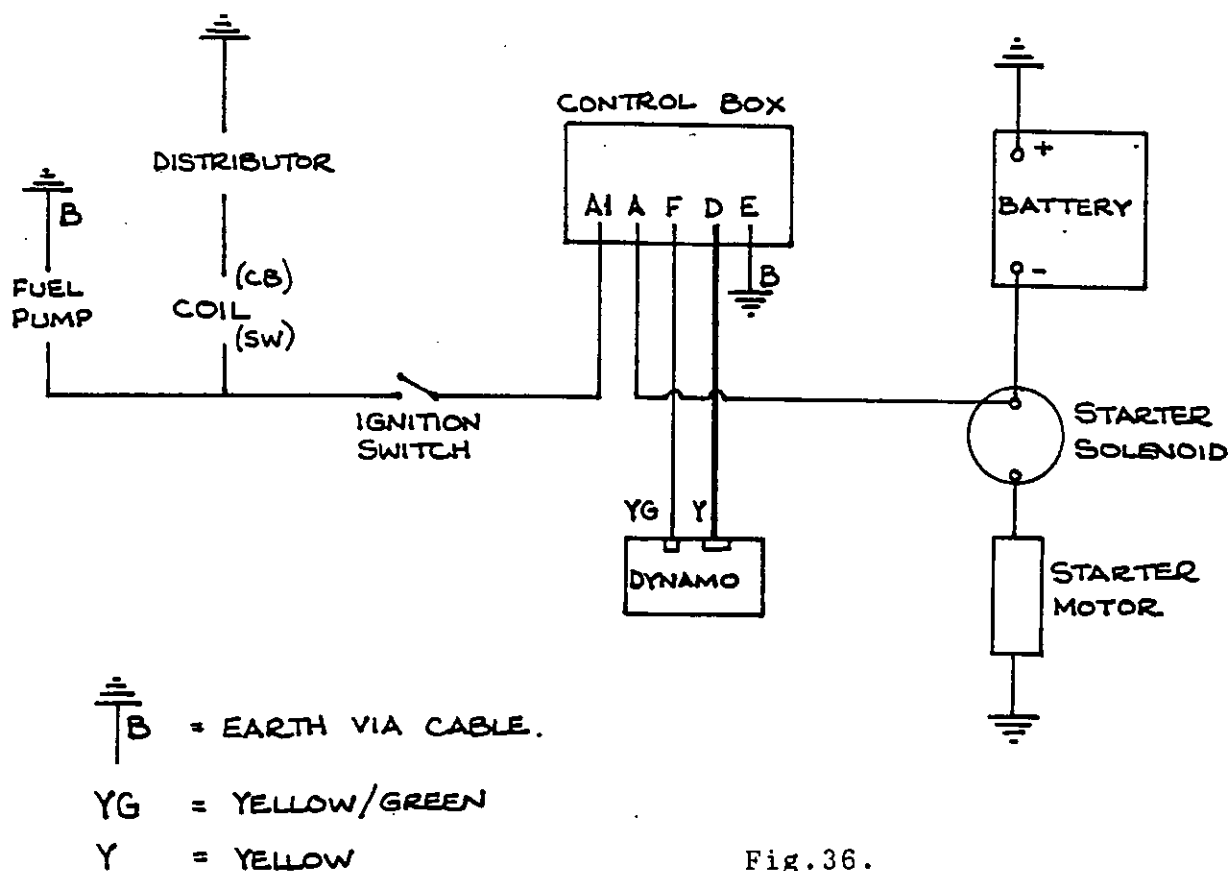


Fig.36.

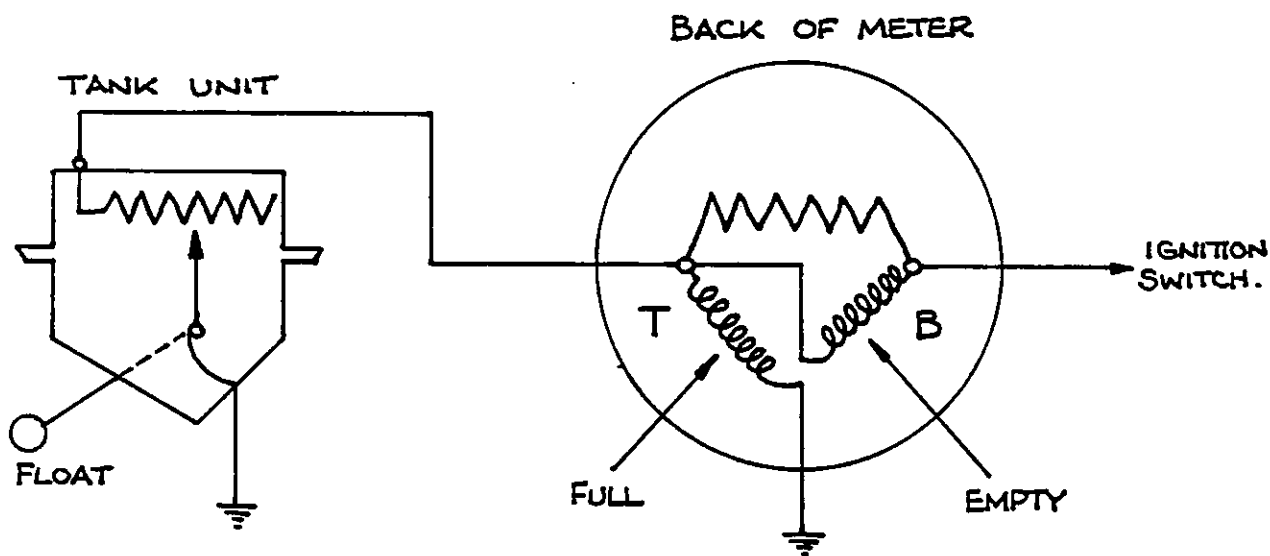


Fig.37.

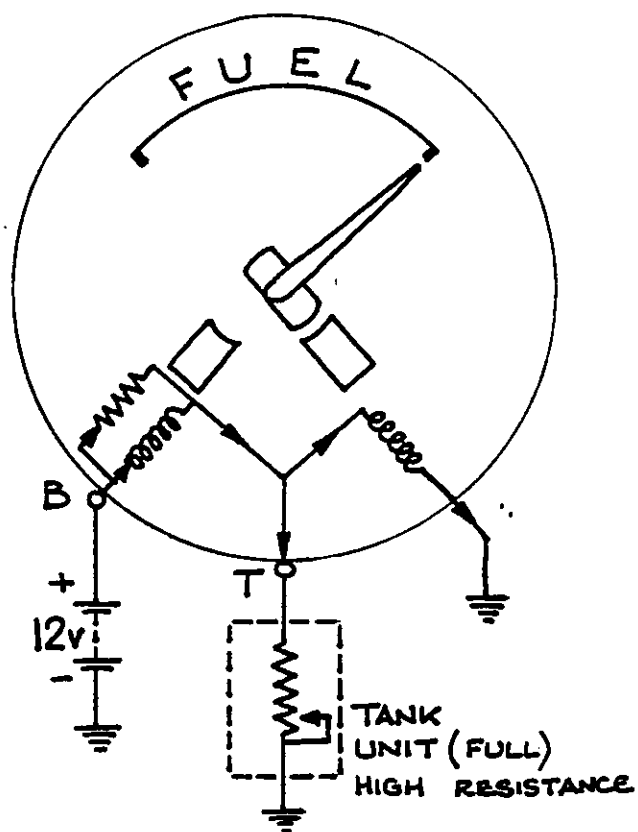
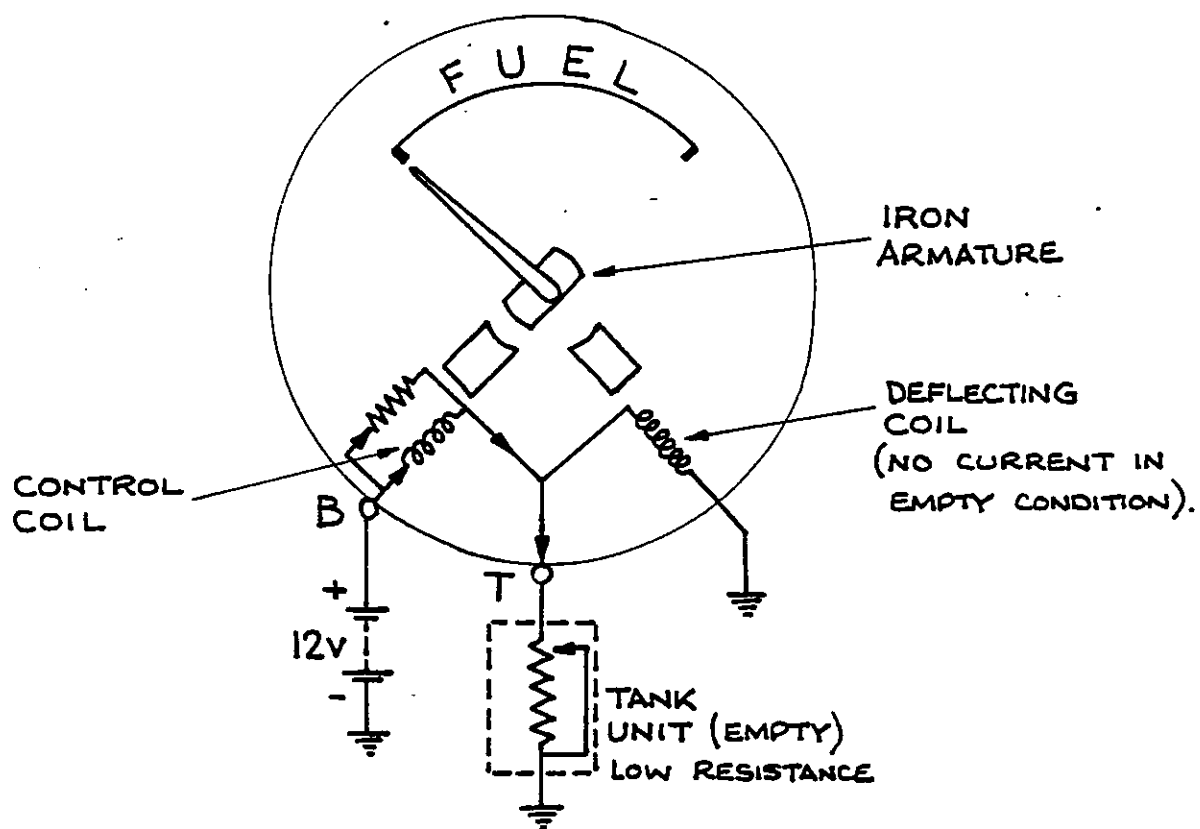


Fig.38.

Fuel Gauges, Dual gauges and Flashers

I won't go into the restoration of the dashboard as this is fairly straightforward but I thought it an idea to share a few of my experiences with you.

My first problem was the fuel gauge. I had determined that the tank sender unit was functioning by putting a multimeter, set on the ohms range, across the terminal and body of the sender. As the float arm was moved up and down, the resistance increased and decreased accordingly. The next step was the gauge. I didn't know much about the Dynamometer or Moving Iron Gauge and tried numerous books and the local library to try and find some information. Eventually by pure chance I stumbled across a circuit diagram in a friend's old motoring book (see fig 37). from this diagram I was able to ascertain that one of the coils inside the gauge was wrongly connected. I corrected this and connected the gauge and sender as shown in fig 38. Using a 12 volt supply. As the float arm was moved up and down then the gauge needle moved accordingly. The theory is that as the float rises (see fig 38) it wipes a variable resistance coil increasing or decreasing the resistance in the circuit.

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The increase eventually courses the current to take the easier path from 'T' to earth. As the force in the coil grows stronger it pulls the needle over to the full position on the gauge dial. As the level in the tank goes down the float arm moves across the variable coil decreasing the resistance. With this lower resistance the current gradually changes its route from the coil at 'T' to a path through the sender and down to earth. Hence the coil at 'B' becomes stronger and slowly pulls the needle back to the empty position.

My second problem was my dual gauge. The oil pressure side worked but the water temperature side had packed up. The previous owner had fitted another water temperature gauge with an electrical sender. I had read an article on how to convert an MGB dual gauge to an MGA Jaeger type so that is what I did. I bought a brand new MGB dual gauge and firstly removed the bezel and glass. If the bezel becomes a little stubborn and won't come off, push the gauge face down on a rubber mat and then twist. With bezel and glass out of the way I carefully levered off the two needles. A small lever as shown in fig 39. is ideal for this but if you can't make one a screwdriver will do. Next, I did exactly the same to my old gauge but being a lot more careful so as not to scratch the dial. I next assembled the Jaeger face to the new gauge and then pushed the

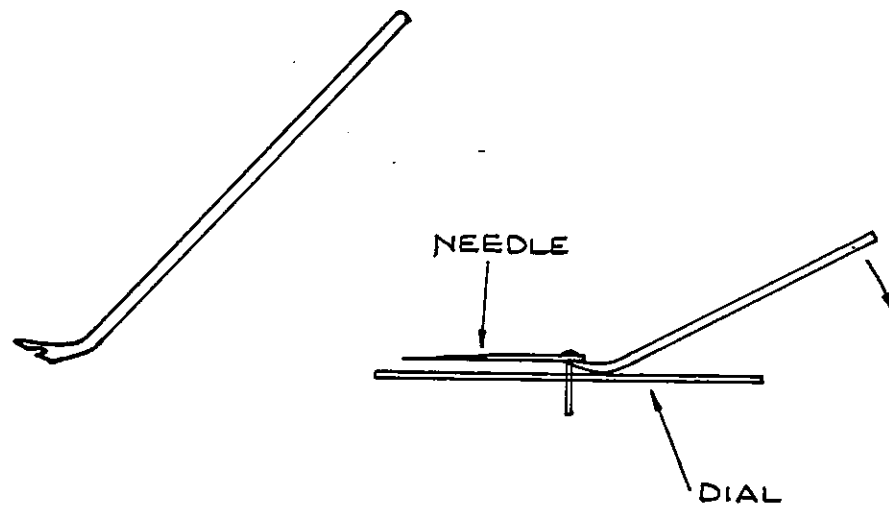


Fig. 39.

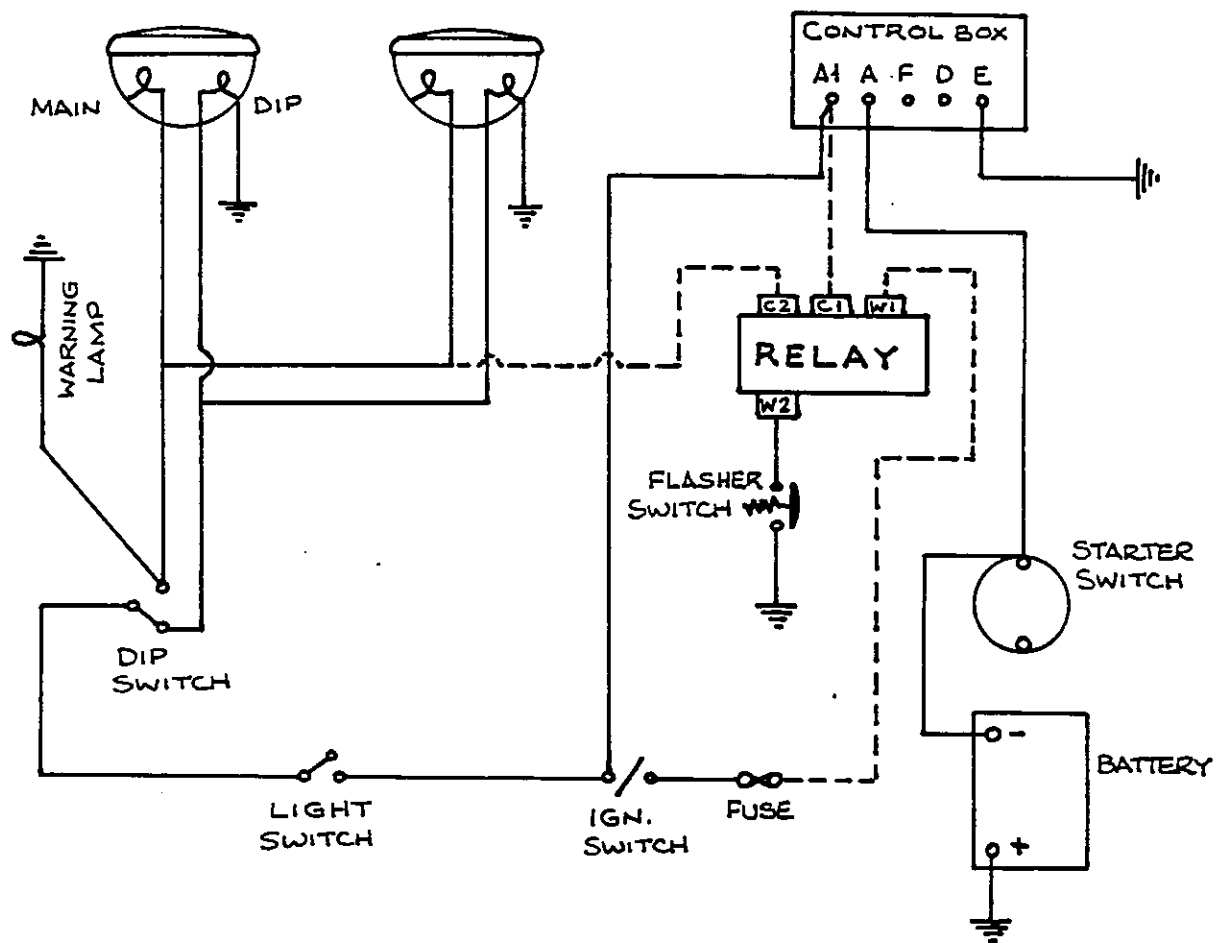


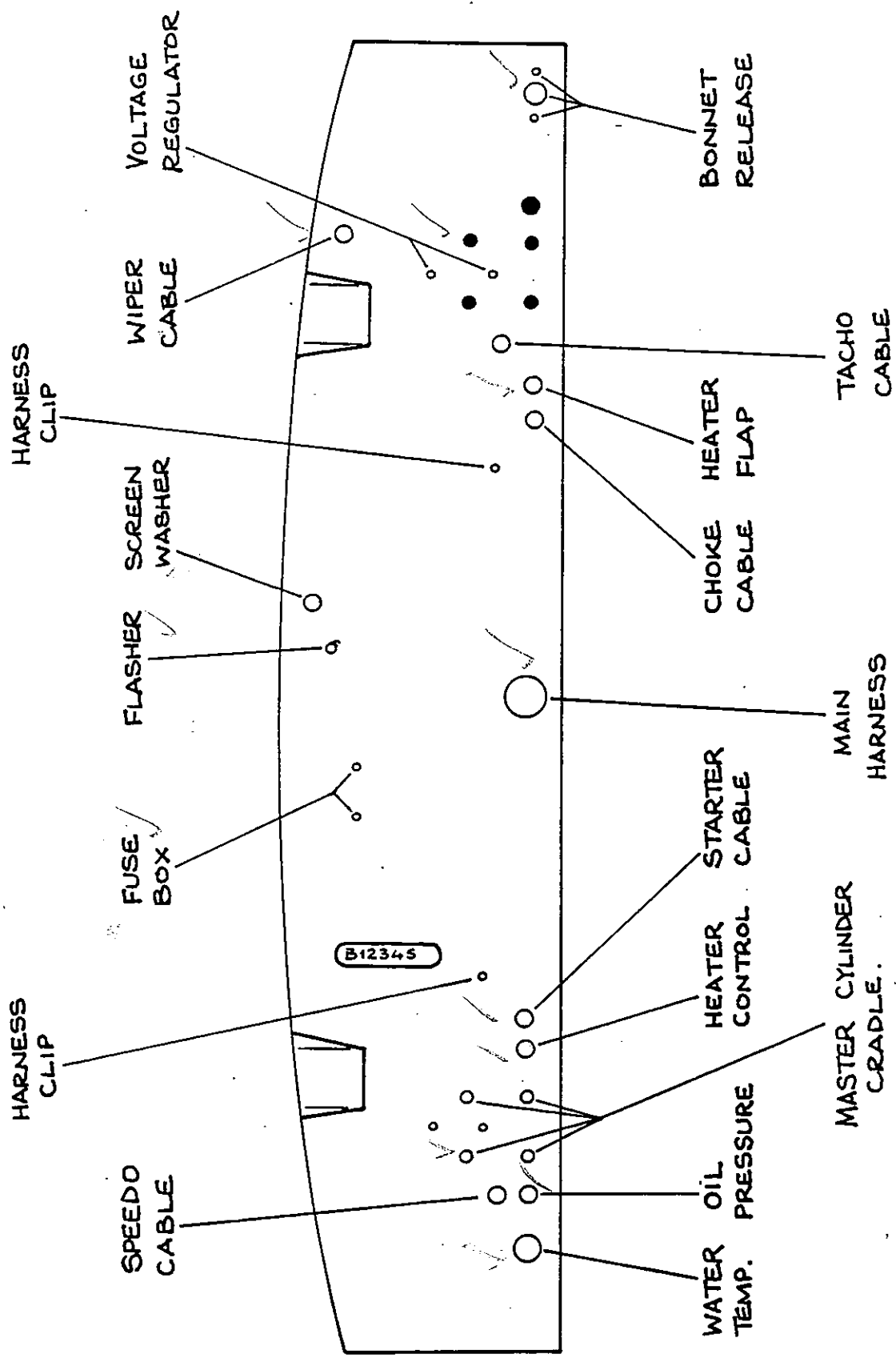
Fig. 40.

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oil pressure needle back on pointing to zero. To calibrate the water temperature gauge, I hung the sender into a kettle of boiling water, left it for a few moments to stabilise and then pushed the needle on pointing to 212 degrees Fahrenheit. Now all that was left was to clean and re-assemble the glass and bezel. One small problem I encountered was that the MGB sender bowl was slightly larger and I had to file some of the hardened sediment out of the cylinder head to get it to fit.

A handy little modification that I decided to fit to my MGA was a headlight flasher. This was an original option and was operated by a long toggle switch situated just above the indicator switch. I was lucky enough to come across a hefty 12 volt relay lying about at work. I assembled this into a small plastic box and wired it into some blade connectors mounted on the outside. I worked out which was the low switching circuit and the high operating circuit and marked the connectors accordingly. I mounted the relay up under the dashboard and wired it into a small push button on the dashboard, see fig 40.

The wiring loom that I purchased didn't come with the dashboard loom, although it did have the main connections and bulbs. Again, I turned to my old loom and using some of the old wire,



RIGHT HAND DRIVE CAR.

Fig.41.

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I connected up the various switches on the back of the dashboard. I marked each one off in red on a photocopy of the wiring diagram so as not to forget anything. Of course you could buy new wire but I found the old loom perfectly adequate. When the dashboard was complete I assembled it loosely so that I could fit the trim before tightening it up. I found the best way to work was sitting on the transmission tunnel with the dashboard upside down on my lap. I next routed all of the cables etc through the bulkhead and I have drawn a diagram that I believe from my investigations shows the correct route for each cable. See fig 41.)

Trim

My next course of action was to trim the interior. As I couldn't afford to buy new seat covers, I had my seats re-upholstered and covered by a small upholsterer in Hemel Hempstead. The upholsterer used my old covers as patterns and his price suited my pocket. I bought a complete cockpit trim kit from one of the well known MGA specialists which included all interior panels, door pockets and enough hide, vinyl and piping to trim all of the cockpit rails.

My door cappings were rotten so I decided to completely refurbish them. I bought the two wooden rails in a sale for less than half the normal price, then I found out why. The rails were about a half inch too wide. After stripping off all of the old leather and wood I screwed the wooden rail to the cast curve and roughly marked how much I would have to remove. I then removed the rail from the casting and proceeded to plane off the bulk of the excess material. As the rail took shape I screwed it to the casting and then finished shaping it with a surform and finally sandpaper. As well as matching the front, make sure that the back of the wooden rail is the same width as your rear curved casting. As the original rail had captive studs to fix it to the door, I had to make the same arrangement on my new rail. I offered the rail up to the door and marked through the holes in the top of the door onto the underside of the wooden rail. I then drilled a hole to accept a 1/4" UNF screw and counterbored the top slightly smaller than the across corners dimension of the screw head. By doing this, I could force the screw down through the rail so that it wouldn't turn. To make quite sure I poured Araldite down into the counterbores to secure the screws. I believe that on some early 1500 models the whole door capping was made of wood. Anyway, with the rail nicely shaped, I now had to replace the hardboard that forms a base for the cast curve. I cut enough hardboard from a sheet to

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cover the base of the casting and then soaked it in boiling water. After several hours the hardboard should be soft enough to bend around the curve of the casting. I clamped it into position and then secured it using self tapping screws. With the board securely in position, all that was left was to trim the excess hardboard off up to the edge of the casting. This I did with a junior hacksaw. Finally, I reassembled the rail and casting and filled any gaps, cracks or screw holes with polyfilla. This was rubbed down and all sharp corners removed.

With my rails complete, the next job was to cover them in leather. The door cappings and rear cast curves were covered in hide whereas the two other rails were covered in vinyl. A good tip to remember is to soak the leather overnight in water. This makes it nice and stretchy and it'll pull over the end of the rail without having to make folds on the corners. Lay the leather upside down on a clean work area. I worked on an old pair of corduroy jeans so as not to scuff the leather. Starting at one end gradually stretch the leather over the corner and tack into the underside of the hardboard or wood, depending on which end you start. I used a heavy duty stapler that I borrowed from work. Gradually work along the rail pulling the hide up either side, around the back and tacking it.

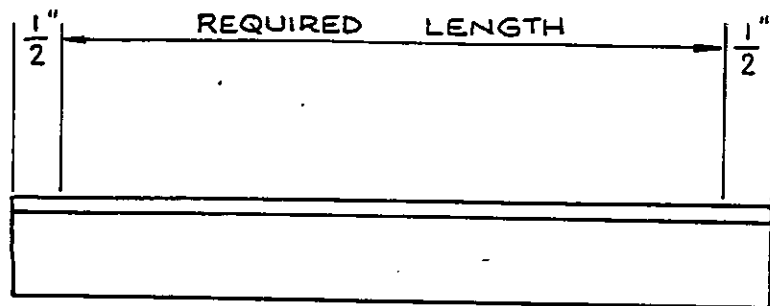


Fig.42.

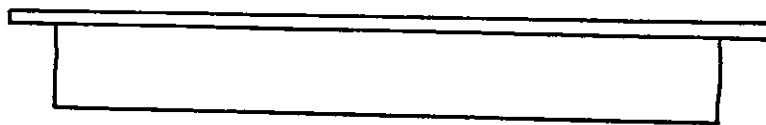


Fig.43.

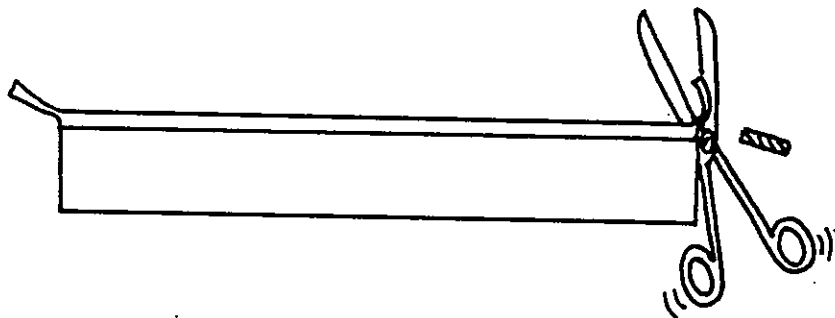
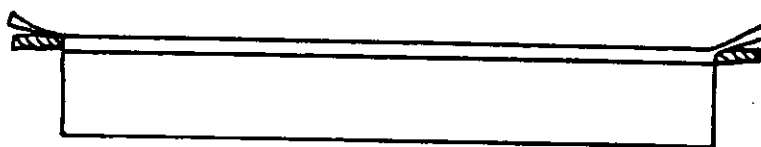


Fig.44.

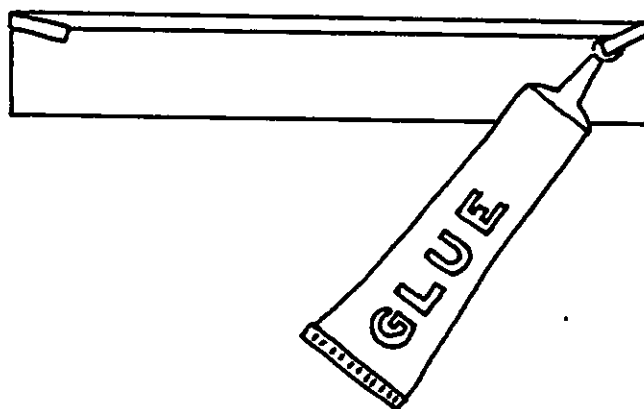


Fig.45.

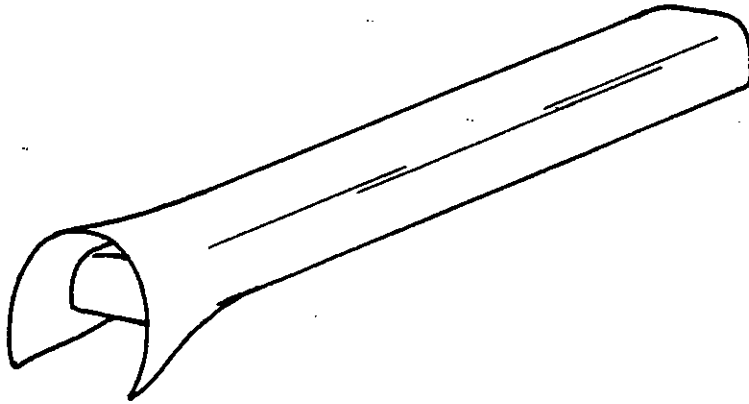


Fig. 46.

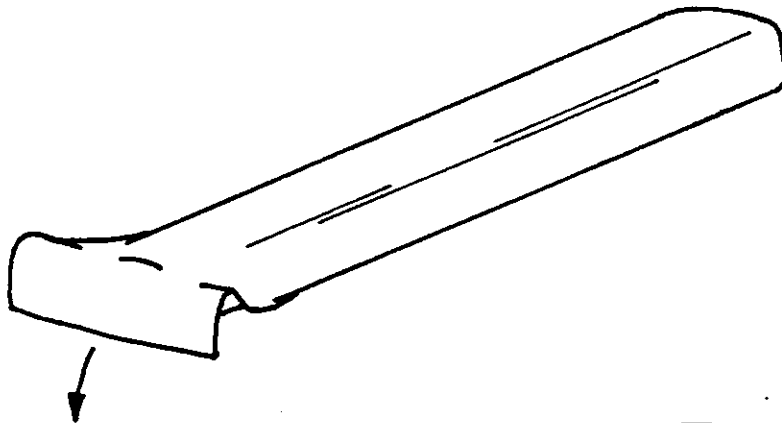


Fig. 47.

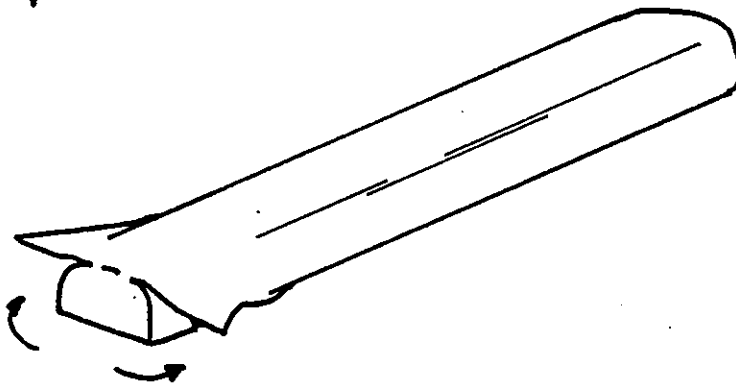


Fig. 48.

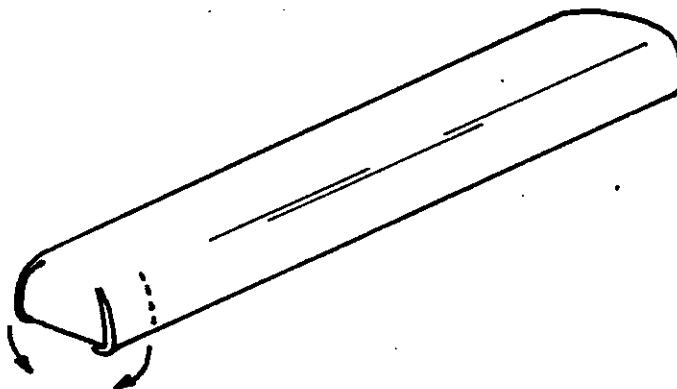


Fig. 49.

You will get quite a bunch of leather at the back. When you have finished, trim the excess away with a stanley knife to leave a flat back to the rail.

The piping is first cut to the length of the rail plus a half inch at each end. See fig 42. Cut away the half inch of flap to leave just the pipe. See fig 43. Pull back the vinyl covering from the half inch of piping and cut off the half inch of piping sisal. See fig 44. Now fold and glue the remaining flap back over the piping to make a neat end. See fig 45. When you have prepared your piping in this manner, simply tack it along the outside edge under the rail. The other cockpit rails are made in almost the same manner except that you can't stretch the vinyl in the same way as the leather so the ends will have to be folded. Some modern vinyls will stretch when warm but I used the canvas material that is similar to the original material used. First tack the vinyl along the length of the rail leaving about three inches tack free at each end, see fig 46. Fold the end down flat on the end of the rail, see fig 47. and then fold the excess material sticking out each side back down the rail underneath the top layer, see fig 48. Now fold the top sides down and under the rail to finish off. see fig 49. I suppose the only thing I can like it to is making a bed as instructed in the scouts or may be a first aid course.

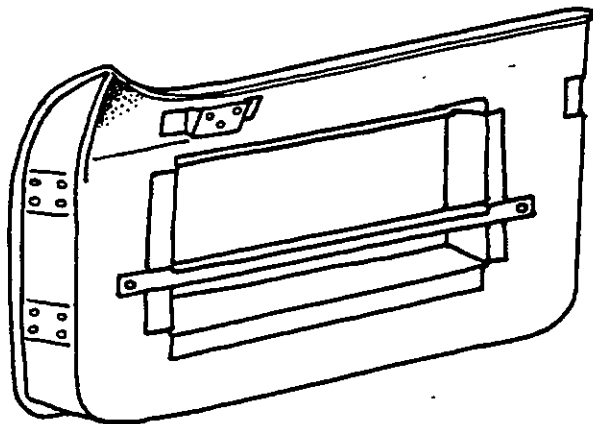


Fig. 50.

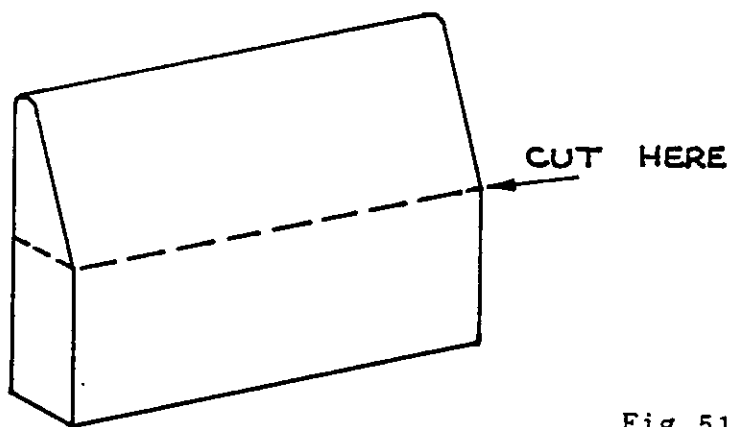


Fig. 51.

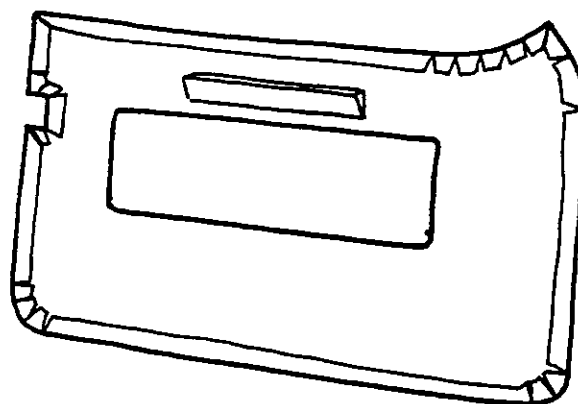


Fig. 52.

Once you have folded it you can determine how much excess you really need and trim the rest off, finish folding and then tack or staple to secure.

As I mentioned before, I bought the door trim ready made. The assembly is fairly straight forward but you do need to know the correct sequence, so I'll outline it for you. I first passed the door lock pull cord through the hole in the back of the door pocket and then pushed the pocket into position. I believe that the pocket should be pop riveted into position but I found it easier to use self tapping screws. I next offered up the steel, pocket capping rail. There were already a few holes in the door for this so I attached it using the various holes and by offering up the door trim I found the correct holes. See fig 50. The capping rail was then screwed into position. Although I didn't have it, there should be an angled piece of wood behind the door trim just above the pocket. This wood supports the trim as it angles up to the top of the door. I happened to have a length of 4" skirting board in my shed which gave me an idea. I cut it into two. one foot lengths and then cut along the length to remove the angled portion from the parallel portion, see fig 51. This angled piece was then glued to the back of the trim panel as shown in fig 52. Finally, the panel was

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offered up to the door, drilled and secured with trim screws and washers. I took the positions of the screws from various books showing original photos of MGA interiors.

The carpets were a fairly straight forward fitting operation. I bought a complete set which includes every little piece required to fit out an MGA. It is possible to buy a rear carpet set for the battery cover etc. but this wasn't original. I started by gluing in all of the pieces of carpet that surround the main floorboards i.e. the chassis rails and board behind the seats. I used about a litre of Dunlop impact adhesive. This stuff should be applied in a well ventilated area as the fumes are very strong. Prior to gluing, I fitted each piece carefully trimming to make sure it fitted correctly. When I was happy with the fit, I liberally coated each surface with the adhesive, left it for 15 minutes and then positioned the carpet and pushed it neatly home. The most awkward piece was over the transmission tunnel due to it's size. This I glued in several stages so that I wouldn't have it sticking to everything. I first glued the centre of the carpet piece which would run down the top of the tunnel leaving two flaps. When that was positioned, I glued the flaps down. I found it was necessary to pad the area around the gear stick with some expanded foam

similar to a bath sponge. The main carpets are fitted by a similar method to the tonneau and hood. I first screwed the press studs into the floorboards in their respective position. Unlike the studs for the tonneau these do not have nuts but a type of wood screw protruding from the bottom. I found it helped to drill a pilot hole to start the screw off. I next marked the top of each stud with some chalk and then laid the carpet into position. The chalk marked the position of each hole on the underside of the carpet. I lastly punched each hole through and attached the female press stud fittings. I had already drilled my seat fixing holes so I pushed up through these and through the carpet.

Brightwork

One factor that really sets a car off, other than the paintwork, is the chrome plating. I often think it would be nice, when asked the question, did you do the whole restoration yourself, to be able to say yes and I even set up a chrome plating plant in my bathroom. Unfortunately, my wife wouldn't let me. I decided to have my original bumpers re-chromed as the reproduction type never look quite right. The front outside bumper sections for instance were originally flat on top but a repro bumper always has a slight ripple across the face. I was a little disappointed when I collected my bumpers as they had

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been selectively plated on the outside only and the inside had been sprayed with some silver paint. There was a lot of loose flaky material inside under the silver paint. I didn't want to leave this obvious rust trap so I cleaned out all of the flaky debris and gave the inside two good coats of silver Hammerite. After two years motoring the insides of the bumpers are still clean.

If you have your windscreen frame chromed, be sure to tell the plater to go easy when polishing it. Too much heat will lead to distortion and a hell of a job when re-assembling it. I have spoken to several people who have broken up to three screens trying to assemble it with a distorted frame. Another tip is to use Neoprene in place of the rubber strip as this will give more, and allow for slight distortion. To the best of my knowledge, it is not possible to chrome plate the cast parts such as the screen grab handles or oval air ducts so these are best replaced with new items.

I found the best way to attach the bumpers to the car was first to loosely assemble the complete bumper assembly with it's irons. On the front you have to remove the two outer bumper irons from the chassis extension and then offer the bumper onto the car.

Replace the irons and gradually tighten all of the nuts up moving the bumper into its correct position as you go. This job sounds very easy but it took a lot of patience to get the right fit.

I haven't covered a complete MGA restoration as most of it is common sense but I hope I've touched on just a few points that you are more likely to find on an MGA. If you have any more problems, the MG Car Club has an MGA Register with a keen committee who I am sure would be more than willing to help. If you are Stateside, the North American MGA Register has over 3500 members and are also very keen.

Happy MGA motoring.

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CHAPTER 7

TOOLS AND REPAIR SECTIONS

As well as spending out on all the parts and materials for your restoration, you also need a good set of tools. There are certain tools now in my collection that I feel have really paid their way.

The angle grinder is one tool that immediately comes to mind. I was lucky to find mine, a Black and Decker 4 1/2", knocked right down in a local tool shop sale. This grinder has had endless uses. Initially, the 4 1/2" grinding wheels came in handy for taking off excess weld or rusty metal, removing rusty bolt heads or nuts and cleaning up rough surfaces. For finer surface work a sanding disc can be fitted. The 4 1/2" cutting wheel was very handy when I cut off the front and back of the shroud. I went through too many wire brushes to count in taking away rust from the chassis or body. Another handy attachment is a polishing mop which I haven't personally used. So you see this one little tool is really priceless.

The second tool in my kit that I couldn't have done without is the Mig welder. I bought the Cebora which was the first of the cheap mini-migs to hit the market. If I'd waited I could have had a more sophisticated model for a few pounds more but that's

life. The Cebora has two power settings for heavy or light gauge welding and a variable wire feed. I found it very easy to use having done some Arc and Oxyacetylene welding in my apprenticeship some eighteen years before but I'm sure anyone could pick it up with a little practice.

The electric drill goes without saying as this has endless uses with a selection of tools like drills, carbide discs, sanding discs, wire brushes and polishing mops.

Another power tool and just as handy is the electric jigsaw which obviously comes into its own when making your floorboards. This tool made what could have been a lengthy process, a couple of hours work.

Mole grips come in all shapes and sizes and I was lucky enough to own and borrow a small selection of these. Mole grips are the perfect substitute for 'G' clamps or tool-makers clamps of which the latter I did also use during my rebuild. As I said, they come in all shapes and sizes. The standard plier type I used to clamp panels together for welding. I also used them to clamp nuts to washers and subsequently the repair panel when

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making captive nuts. For those awkward areas a pair with a very deep throat are available or you can get some with wide flat jaws.

A good pair of tinsnips is another invaluable asset. The offset type are the best which come in left or right hand. I bought a pair of the ordinary flat scissor type and they wouldn't cut through a piece of paper let alone 19 S.W.G. mild steel sheet.

A blowlamp is not as obvious a choice but of course it was invaluable whilst doing the lead loading. The main problem is that you tend to go through gaz bottles like anything.

The engine hoist I couldn't afford and so I hired a mobile hydraulic hoist overnight for under £10. I was lucky to pick up a Burgiss airless spray gun at a boot sale and with this I sprayed the inside of the body, wing, boot, bonnet and splash panels.

One or two small tools that also came in handy were the three taps of the most common threads used on the MGA being $\frac{1}{4}$ ", $\frac{5}{16}$ " and $\frac{3}{8}$ " UNF. These came in very handy for clearing out old threads or after welding captive nuts. Naturally these

taps are useless without a tap wrench. That was an item that I had made during my apprenticeship but a small tap set with wrench is not too expensive.

Finally the one thing, although not strictly a tool, was the scaffolding. This I was lucky enough to acquire from a good friend and without it I don't know where I would have put the body. With only a short drive and no access to my back garden the only place to put the finished body was over my head. Whilst working on the chassis, the body was supported about five and a half feet off the ground. Needless to say, I banged my head a couple of times. One advantage of having the body in this position was that I could roll the finished chassis onto the drive and get to the underside of the body to spray it.

These are some of the main tools that I felt I couldn't have done without which leaves spanners, screwdrivers etc which are usually part of any bodies tool kit.

Repair Sections Available

One thing that makes our task easier is the number of repair panels available. All of the MGA parts specialists have over the years built up a very comprehensive range of repair panels and nowadays just about every part of the MGA body is available. One of the most common areas of rot on the MGA body are the door pillars, sills and surrounding areas. Some sell the door pillars and sill section separately where as others sell them as a complete goal post or 'F' section. The area behind the door posts also rot and these panels are also available, the front panel coming complete with the angled plate that runs up the chassis. The rear panel is complete with the captive nuts for the hood frame. The small panel that supports the battery cover is also prone to rust and is also available.

Moving towards the front of the car the inner wheel arch and surrounding panels are available as is the front half of the shroud that surrounds the grill orifice. The duct panel can be supplied with or without the front curved portion that the front valance is attached to. The bottoms of the wings are prone to rust as is the section around the headlamps and repair sections are available for these areas. Rust isn't the only reason for repairs as a rear end shroud can be repaired using a new panel

which starts across the bottom of the boot opening and continues down behind the bumper. The sides of this panel are also available.

To list all of the repair panels would mean listing just about all of the panels on an MGA but I feel that I have covered some of the main areas. If you're really stuck you can buy a complete body.

APPENDIX A
IDENTIFYING YOUR MGA

Have you ever thought what all of the letters and numbers on your car's chassis plate mean. The 1500 MGA numbering system carried straight on from the M.G. TF, the last TF being number 10100 and the first MGA 10101. The 1500 code seems to have more information in it than the 1600 and was made up as follows.

1st character denotes the model

H = M.G. Midget (TF) or MGA two seater

2nd character denotes the type

D = Roadster

M = Coupe

3rd character denotes the colour

A = Black

C = Dark Red

D = Dark Blue

E = Mid Green

K = Light Red

L = Light Blue

R = White

T = Light Green

4th character denotes the class

1 = R.H.D.Home market

2 = R.H.D.Export

3 = L.H.D.

4 = North American

5 = Completely knocked down - R.H.D.

6 = Completely knocked down - L.H.D.

CONTD.

5th character denotes the paint

1 = Synthetic

2 = Synobel

3 = Cellulose

4 = Metallic

5 = Primed

The actual chassis number then followed the code.

The introduction of the 1600 brought with it a brand new coding system and was made up thus.

1st character denotes the manufacturer

G = M.G.

2nd character denotes the model (cubic capacity)

H = 1400 - 1999 c.c.

3rd character denotes the body type

N = Roadster

D = Coupe

4th character denotes the model series

= MGA 1600 (no number used)

2 = MGA 1600 Mk.2.

5th character denotes the specification

= R.H.D. (no letter used)

L = L.H.D.

The chassis number also followed the specification code as in the 1500 MGA. Some 1600 Mk.2's had the fourth and fifth characters swapped around. The colour code used in the 1500 number was discontinued and so owners wishing to find out the original colour of their 1600 will have to contact The British Motor Industry Heritage Trust (Address below). So now you all rush outside and check that your plate matches up to your car.

APPENDIX B

INSTRUMENT IDENTIFICATION

I recently had doubts about the Tachometer fitted to my MGA as it seemed to be reading too high in comparison with the speed of the car. A friend offered me another Tachometer to try and it was then that I realised that there were several different types. Identification is made by a small code printed on the dial of the instrument. When I checked I found that I did have the correct Tachometer fitted and so there must be a problem with it. I have listed the codes below so that you may check the instruments in your car.

SPEEDOMETER	CAR & CHASSIS No.	YEAR	AXLE RATIO
SN 6104/02	1500 to 14089	55-56	4.3:1
SN 6104/06	1500 from 14090	56-58	4.3:1
SN 6104/09	1500 TWIN CAM	56-58	4.55:1
SN 6161/17	TWIN CAM	58-59	4.55:1
SN 6161/17	1600	58-61	4.55:1
SN 6161/06	1600	58-61	4.3:1
SN 6161/12	1600 Mk.II.	61-62	4.1:1

TACHOMETER	CAR & CHASSIS No.	YEAR
RN 51-112-00	1500 to 14089	55-56
RN 2300/01	1500 from 14090	56-58
RN 2300/02	Twin Cam	58-59
RN 2350/01	1600	59-61
	1600 Mk.II.	61-62

Contd.

FUEL GAUGE	CAR & CHASSIS No.	YEAR
FG 2530/25	1500 to 14089	55-56
FG 2530/05	All from 1500 No. 14090 onwards	56-62

DUAL GAUGE	CAR & CHASSIS No.	YEAR
GD 1501/00	1500 to 14089	55-56
GD 1501/01	All from 1500 No. 14090 onwards	56-62

APPENDIX C

MGA ORIGINAL BODY COLOURS

1500 COLOURS

COLOUR	DESCRIPTION	FACTORY CODE	GIPGLOSS CODE
Old English White	Creamy White	WT3	GL 18580
Black	Black		
Orient Red	Tomatoe Red	RD3	GL 18458
Mineral Blue (Coupe only)	Midnight Blue	BU9	GL 18921
Glacier Blue (Roadster only)	Medium Turquoise	BU4	GL 17983
Island Green (Coupe to 48979)	Light Green	GN6	GL 13329
Tyrolite Green (Roadster to 48979)	Spearmint	GN7	GL 17982
Ash Green (Roadster from 49000) (Coupe from 48980)	Very Pale Green	GN2	GL 20784

1600 COLOURS

COLOUR	DESCRIPTION	FACTORY CODE	GIPGLOSS CODE
Old English White	Creamy White	WT3	GL 18580
Black	Black		
Chariot Red	Blood Red	RD16	GL 21521
Iris Blue	Pale Blue	BU12	GL 20306
Dove Grey	Glossy Primer	GR26	GL 21520
Alamo Beige	Tan	BG9	GL 21519

These paint codes were taken from Colour Identification Patterns supplied by General & Industrial Paints Ltd. Although G & I Paints don't exist now, the Gipgloss paint system is available from Ault & Wiborg Paints Ltd. who are at the same address that G & I had occupied. Ault & Wiborg supply the

MGA colours under the same codes as quoted above. I can only assume that at some time, Ault & Wiborg have taken over General and Industrial Paints Ltd.

Some of you may remember that at the time that G & I Paints were making the MGA paints their Trade Mark was a Parrot sitting on the word GLASSO. It seems that this Parrot originally belonged to the company who produced Glasurit paints and was copied by G & I. After some years the Parrot is now perched firmly back on the word GLASURIT.

APPENDIX D

M G A D E L U X E P R O D U C T I O N			
	1 9 6 0	1 9 6 1	T O T A L
R O A D S T E R	1 6 6	1 9 4	3 6 0
C O U P E	1 6	1 9	3 5
T O T A L	1 8 2	2 1 3	3 9 5

APPENDIX E

The MGA tool kit was supplied in two forms, standard and optional extra. The standard was the kit supplied with every brand new MGA produced. The second kit was an option which could be supplied in place of the standard kit. Outlined below are the contents of the two kits.

The standard kit consisted of ; Screw Jack complete with Handle and Crossbar, Wheel Brace, Tyre Lever, plug Spanner and a canvas Tool Roll.

The optional kit consisted of ; A Standard Tool Kit, 4 Spanners $5/16 \times 3/8$ AF, $7/16 \times 1/2$ AF, $9/16 \times 5/8$ and $11/16 \times 3/4$ AF, an adjustable 7" spanner, Box Spanner $1/2 \times 9/16$ AF, Tommy Bar, Phillips Screw Driver and a pair of 6" Pliers.

APPENDIX F

MGA PRODUCTION AND EXPORTS, 1955 - 1962 (ALL MODELS)									
	1955	1956	1957	1958	1959	1960	1961	1962	TOTAL
MGA 1500									
ANNUAL PRODUCTION	1,003	13,410	20,571	16,122	7,644				58,750
EXPORTED FROM									
ANNUAL PRODUCTION	793	12,611	19,805	15,431	7,423				56,063
ANNUAL PRODUCTION				541	1,519	51			2,111
EXPORTED FROM									
ANNUAL PRODUCTION				476	1,242	33			1,751
ANNUAL PRODUCTION					14,156	16,930	415		31,501
EXPORTED FROM									
ANNUAL PRODUCTION					13,235	15,776	318		29,329
ANNUAL PRODUCTION							5,670	3,049	8,719
EXPORTED FROM									
ANNUAL PRODUCTION							5,185	2,938	8,123
TOTAL ANNUAL PRODUCTION	1,003	13,410	20,571	16,663	23,319	16,981	6,085	3,049	101,081
TOTAL ANNUAL EXPORTS	793	12,611	19,805	15,907	21,900	15,809	5,503	2,938	95,266

Paint Upholstery

Description	Colour Scheme							
	Colour Scheme							
Body	Orient Red	Orient Red	Glacier Blue	Glacier Blue	Ash/TY Green	Ash/TY Green	Old Eng White	Old Eng White
Dash (1500)	Orient Red	Orient Red	Glacier Blue	Glacier Blue	Ash/TY Green	Ash/TY Green	Old Eng White	Old Eng White
Wheels	Silver	Silver	Silver	Silver	Silver	Silver	Silver	Silver
Hard Top	Black	Black	Black	Black	Black	Black	Black	Black
Seats	Red	Black	Grey	Black	Black	Black	Red	Black
Seat Piping	Red	Red	Grey	Grey	Green	Green	Red	Red
Door Panels Kick Panels Rear Quarter Panels And Passenger Compartment Surround Moulding	Red	Black	Grey	Black	Grey	Black	Red	Black
Spare Wheel Cover	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
Hood and Side Screen s	Black	Black	Ice Blue	Ice Blue	Ice Blue	Ice Blue	Black	Ice Blue
Tonneau Cover	Black	Black	Ice Blue	Ice Blue	Ice Blue	Ice Blue	Black	Black
Carpeting	Black	Black	Black	Black	Black	Black	Black	Black
Door Seals	Red	Red	Black	Black	Black	Black	Red	Black
Dash (Twin Cam Only)	Red	Black	Grey	Black	Black	Black	Red	Red

MGA 1600 & TWIN CAM ROADSTER COLOUR SCHEME

Paint Upholstery

Description

Colour Scheme

Body	Chariot Red	Chariot Red	Chariot Red	Iris Blue	Alamo Beige	Dove Grey	Old Eng White	Old Eng White	Black	Black
Dash (1600)	Chariot Red	Chariot Red	Chariot Red	Iris Blue	Alamo Beige	Dove Grey	Old Eng White	Old Eng White	Beige	Red
Wheels	Silver	Silver	Silver	Silver	Silver	Silver	Silver	Silver	Silver	Silver
Hard Top	Black	Black	Black	Black	Black	Black	Black	Black	Black	Black
Seats	Red	Beige	Beige	Black	Red	Red	Red	Black	Beige	Red
Seat Piping	Red	Beige	Beige	Light Blue	Red	Red	Red	White	Beige	Red
Door Panels Kick Panels Rear Quarter Panels And Passenger Compartment Surround Moulding	Red	Beige	Beige	Black	Red	Red	Red	Black	Beige	Red
Spare Wheel Cover	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
Hood and Side Screen s	Beige	Beige	Beige	Blue	Beige	Grey	Grey	Grey	Grey	Grey
Tonneau Cover	Beige	Beige	Beige	Blue	Beige	Grey	Grey	Grey	Grey	Grey
Carpeting	Black	Black	Black	Black	Black	Black	Black	Black	Black	Black
Door Seals	Red	Red	Red	Black	Red	Red	Red	Black	Black	Red
Dash (Twin Cam Only)	Red	Beige	Beige	Black	Red	Red	Red	Black	Beige	Red

MGA 1600 II ROADSTER COLOUR SCHEME

Paint Upholstery

Description Colour Scheme

Description	Chariot Red	Chariot Red	Chariot Red	Iris Blue	Alamo Beige	Dove Grey	Old Eng White	Old Eng White	Black	Black
Body	Chariot Red	Chariot Red	Chariot Red	Iris Blue	Alamo Beige	Dove Grey	Old Eng White	Old Eng White	Black	Black
Wheels	Silver	Silver	Silver	Silver	Silver	Silver	Silver	Silver	Silver	Silver
Hard Top	Black	Black	Black	Black	Black	Black	Black	Black	Black	Black
Seats	Red	Beige	Black	Black	Red	Red	Red	Black	Beige	Red
Seat Piping	Red	Beige	Red	Light Blue	Red	Red	Red	White	Beige	Red
Door Panels Kick Panels Rear Quarter Panels And Passenger Compartment Surround Moulding	Red	Beige	Black	Black	Red	Red	Red	Black	Beige	Red
Spare Wheel Cover	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
Hood and Side Screen s	Beige	Beige	Grey	Blue	Beige	Grey	Grey	Grey	Grey	Grey
Tonneau Cover	Beige	Beige	Grey	Blue	Beige	Grey	Grey	Grey	Grey	Grey
Carpeting	Black	Black	Black	Black	Black	Black	Black	Black	Black	Black
Door Seals	Red	Red	Red	Black	Red	Red	Red	Black	Black	Red
Dash	Red	Beige	Black	Black	Red	Red	Red	Black	Beige	Red
Dash Top	Red	Red	Black	Black	Red	Red	Red	Black	Black	Black

METAL "JODDLING" - THE CHEAP WAY

Anyone who has ever fitted repair panels to body or wings of an 'A' or any other car will have realised that a simple overlap of the panels is not an ideal solution. The professional method of doing this job is with the use of a "Joddler" or edge setter to form a recessed edge on one panel which allows the repair to finish flush, as illustrated in sketch 1.

This "Joddled" edge has the advantage in that it stiffens the jointed area which helps to minimise welding distortion. As purpose made "Joddlings" tools cost in the region of £40 + I have devised a 'simple to make' alternative which produces excellent results.

The basic tool to be converted into a joddler is a "Mole" or "Vice" grip. Any old or almost worn out variety of this tool will suffice as the state of the jaws is unimportant, however unless you have a Superman type grip the mole will need to be of the 10" variety.

The only other items needed are a small piece of hardened steel (I used a worn out vise jaw) and the use of an angle grinder and welding set. Start by cutting two matching pieces from the approx $\frac{1}{2}$ " x $\frac{1}{4}$ " cross section steel stock, see sketch below. Forming the recess in these pieces is easy using a small angle grinder. It can be done with a file but the hardness of a vise jaw means the job could take a long time & will almost certainly wear out your file.

The two leading corners of these new jaws should be relieved slightly as it will be impossible with hand power to form full 90° bends in anything but the very thinnest of steel sheet.

Having made up these new jaws it is now only necessary to weld them into the original mole jaws.

A little bit of trial & error of both location and screw adjuster setting will be required prior to welding to ensure you get adequate pressure at the jaws combined with clearance when the jaws are open. Once welding is completed you have an easy to use "Joddler" which will produce very good results on 20 & 22 gauge steel. Anything above this thickness will mean a bit of grip developing training but as most repair panels are made in metal of these thickness very little trouble should be experienced.

ILLUSTRATION 1

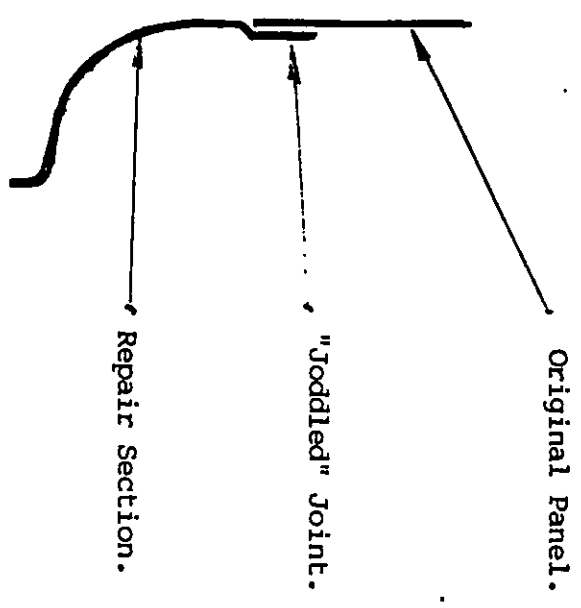


ILLUSTRATION 2

TYPICAL DETAIL OF NEW MOLE JAWS -
MADE FROM OLD VISE JAW OR SIMILAR

DIMENSIONS ARE APPROXIMATE AND
 MAY NEED TO BE ADJUSTED TO
 SUIT STEEL STOCK AVAILABLE &
 MOLE JAW SIZE.

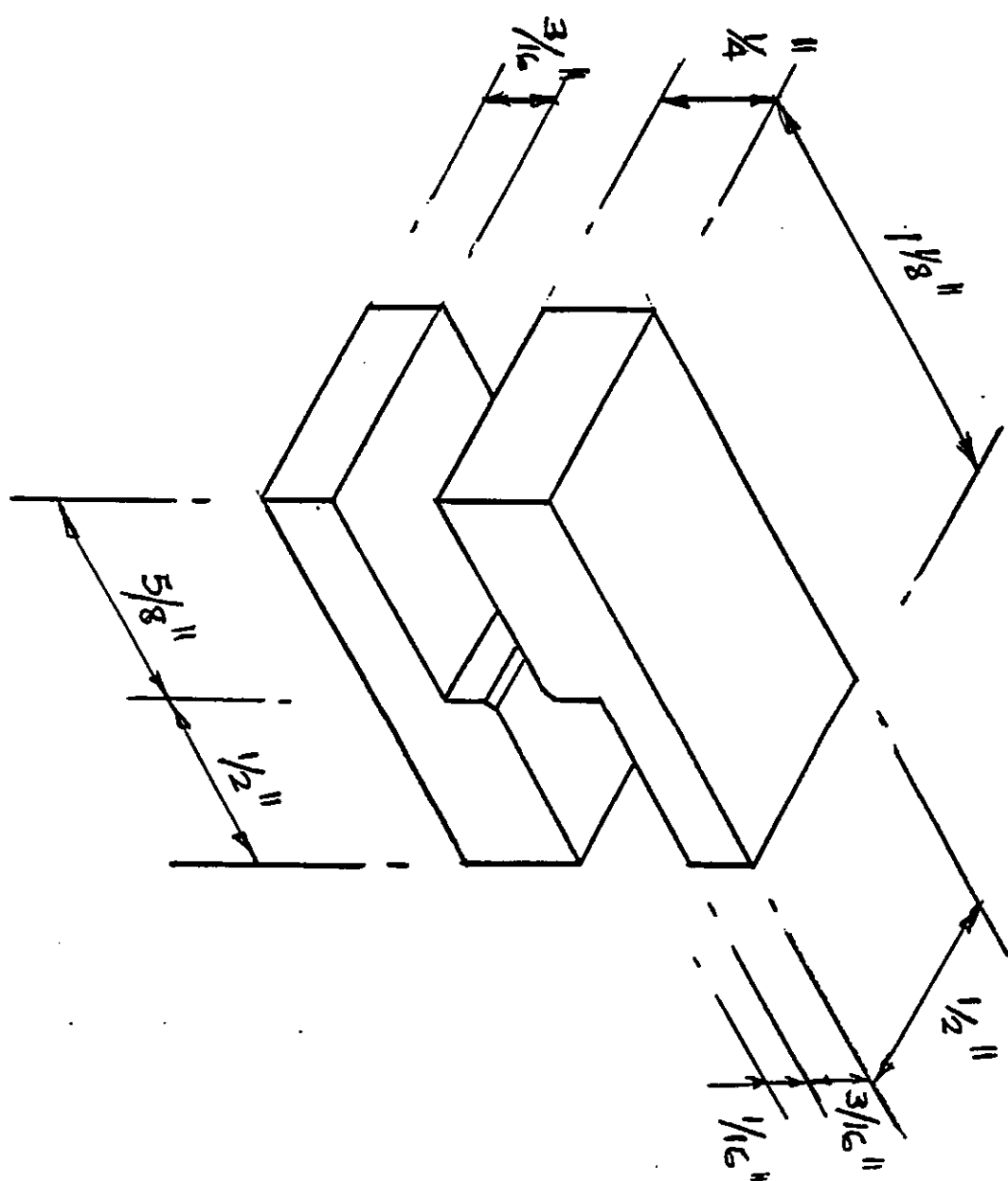
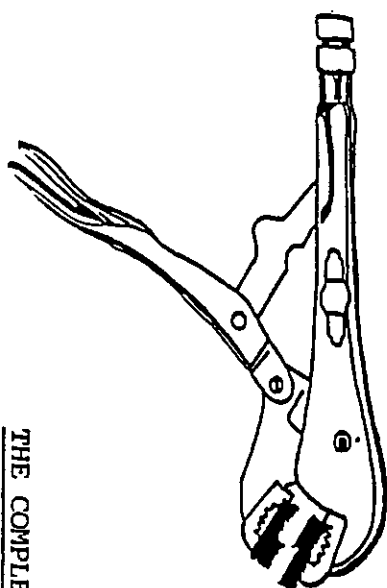


ILLUSTRATION 3THE COMPLETED "JODDLING" TOOL

THE MGA GEARBOX - By Charlie Kaelin

Although there were modifications during the production life of the MGA gearbox, basically the same unit was fitted to the MGA 1500, 1600, 1600 Mk II, twin-cam and early (3 synchromesh) MGB. The majority of the internal parts from all the five gearboxes are therefore interchangeable.

All gearboxes on the MGA, and early MGB have four forward gears and reverse, with synchromesh engagement for top, third and second gears. Top gear is a direct drive, third and second gears are obtained by constant-mesh pinions and first and reverse by sliding spur gears.

Although the MGA gearbox has a reputation for being a robust and virtually indestructible unit, like all gearboxes it does have a limited service life. Parts which are most prone to failure are the second speed gear baulk ring and the layshaft with its associated needle roller bearings.

Dismantling

Before gearbox dismantling is commenced it is advisable to make sure that the box is in neutral, this makes the removal of the interlock arm easier. Remove the propeller shaft driving flange by unscrewing the nut (service tool 18G 1205 - ex 18G34A) together with the spring washer and sliding the flange off the splined third motion shaft. If it is decided to replace the rear extensions oil seal the old seal should be removed at this stage (service tool 18G389 with adaptor 18G389B) as the service tool requires the 3rd motion shaft to be in place in the extension. Remove the rear extension cover by unscrewing the six bolts. The interlock arm assembly can then be removed by a process involving a certain amount of manoeuvring. If difficulty is experienced use of a 14 lb sledge hammer is not to be recommended in this instance! The six bolts and two nuts bolting the rear extension housing to the main gearbox casing may now be removed and the rear extension pulled away, manoeuvring the remote control selector lever from the selectors. Difficulty may be experienced removing the extension as in some cases the locating dowel tends to bind. If this is the case it is probably best to rest the gearbox in a neutral position, tail-end up, on two pieces of wood for support.

Screw the propeller shaft driving flange nut back onto the 3rd Motion shaft and tap the nut with a hammer whilst applying upwards pressure on the extension with the other hand. The other alternative of lying on the floor with the gearbox supported between the legs whilst gripping the extension and pushing against the bell housing with the feet is an operation fraught with danger. The thought of a rear extension suddenly hurtling up between one's legs has been sufficient to deter many otherwise dauntless gearbox rebuilders. The foolhardy few who tried this method sadly ended up with voices one octave higher than previously and a rather restricted social life.

The large side plate can now be removed by unscrewing the 3 countersunk screws and the seven bolts, remembering to replace the bolt with the fibre washer in its original position on re-assembly. Failure to do this will probably result in oil leakage from the inside cover. This is because whilst the other bolt holes are blind the hole containing the bolt with the fibre washer breaks through into the gearbox casing. This hole was undoubtedly previously used as an oil level indicator when refilling the gearbox with oil and was subsequently not used once a dipstick was incorporated into the gearbox. Having removed the side cover slacked off the locknuts on the three change-speed forks and remove the set screws from each fork. There is no need to remove the locating block bolted onto the rear face of the gearbox casing as the selector shafts can be pulled out by gripping the selectors on the end of each shaft. While holding the corresponding selector fork steady with one hand, pull the selector shaft out through the back of the box with the other. Before finally pulling out each shaft cover the locating block with a rag to catch the ball and spring which will fly out when the shaft is finally removed. Remove the reverse selector fork, top and

THE MGA GEARBOX/Cont...

third fork, and first and second fork in that order noting that the third and fourth speed fork has a distance piece also. If difficulty is experienced pulling the shafts out then carry out the next stage of dismantling which is to remove the front cover assembly. This is the cover located inside the bell housing and upon which is mounted the clutch thrust lever and carbon release bearing. First remove the lock nut and the bolt and remove the thrust lever, together with the carbon release bearing. The front cover may then be removed by unscrewing the seven nuts, taking care not to lose the skim or skims which will be found between the inside of the cover and the first motion shaft bearing. When the cover has been removed the ends of the selector shafts will be revealed and can be pushed out by means of a suitable drift. The layshaft may now be tapped out allowing the lay gear to lie in the bottom of the box. Prise down the lock tab from the set screw which retains the reverse gear shaft in place and remove the screw. Push out the reverse gear shaft and remove the reverse gear. Drive out the third motion shaft to the rear by tapping the bearing housing using a suitable drift. Remove the shaft with its associated gears and put to one side, taking care not to misplace the 3rd and top baulk ring which will now be free to fall off the stops. Similarly remove the first motion shaft by driving out to the front again by using a drift against the bearing housing. Do not lose the 18 needle roller bearings from the inside of the rear of the first motion shaft. The lay gear may now be lifted out from inside the box together with the front and rear thrust washers.

The third motion shaft may now be dismantled. (see Fig. 1) The third and top baulk ring is loose and can simply be removed, then slide the synchromesh sleeve complete with its hub from the splined third motion shaft. Do not pull the sleeve from its hub unless it is desired to renew the 3 balls and springs located at 120° to one another, inside the hub. It is advisable when stripping the 3rd motion shaft to place all items in a row alongside the shaft as they are removed so as not to forget the order in which they are re-assembled. After removing the synchromesh sleeve and hub press down the third speed gear cone thrust washer plunger (see Fig. 2) with a small bladed screw-driver whilst closing this, rotate the splined thrust washer to align its splines with those of the shaft. The thrust washer can then be slid off the splines. It is advisable here to remove the plunger and spring and keep it somewhere safe, otherwise they may drop out of the shaft and be lost.

The third speed gear with its splined bush can now be removed followed by the bush interlocking washer and the second speed gear with its bush and baulk ring. (Have a look at this baulk ring and check for wear on the three projecting lugs. If these are worn, replace the baulk ring.)

GEARBOX - PART II - Charlie Kaelin

INSPECTION AND RENEWAL OF WORN PARTS

The most common failures of the MGA gearbox and those which usually cause concern are failure of the synchromesh on changing gear from third into second and the tendency for the gearbox to jump out of the third on overrun. Synchromesh failure was overcome during the production run of the early MGB gearbox by introducing a baulk ring of sintered steel (Pt. No. 22M 249) which gives longer second gear synchromesh life. It must, however, only be used with the new second speed gear (Pt. No. 22M 230) which has a molybdenum-coated synchroniser cone surface. The change in production was made at engine nos. 18GBUH 31472, 18GBUL 24123, 18GBRUH 31003 and 18GBRUL 25995. These two parts are directly interchangeable with the previous brass second speed gear baulk ring (Pt. No. 11G 3063) and the original second speed gear (Pt. No. 11G 3064). If close ratio gears are fitted to the gearbox it will be found necessary to use the sintered steel baulk ring as the close-ratio second speed gear (Pt. No. C22H 1094) has a molybdenum-coated cone surface.

Certain modifications to the gearbox were introduced to obviate the previous tendency to automatic disengagement of third gear. If disengagement of third gear has been found then the third and fourth gear selector rod should be inspected by checking the depth of the detent notches in the rod, giving particular attention to the third speed notch nearest the centre of the rod. Do not include the smaller central (neutral position) notch in this

inspection. Measure the diameter of the detent ball with a micrometer (see fig. 3) and place it in each of the deeper notches in turn and measure distance C. If this measurement is greater than 0.724in. a new selector rod providing dimension C in both 3rd and 4th speed notches should be fitted. The depth of these two detent notches has increased by 0.018in. on later gearboxes to give the dimension shown in fig. 3.

Check the depth of the bore in the selector rod locating block (see fig. 4) using a depth gauge micrometer. This depth should be 2.094in. (see A, fig. 4). On unmodified gearboxes the depth was 2.157in. In this case fit a packing washer 0.063in. thick in the bottom of the bore.

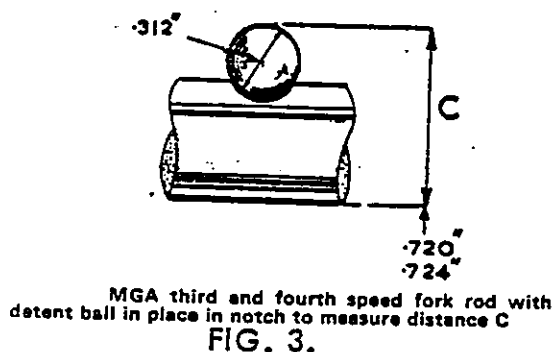
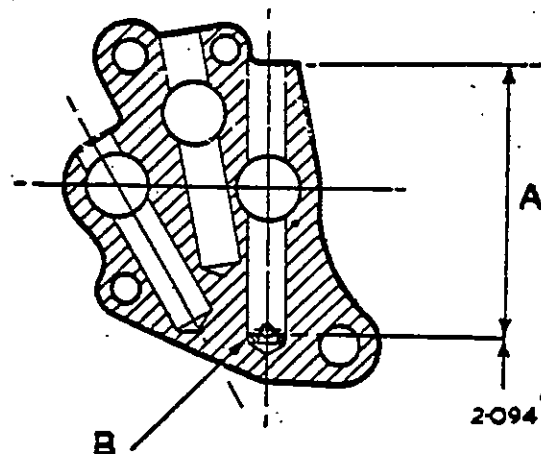


FIG. 3.



MGA selector shaft locating block showing washer B fitted to give modified bore depth A

FIG. 4.

Check the length of the 3rd and 4th selector rod detent spring whose free length should be 1.187in. and have a poundage of 18 - 20 when the upring is compressed to 0.75in. As these springs (Pt. No. 22A75) adapt a permanent set in service it is usually best to replace all three anyway when the box is dismantled.

It is also advisable whilst the third motion shaft is in the dismantled state to check the outside diameter of the second and third gear idler pinion bushes (see fig. 1) (Pt. Nos. 11G 3028 and 11G 3029 respectively). This diameter should be between 1.3115 and 1.312in. Ensure also that this dimension is constant throughout the length of each bush. Replace them if they are worn immersing them in warm oil to facilitate fitting.

The next item to inspect is the layshaft together with the layshaft needle roller bearings both items being very prone to failure without however it is more usual than not that both these items will be found to be severely worn due to "Brinelling" of the metal bearing surfaces. This is indicated by a flaky, chipped appearance and can be seen quite clearly both on the layshaft and on the needle rollers and usually appears on the rear bearing surface of the shaft rather than on the front. That this wear usually initially takes place on that part of the layshaft which is supported by only one needle budler bearing indicates a problem of overloading.

The other (front) end of the layshaft runs in two sets of needle roller bearings and these roller bearings together with the front bearing surface of the layshaft are not so prone to rapid wear.

This problem must certainly have been recognised by B.M.C. as the later 3 synchro MGB boxes were modified to take a longer diameter layshaft together with two pairs of caged-type roller bearings on the layshaft instead of the pair and a single as in the MGA box.

This change to a longer layshaft was first made in production in March 1967 on cars with engine nos. 18 GBUH 74720, 18 GBUL 60597, 18 GBRUH 74529 and 18 GBRUL 58224. Fitting them to either an earlier MGB box or to the MGA box requires a new laygear, a larger decimeter layshaft (Pt. No. 22H 571) 2 pairs of caged-type needle roller bearings (Pt. No. 22H 471) and a different distance tube (Pt. No. 22H 672). The gearbox casing must also be seamed in line to a diameter of 0.6688in. - 0.6699in. to take the longer diameter layshaft.

However, if it is desired to retain the smaller layshaft with its three needle roller bearing system then the old needle roller bearings should first be removed from the laygear. The needle roller bearings cannot be removed until the retaining circlips have been taken out. This can be, and often is, a most bloody operation so have a few tins of elastoplast handy - you're going to need them. The circlips have a chamber on the ends, supposedly in order to enable one to obtain purchase on the edge with a small screwdriver or some other ingenious extraction tool. Sometimes the circlips can be prised out of their grooves relatively easily with the blade of a small screwdriver, especially if they are stuck. Usually any attempt to prise out one end of the circlip results in you chasing it round and round in the groove and ending up not only extremely frustrated but with a hand looking like a bloodstained apology for a pin cushion. It makes for a much easier life if the circlips are carefully smashed, partly out of their grooves. (How one smashes 'carefully' is up to the individual with the edge of a chisel?) They can then be gripped by a pair of snipe-nosed pliers and twisted out.

Carefully examine the needle rollers and if brinelled replace the bearing (Pt. No. 3H 2865). The later, large diameter needle roller bearings, being caged, do not have retaining circlips and this possesses certain advantages over the earlier type.

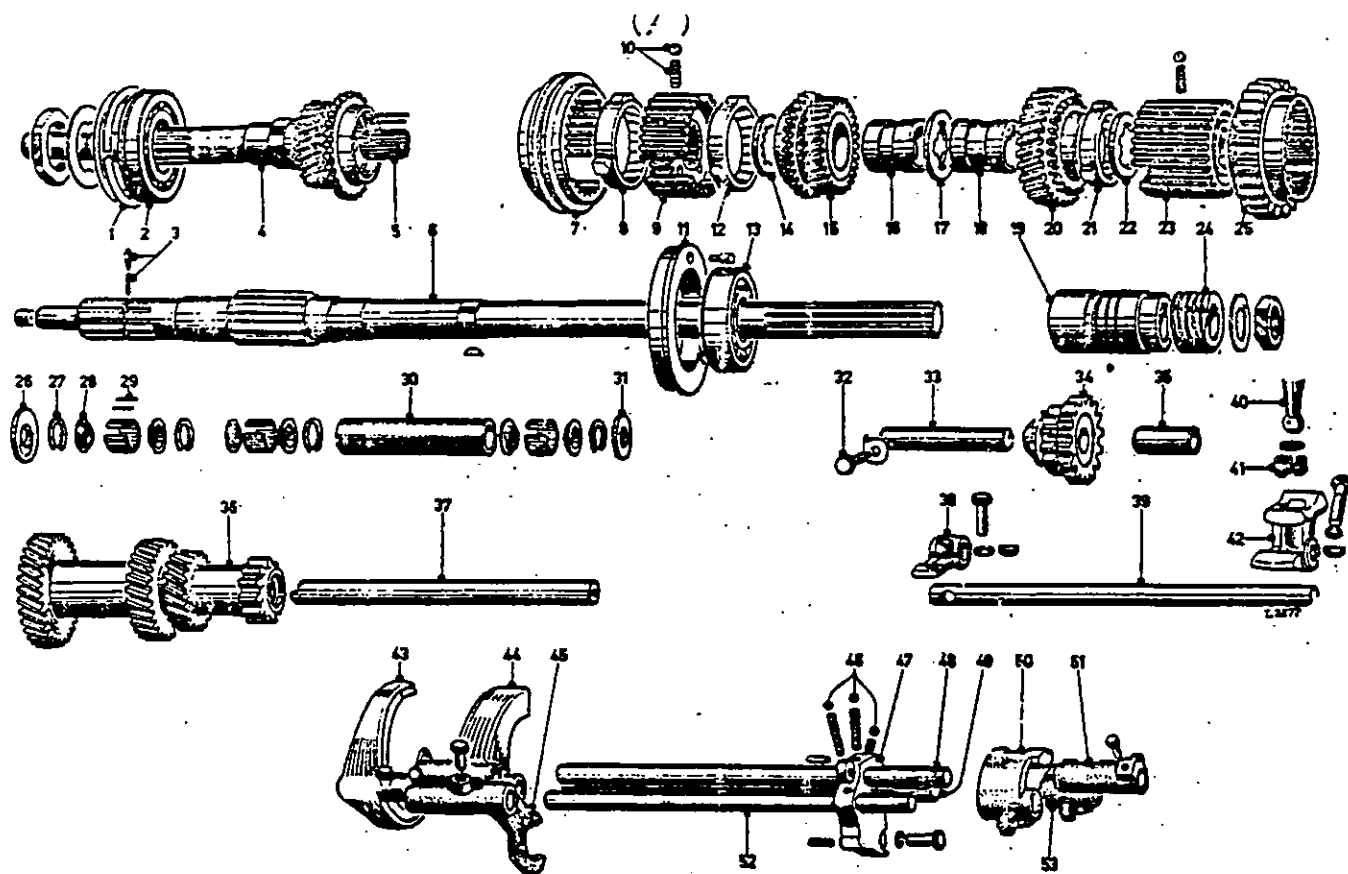
Other items to inspect are the state of the gear teeth which, being robust are generally alright unless they have been severely mistreated, and the oil seals. It is advisable when stripping a gearbox to replace all the oil seals as a matter of course, the main ones being the front cover oil seal and the one located in the rear extension but the speedo drive oil seal may also require replacement. First and third piston shaft ball bearings are very robust and do not usually require replacing. Baulk rings should be inspected and if showing signs of severe wear on their three projecting lugs should be replaced. 3rd and 4th speed gear baulk rings are not as prone to wear as the second speed item which should really be replaced as a matter of course unless it is fairly new. You may of course decide to replace the original second speed baulk ring with the later type sintered steel one together with a new second speed gear, but if not, the correct original 2nd speed baulk ring as Pt. No. 11G 3063.

Carefully inspect the eighteen 1st motion shaft needle roller bearings which are inside the tall end of the first motion shaft and bear upon the front end of the third motion shaft. These have been found on occasion to show signs of brinelling, in this case they should be replaced quoting Part No. 6K 892.

Last but not least check the clutch withdrawal lever bolt (Pt. No. 11G 3196) and the bush (Pt. No. 11G 3195) as both these items wear very quickly. New bushes are very easy to install but don't forget to soak it in oil for 24 hours prior to fitting. Also check the slave cylinder push rod (Pt. No. BHA 4074) and clevis pin as these are also quite often in a very bad state.

Remove the thrust washer from the splined shaft and remove the first and second speed hub and gear. Again do not separate the sleeve and hub unless it is thought necessary to renew the 3 balls and springs. Incidentally, it should be pointed out that if it is intended to renew these balls and springs it will be found extremely beneficial to use the two service tools 18G222 and 18G223 to replace the balls and springs in the second speed cord 3rd and top speed synchronised hubs respectively. If you do inadvertently slide the sleeve from the hub and allow the balls and springs to fall/fly out, then you are in for a few nights' work putting them all back again, without the use of the above tools. It can be done, of course, without recourse to these tools but it needs two people to pass all 3 balls and springs in simultaneously so that the sleeve can be slid back over the splined hub.

As far as stripping the third motion shaft is concerned, this is normally as far as one would go, unless it is desired to remove the rear bearing or the speedometer worm gear. If further dismantling is required, then the shaft may be completely stripped by tapping up the locking tab and unscrewing the rear retaining nut. Withdraw the washer, speedometer drive gear, Woodruff key, and the distance sleeve from the shaft. The rear bearing and housing can then be pressed from the shaft.

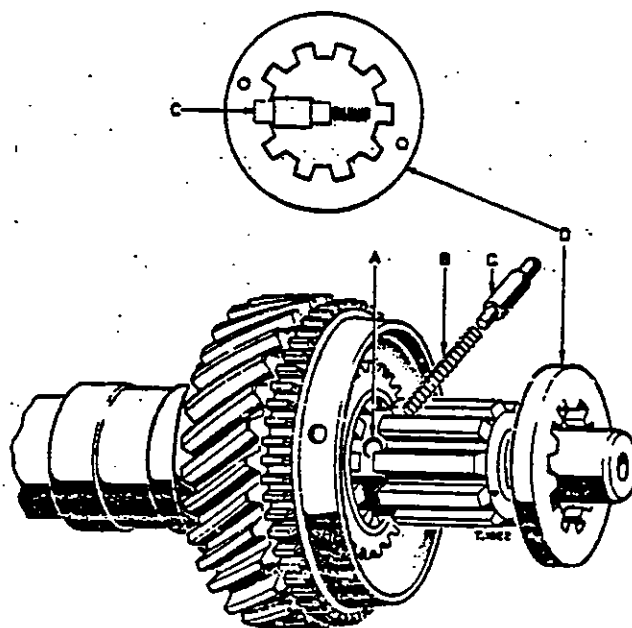


Gearbox, exploded view

Fig. 1.

- 1 Circlip
- 2 Main drive pinion bearing
- 3 Interlock plunger and spring
- 4 Main drive pinion
- 5 Mainshaft pilot bearing
- 6 Mainshaft
- 7 Third/top gear synchronizer sleeve
- 8 Top gear baulk ring
- 9 Third/top gear synchronizer hub
- 10 Detent ball and spring
- 11 Mainshaft bearing housing
- 12 Third gear baulk ring
- 13 Mainshaft rear bearing
- 14 Front thrust washer
- 15 Third gear idler pinion
- 16 Third gear idler pinion bush
- 17 Interlock ring
- 18 Second gear idler pinion bush
- 19 Spacer bush with oil scroll
- 20 Second gear idler pinion
- 21 Second gear baulk ring
- 22 Rear thrust washer
- 23 Second gear synchronizer hub
- 24 Speedometer worm wheel
- 25 First gear sliding pinion
- 26 Front thrust washer
- 27 Circlip
- 28 Needle bearing cage
- 29 Bearing needles
- 30 Spacer bush
- 31 Rear thrust washer
- 32 Lock bolt
- 33 Reverse gear idler shaft
- 34 Reverse idler gear
- 35 Bearing bush
- 36 Countershaft gear cluster
- 37 Countershaft
- 38 Selector/shifter finger
- 39 Selector/shifter shaft
- 40 Selector/shifter lever
- 41 Cup (two halves)
- 42 Trunnion
- 43 Third/top gear shifter fork
- 44 First/second gear shifter fork
- 45 Guide block
- 46 Detent balls and springs

- 47 Reverse gear shifter fork
- 48 First/second gear shifter fork shaft
- 49 Third/top gear shifter fork shaft
- 50 Reverse shifter dog
- 51 First/second shifter dog
- 52 Reverse gear shifter fork shaft
- 53 Third/top shifter dog



- A Hole in mainshaft
- B Plunger spring
- C Plunger
- D Lock ring

Fig. 25. Mainshaft, location of spring-loaded plunger

Fig. 2.

This completes gearbox dismantling. If problems have been encountered with oil winding itself up the speedometer cable into the back of the speedometer then it may be advisable to renew the small pinion oil seal which is located within the large bushed nut screwed into the gearbox casing.

THE MGA GEARBOX - PT. III - Charlie Kaelin

GEARBOX REASSEMBLY (PT. I)

As all the best (?) workshop manuals never cease to tell us, reassembly is a reversal of the procedure of dismantling. Just try telling that to someone who has completely dismantled an MGA, packed all the pieces into half a dozen tea chests and left them to gather dust for 3 years whilst he contemplates the arduous rebuilding programme ahead of him.

Anyway, if you're sitting comfortably and can cast your mind back to the point where we left off last time (Pt. II Vol. 3, Issue 2), I shall begin. It is assumed that you have checked all relevant parts for wear and have the necessary replacements to hand, and that all original, usable bits and pieces have been cleaned (petrol and brush and wipe over with clean rag) and given a thin coat of engine oil. Make a start by assembling the third motion shaft, assembling from the front end (numbers in brackets quoted during reassembly refer to items shown in Fig. 1 Vol. 3, Issue 1 of MGAactivities). First replace the rear thrust washer (22) on the front end of the splines, ground face to the front, this is followed by the longer of the two brass bushes (18) with the dog towards the front. It is important that this bush is fitted so that the oil hole lines up with the one in the shaft and that the cut-away portion of the third speed splined bush (16) will be over the locating peg hole when the dogs of both bushes are engaged with the interlock ring (17). Fit the second speed baulk ring and gear onto the bush with the plain side of the gear towards the front. Slide on the interlock ring and the shorter splined bush (16) locating the dogs of both bushes in the interlock ring. Insert the spring and locating peg into the hole in the shaft. Fit the third speed gear (15) onto the bush with the synchroniser cone facing the front. Replace the front thrust washer (14), machined face towards the gear, and, while holding down the locating peg with a thin piece of steel wire passed through the hole in the gear cone, push the washer over the peg turning it until the peg engages with one of the splines. Fit the three balls and springs to the third speed synchroniser hub (9) and push on the synchroniser sleeve (Service tool, 18G 223). Locate the whole synchromesh assembly hub, together with the two baulk rings, onto the shaft ensuring that the plain side of the hub faces the rear.

The remaining items are replaced from the rear of the shaft, insert the three balls and springs in the second gear hub (23) and push on the synchroniser sleeve (25) using Service tool 18G 222 if necessary (or available). Fit the first speed gear and synchromesh hub together with the baulk ring to the shaft. If the rear bearing is being replaced press the new bearing into its housing, with the outer flange of the housing to the rear, and fit it to the shaft. Push on the distance sleeve, speedo drive gear and Woodruff key together with the lock washer and nut. This completes reassembly of the third motion shaft. It is advisable to check the end float of the second and third speed gears and adjust it so that it lies between 0.004 - 0.006ins. Thrust washers are available in four thicknesses for this purpose. Before the lay gear is built up it may be decided to discard the earlier lay gear and shaft in favour of the later, more robust type. Fitting them entails a new lay gear, layshaft (22H 571 or 22H 465), front thrust washer (22H 466), rear thrust washer (22H 467, 468, 469 or 470), distance tube (22H 672) and four caged needle roller bearings (22H 471). The correct rear thrust washer to use of those quoted above is the one which will give a lay gear end float of 0.002/0.003in. The gearbox casing will also have to be reamed in line to a diameter of 0.6688 - 0.6699ins. to take the larger diameter layshaft. The later type of lay gear system has no circlips holding the needle roller assemblies in place. Assembly consists simply of inserting the distance tube into the lay gear followed by insertion of a pair of oiled needle roller bearings into each end of the gear. The earlier type of lay gear is assembled by inserting one needle roller bearing into the small (rear) end of the lay gear. This bearing is then located by pressing a new circlip into the groove. The remaining two assemblies are fitted into the large (front) end of the lay gear in the following order:- a circlip, a needle race, a circlip, a needle race, a circlip. It will

probably be found helpful to use grease to hold the bearings in position until the circlips are in place. In the unlikely event of your having managed to reclaim some of the old circlips during earlier dismantling of the lay gear it should be stressed that new circlips (11G 3027) should always be fitted on reassembly.

If it has been decided to renew the first motion shaft bearing it should be fitted to the shaft with the spring ring away from the gear. Replace the lock washer, tighten the nut (left hand thread) using Service tool 18G5 and bend over the locking tab.

THE MGA GEARBOX PART III - Charlie Kaelin

GEARBOX ASSEMBLY (Pt. II)

Having assembled the first and third motion shafts and the lay gear, the above items may be installed in the gearbox casing. First locate the front and rear thrust washers in their respective places on the lay gear holding them in place by means of a smear of grease. The lay gear with the two washers attached can be lowered into the gearbox casing until the assembly is in line with the holes in the casing in which the lay gear is located. Holding the gear and washers in this position feed a length of iron/copper wire through the assembly from the rear until it emerges out of the front of the casing. Fasten the wire at both ends leaving enough slack to be able to push the lay gear and washers well down into the bottom of the gearbox. Now refit the first motion shaft into the front of the gearbox gently drifting the bearing into the gearbox housing. Make sure that the lay gear is well clear of the first motion shaft as you drift the bearing into place or you may damage both the lay gear and synchroniser cone. Now lift the gearbox into a vertical position with the first motion shaft pointing downwards and support it on two pieces of wood. Smear the eighteen first motion shaft needle rollers in thick grease and replace them inside the tail end of the first motion shaft. Hold the third motion shaft firmly and slowly feed it face downwards into the rear end of the gearbox casing taking care to hold onto the third/top gear synchroniser hub and baulk ring assemblies otherwise they will fall off. Gently feed the top of the third motion shaft into the back of the first motion shaft taking care not to dislodge any of the needle rollers. Before finally drifting the third motion shaft bearing housing (11) into the rear of the gearbox casing use the gasket fitted between the box and the rear extension to position the dowel and bearing housing. Push home the shaft together with the rear bearing and housing.

The lay gear may now be brought up from the innermost depths of the gearbox and, together with the thrust washers, lined up with the layshaft holes in the casing. Undo the wire which passes through the lay gear assembly and gently remove it, pulling it so that it travels from the front of the gearbox towards the back. Follow immediately behind the wire either with the layshaft (stepped end towards the front of the box) or with Service tool 18G 471 (dummy layshaft)

If using tool 18G 471 as a pilot follow immediately behind it with the layshaft. When the layshaft is in position, turn it so that the cut-away portion lines up with the layshaft locating groove in the front cover. Locate the front cover gasket in position. Smear a small amount of grease onto the shim or shims which normally reside against the first motion shaft bearing and stick them onto the bearing. Replace the front cover first smearing a small amount of oil around the edge of the front cover oil seal. The front cover centralising tool (18G 598) may be used to ensure that the front cover oil seal is concentric with the first motion shaft when the cover is fitted but it is not strictly necessary. Tighten the front cover gradually and evenly to avoid distorting the cover. Fit the reverse gear and shaft and tighten and lock the set screw using a new tab washer. Refit the clutch withdrawal lever. Position the gear change forks remembering that the reverse fork goes in the first followed by the front and second-speed (44), and then the third and fourth speed fork (43). Fit the distance piece to the third and fourth speed selector shaft making sure that the fork locating screws line up with the shaft holes. When fitting the selector rods it may be found beneficial to use a punch having a concave surface at the end in which to locate the detent ball when depressing the ball and spring prior to inserting each shaft into the selector block. When the fork locating screws have been tightened down don't forget to tighten the lock nuts and to use new washers. Fit the gearbox side plate together with a new gasket and ensure that the fibre washer goes onto the correct bolt otherwise you may end up with a leaking gearbox.

Before fitting the rear extension with its gasket, make sure that the third motion shaft distance piece and speedo gear are in position. Make sure when fitting the extension that the dowel on the rear bearing housing is correctly lined up with the corresponding hole in the extension. Ensure that the gearbox is in neutral before locating the interlock arm into the side of the rear extension otherwise you will have trouble locating the arm correctly. Replace the extension side cover along with a new gasket. In the case of MGA 1600, 1600 MKII and Twin Cam models all that remains is to replace the third motion shaft flange together with nut and spring. As you may have gathered this brings the reassembly of the MGA gearbox to a close (and about time too, you may say).

This restoration guide is an MGA register publication. All information is given in good faith and has been obtained from a variety of sources. All specifications & technical information have been extracted from contemporary official publications whereas the rebuild & overhaul techniques are drawn from the personal experiences of the main & other contributing authors. Every effort has been taken to confirm the accuracy of the information given but no liability can be accepted for any errors contained in this publication. Readers are warned that they attempt any mechanical or other modifications or methods referred to in this publication at their own risk. If in doubt seek the advice & assistance of a specialist. Anyone requiring further information on any matters relating to MGA's in particular or MG cars in general please contact the MG car club:-

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