Introduction

In kit car terms the Cyclone is of a relatively sophisticated and complex design and is not of the "*cheap and cheerful*" or "*knock it together in a weekend*" type of kit. It will reward careful and thoughtful construction and setting up with superb performance, handling and roadholding. It is not generally recommended as a first time build or to anyone lacking in mechanical knowledge and ability. Nevertheless if you consider yourself to be a reasonably competent home mechanic with plenty of enthusiasm and a decent toolkit then with the help of this manual and a bit of common sense, you shouldn't have any trouble in building a first class example of the uniquely styled Cyclone.

The operations and procedures described in this manual are particular to the Cyclone and do not cover such things as rebuilding or reconditioning parts from donor cars. For this information it is recommended that you refer to the appropriate *Haynes* or *Autodata* manual.

During the course of construction the main tools you will need are :-
Metric and AF socket sets, metric and AF combination spanners, a selection of Phillips and flat blade screwdrivers, pliers, sidecutters, hammer, pop-rivet gun, tinsnips, hacksaw, round and flat files, "G"-clamps, electric drill, 4 axle stands, trolley jack - and a little patience. When the time comes for fitting the engine and transmission you will also need to hire, beg, steal or borrow a decent engine crane.

Remember to always adopt safe working practices. Never crawl under a car or even a chassis which is supported only on a jack - make sure it is quite secure on axle stands. If you are using a sander, grinder, chisel or any other tool, where it is appropriate wear protective clothing in the form of goggles, gloves, ear defenders and overalls. Work methodically in a clean and tidy workshop and you will enjoy building your Cyclone.

Of course you already know all of this so forgive me for having to re-state the obvious !

Recommended Donor parts

The original Cyclone prototype was designed to utilise parts from a 1984 Vauxhall Cavalier SRi (1800cc). The following list comprises the most suitable and recommended donor parts necessary to complete your Cyclone. *Any deviations from this list* (other than trim and cosmetic items) *must be discussed with and cleared by Car Craft.*

Donor parts required

Send items marked * to Car Craft for modification

Vauxhall Cavalier 1983 on

Engine with all ancilliaries
Transmission
Driveshafts
* Front struts with hubs and bearings (*Not from 1300cc*)
Front brakes
* Track rods (complete with adjusters)
* Gear lever assembly and linkage
* Steering column
Column switches with cowling and ignition switch
Main lighting switch
Windscreen wiper relay
Hazard switch
Rear foglight switch
Instrument panel
Rear light units
Expansion tank for cooling system
Screenwash reservoir from Mk 1 Astra

NOTE: *Most of these parts can also be sourced from Mk 1 and Mk 2 Astras.*

RWD Cavalier Mk 1 / Opel Manta/Ascona

Front hubs / Uprights / Stub axle assemblies
Front brake calipers and discs
Steering rack
Lower steering column with U/J

Mini

Heater unit
Complete wiper motor / Rack / Wheelbox assembly
Sunvisors

Continued over...

Donor parts required cont...

Metro

Handbrake lever and cable

Fiat 126/Panda

Sunvisors
Interior mirror with courtesy light } Suggested

Although the 1800 SRi engine was used in the original car, any of the 4 cylinder engines from the front wheel drive Vauxhalls can be accomodated up to and including the 16 valve turbo unit from the 4x4 Cavalier and Calibra Turbo. It should be mentioned that the turbo unit is much more complicated in terms of wiring, plumbing, intercoolers, oil coolers, etc., and is a lot more expensive and more difficult to find than any of the non-turbo engines.

Use a 5-Speed F16 or F20 (marked on casing) gearbox. Engines of less than 1600cc were generally mated to an F10 or F13 gearbox which also had smaller diameter, hence weaker driveshafts.

The first Cyclone was eventually fitted with a 16 valve turbo engine which developed around 220 bhp. The chassis and suspension is quite capable of handling this amount of power but we would suggest that if you intend to go much above this figure then brake discs, pads and calipers should be uprated.

Wheels should be 7" x 15" with a 100mm PCD, a 15-20mm offset and 57mm centre spigot diameter. Fit 195/50/15 tyres at the front and 205/50/15 rear.

PLEASE NOTE THAT CAR CRAFT WILL NOT ACCEPT RESPONSIBILITY FOR EVENTS RESULTING FROM THE USE OF NON-RECOMMENDED PARTS.

Wiring

The wiring loom supplied by Car Craft is professionally made specially for the Cyclone. Unfortunately it is impossible to obtain original Vauxhall multi-plugs such as those which connect to the instrument panel and the rear lights. It is therefore necessary when you remove the instrument panel and the rear light units from a donor car to also aquire the relevant multi-plugs with a good few inches of wire attached to them. The Car Craft loom will connect onto all of the other switches and electrical units.

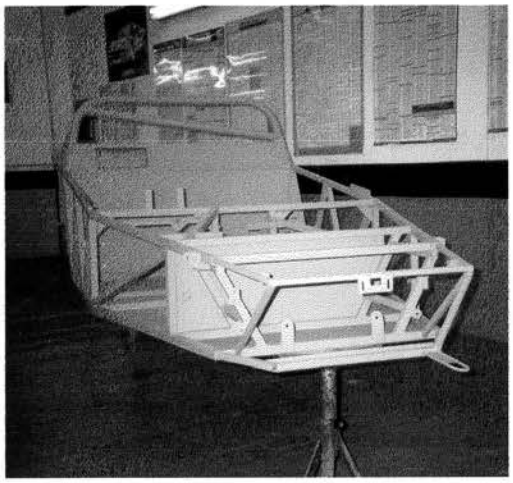
Obviously if you intend using a standard fuel injection engine then you will also need to keep the original engine loom (connects to injectors, sensors and E.C.U.) along with the E.C.U. and fuel pump relay - the Cyclone loom will connect into this.

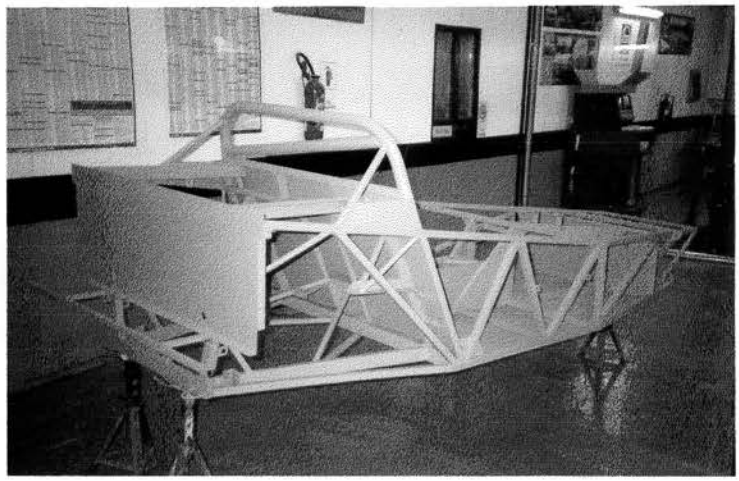
Making a start

If you are doing a complete build from a basic kit then it makes sense to install all the mechanical and suspension components into the chassis before fitting the glassfibre panels and painting. If you have bought a paneled and painted body/chassis unit then you will just have to be very careful not to damage the bodywork during the build up.

When you receive the basic chassis kit you will find that the chassis is fully bracketed with the floor and bulkhead panels (NS4 Alloy) bonded and riveted to the frame. The rollover bar is an integral part of the chassis and seat belt mounting points for inertia-reel lap / diagonal belts are fitted. To make mechanical assembly easier, the rear engine bulkhead and the tunnel side panels have not been fastened and so will need bonding and riveting at a later stage. These panels have been pre-drilled and the tunnel sides stamped N/S and O/S (nearside and offside). The chassis is finished in etch primer and will require further painting with either Hammerite or any good quality gloss or semi-gloss finish in the colour of your choice. Do not sand the etch primer - just degrease it, give it a very light rub over with Scotchbrite and paint it.

Please note that when the time comes to fit the rear bulkhead, tunnel sides and footwell panels, the correct size of rivets nust be used. The footwell panels are not stressed and so are not bonded but are secured with 1/8" diameter pop rivets. The rear bulkhead and tunnel sides are lightly stressed panels and so these must be bonded and riveted with 5/32" diameter rivets.

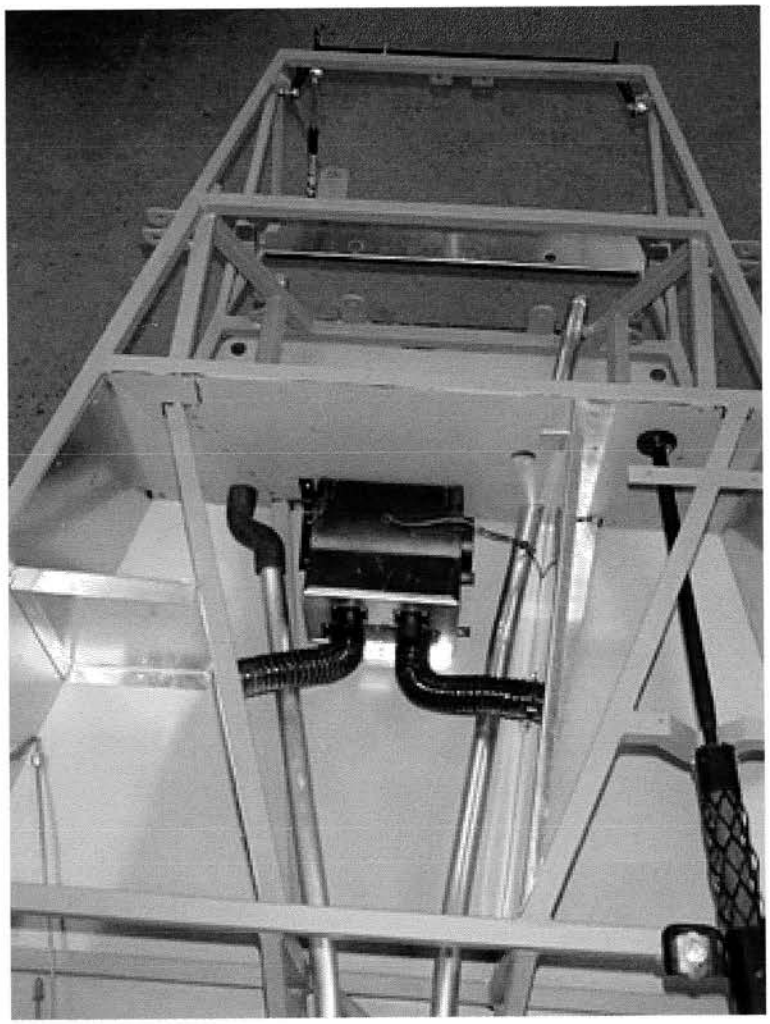




The chassis as you receive it

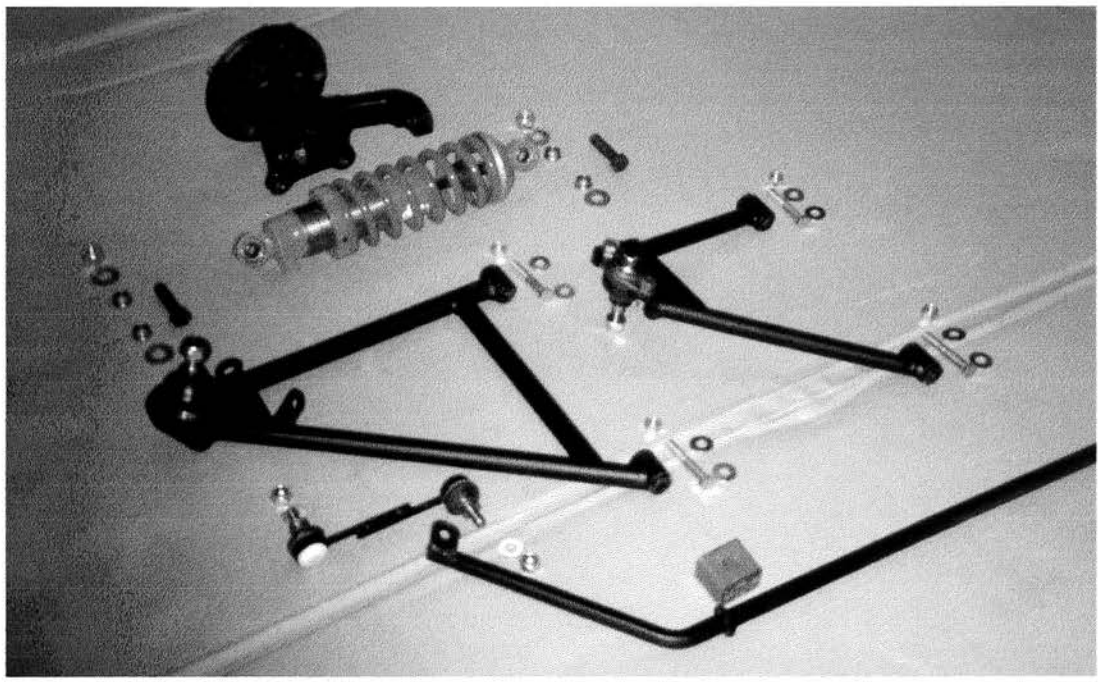
Making a start...

When the painting is complete and dry then the very first job is to install the aluminium coolant pipes which pass through the central tunnel. The right hand pipe is one piece whilst the left hand pipe is in two sections which are joined by an "S" shaped hose immediately behind the front bulkhead. Position the pipes so that their front ends protrude about 30 - 40mm beyond the front wishbone mounting brackets. Secure them with the aluminium "P" clips and seal the small gap around the pipes where they pass through the front bulkhead with a silicon sealer or "*Sikaflex*". Fit the stainless steel heatshield to the rear bulkhead frame using self-tapping screws into the vertical chassis tubes and 5mm nuts and bolts through the small brackets at the sides of the shield (the holes are pre-drilled).



Front suspension

Mount the anti-roll bar to the chassis using the nylon blocks provided (the brackets on the ends of the bar should point upwards) having first lubricated the bearing surfaces of the blocks with multi--purpose grease. At this stage do not fit the drop links to the ends of the anti-roll bar. Bolt the steering rack (RWD Cavalier or Opel Manta) to its mountings. Fit the lower wishbones leaving the nuts and bolts loose. These wishbone pivot bolts should not be tightened until the car is set at its correct ride height, otherwise they will be unduly stressed. The brackets for the top wishbones are not welded to the chassis, but are bolted through sleeved holes in the chassis tubes. This is to enable the camber angle to be adjusted by inserting or removing shims or spacers between the brackets and the chassis. Fit these brackets to the chassis with, as a starting point two 3mm shims between each bracket and the chassis tube. The shims behind the rear bracket drop in from above, those behind the front bracket push in from below. Now fit the top wishbones to the brackets - again leave the bolts loose. Fit the AVO spring/damper units into the brackets on the chassis and lower wishbones making sure that you fit the top mounting bolt from the front and the lower bolt from the rear. Again leave the nuts and bolts loose until later. Make sure also that the damper adjusting knobs face inwards toward the body of the car. If you coat the bolts and spacers with an anti-seize compound such as "Copaslip" it will make future dismantling easier.



Nearside front suspension components and anti-roll bar

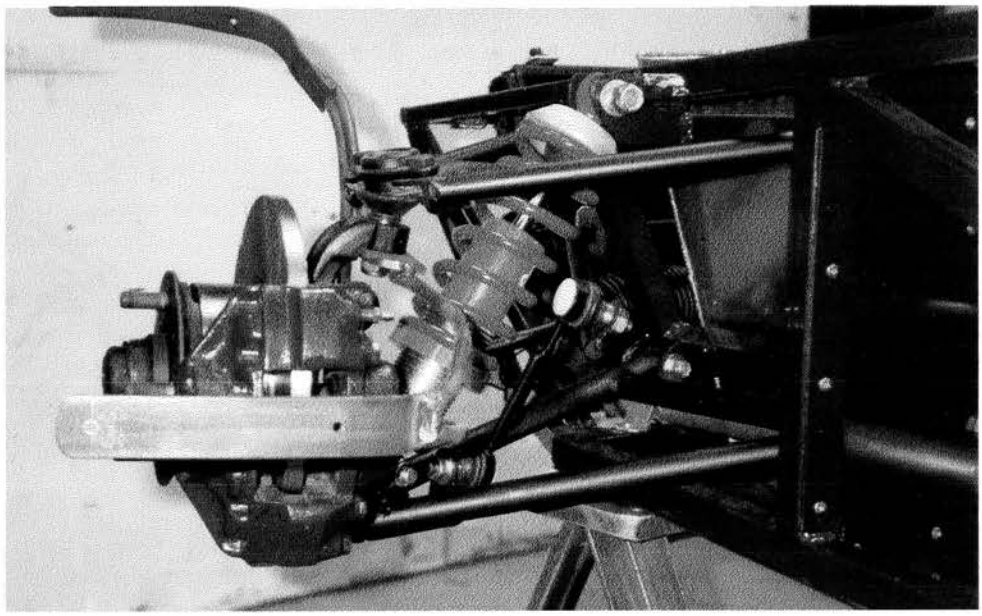
When preparing the uprights/hub carriers, discard the pressed steel backplate cum dustshield. It is usually rusting away, and the brakes are better cooled without it. Drop the uprights onto the lower balljoints, but before fitting the nyloc nuts or upper ball joints, you must fit the front mudguard stays as these are also secured by the ball joint nuts. Depending on the manufacturers tolerances on the uprights and the ball joints, you may find that the threaded shank on the balljoint doesn't quite protrude all the way through the nylon insert on the nut - if this is the case, it is a good idea to apply a few drops of Loctite to the threads before tightening.

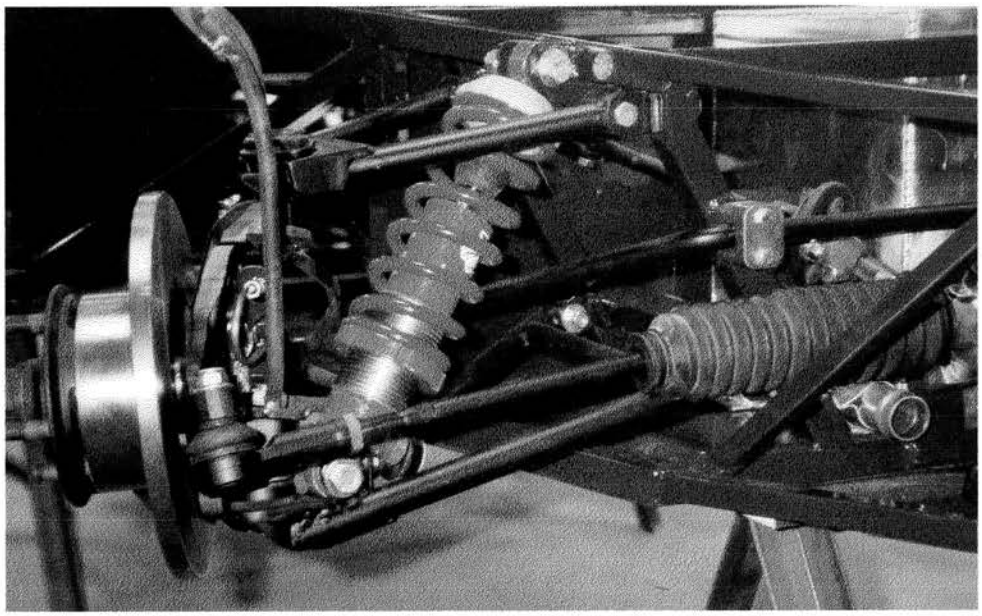
Front suspension cont.

Fit the anti-roll bar links - note that they are handed.

Use new track rod ends (RWD Cavalier/Manta) and wind them onto the track rods an equal number of turns each side - about eight turns is a good starting point. During any future adjustment always adjust each side by an equal amount. Lock them in position with the locknuts.

Assembly of the hubs, discs and calipers is staightforward and the same as for the donor car. It is recommended that you use reconditioned calipers or rebuild your own using new seals, pistons, etc. Clean out and check the condition of the hub bearings before re-using them. If in doubt fit new ones.

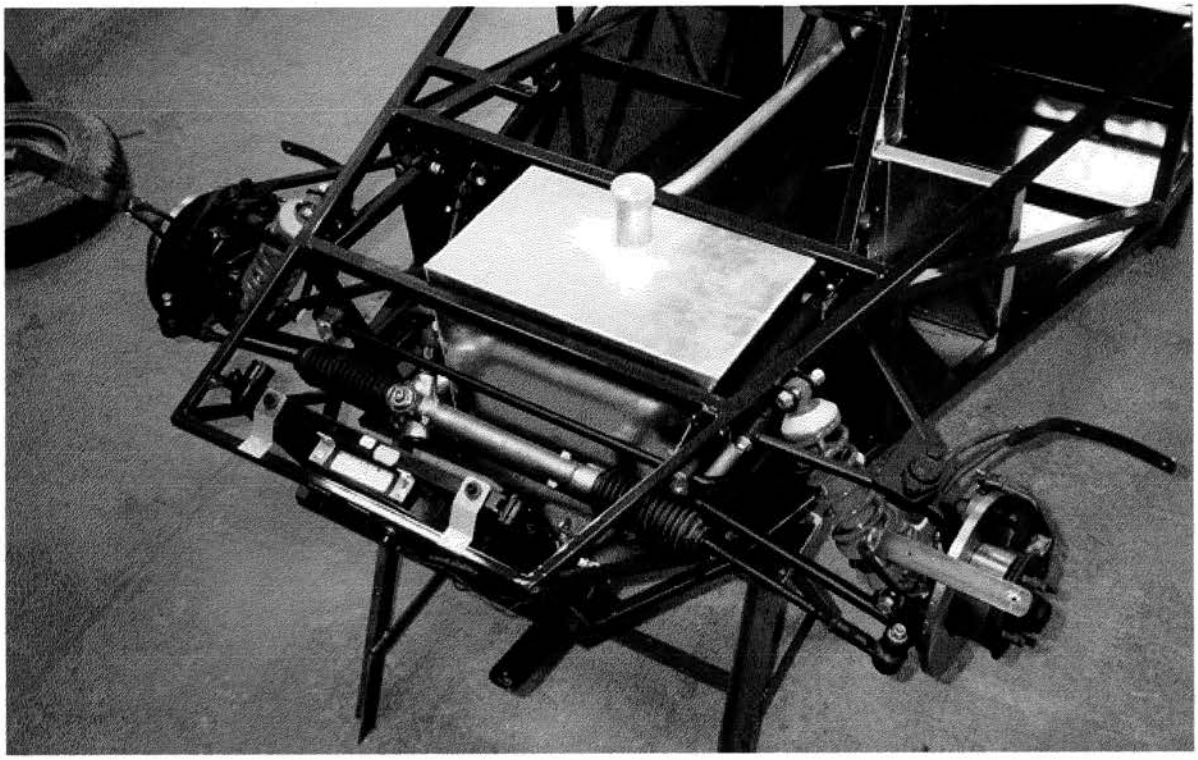




Front suspension including mudguard stays and brakes

Steering rack and column

The steering rack should be fitted with its standard lower flexible coupling, short lower steering column and universal joint from the RWD Cavalier/Manta. Now fit the upper inner and outer column assembly (FWD Cavalier - modified exchange unit from Car Craft) by pushing the forward end of the column which has already been fitted with the inner nylon bush (lubricate with graphite grease) through the bulkhead mounted outer bearing and into the universal joint on the lower column. Bolt the upper column to the chassis brackets behind the screen frame. The jubilee clip is fitted to the inner column to prevent the inner part of the nylon bearing from riding up the inner column and dropping out of the outer bearing. Make sure that everything lines up well and nothing is overtight or stiff. Any misalignment in this assembly will ruin the "feel" of the steering and spoil the straight line stability of the car. It is a good idea to leave the pinch bolts on the steering column loose until you have temporarily fitted and tightened up the steering wheel.

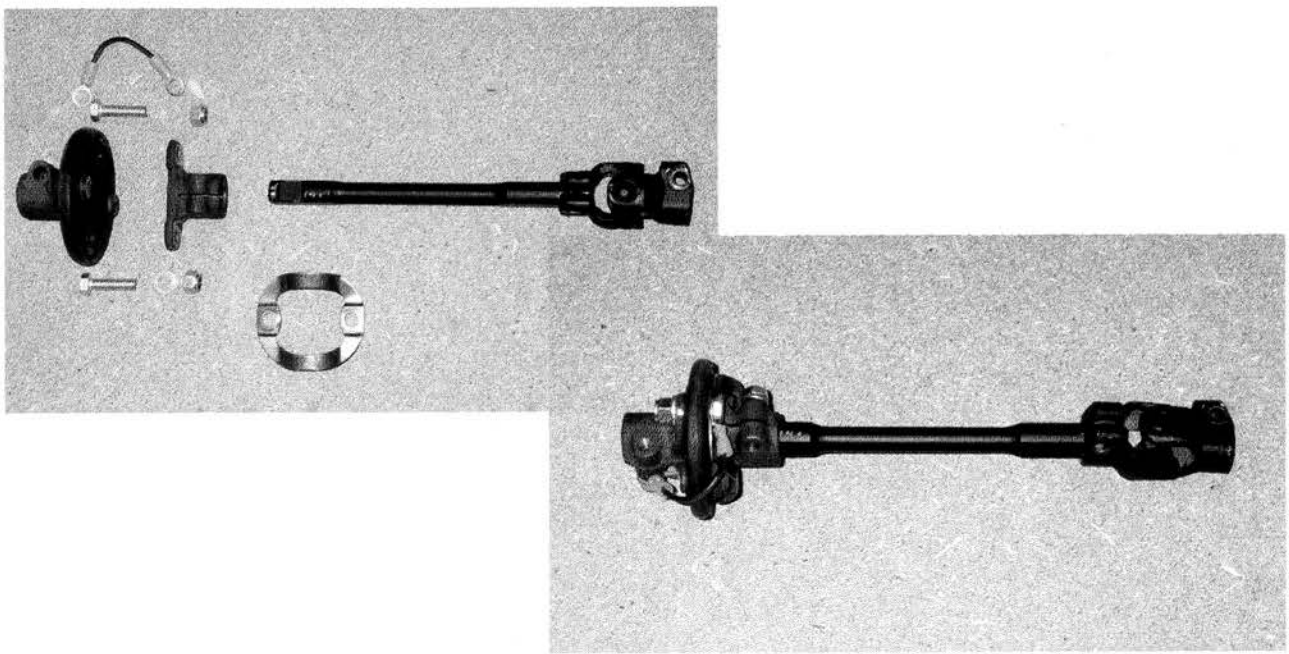


Completed front suspension and steering assembly

"Quick rack" and Lockstops

It is recommended, but by no means essential (particularly on a road car) that you fit a high-ratio steering rack, or a conversion kit to your existing rack and pinion. This will give more direct steering which requires less turns of the steering wheel from lock to lock - Competition cars will benefit most from this conversion.

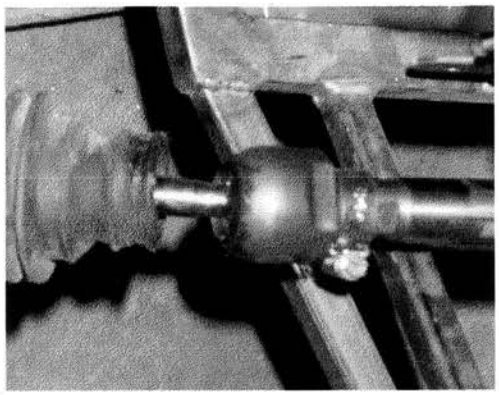
If you do fit a "quick rack" then you may find that the top end of the pinion shaft is different to the original. The original standard rack and pinion incorporated the lower flexible steering column coupling as part of the pinion shaft. The pinion shaft on a quick rack does not have this flexible coupling but has either a splined end to the shaft or a shaft with two flats ground into it. If your quick rack has a pinion shaft with the splined end then you will need a flexible coupling/adaptor from *Peter Maiden Components* (Tel: 01827 874488). If on the other hand it has the two flats then you can make up your own adaptor. When you acquired your donor parts, you should have got the flexible coupling which fits onto the bottom of the Mk2 Cavalier steering column. This coupling fits to a steering column and to a pinion shaft which both have flats on them, but if you examine (measure) each end of the coupling, you will find that they are intended to fit slightly different shaft sizes. You will need the part of the coupling which fits the larger shaft. (Try it for size on the lower column for the Mk1 Cavalier). The flexible part of the coupling is fastened to the metal parts with rivets - either drill out two of these rivets or grind off their heads and punch out the remainder so that you have removed and discarded the metal shank part of the joint which fitted the smaller shaft. Similarly remove from the original Mk1 pinion shaft the metal shank which fits to the steering column. You now have two parts of a joint which can be bolted together to make up a complete flexible joint which will mate the lower steering column to the quick rack pinion shaft. Be careful not to lose the metal sleeves from the flexible part of the joint. When you eventually fit the rack, joint and column into the chassis, an earth strap must be fitted between the two metal parts of the flexible coupling otherwise you will not be able to make the horn work.



Flexible coupling made up from Mk1 & Mk2 parts

"Quick rack" and Lockstops cont.

On the Mk 1 Cavalier or Opel Manta the maximum amount of lock is limited by "lockstops" on the front hubs and wishbones. There are no such stops on the Cyclone, but there is a simple and effective way to limit the amount of lock available and thereby prevent accidental contact between the lower inner edges of the front mudguards and the body sides. When the front suspension has been assembled and the steering rack fitted, jack up the front of the car so that the suspension falls to its lowest position. Pull back the rubber steering rack gaiters to reveal the ball joints at the end of the rack. Now fit a "Jubilee" clip around the inner part of each of the steering rack ball joints. **See Photographs below.** Turn the steering onto full lock either way and adjust the position of the "Jubilee" clips so that the clips come into contact with the aluminium rack housing when there is about 10-15mm clearance between the rear lower edge of the front mudguards and the body sides. Before refitting the rubber gaiters, make sure that the "Jubilee" clips are very tight. This operation must be done with the front suspension at maximum droop, as it is in this position that the mudguard to body clearance is at its minimum. This job is more difficult if the nosecone has already been fitted.

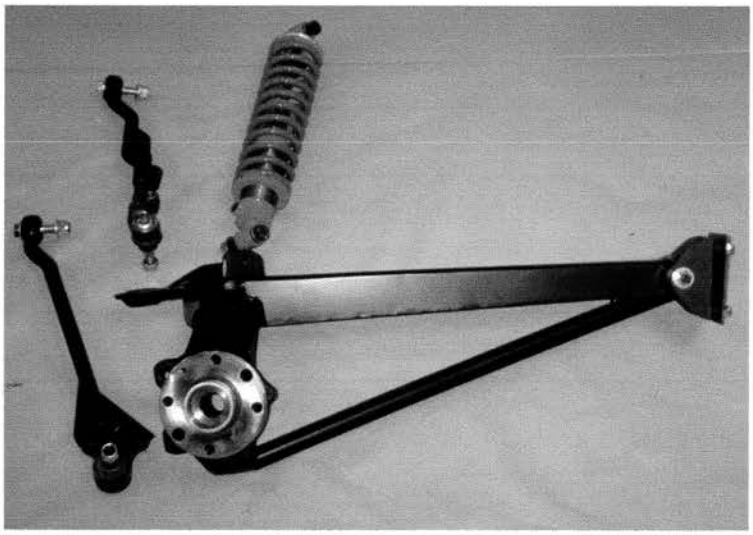


Fit "Jubilee clip as lockstop

With full lock applied "Jubilee" clip limits travel

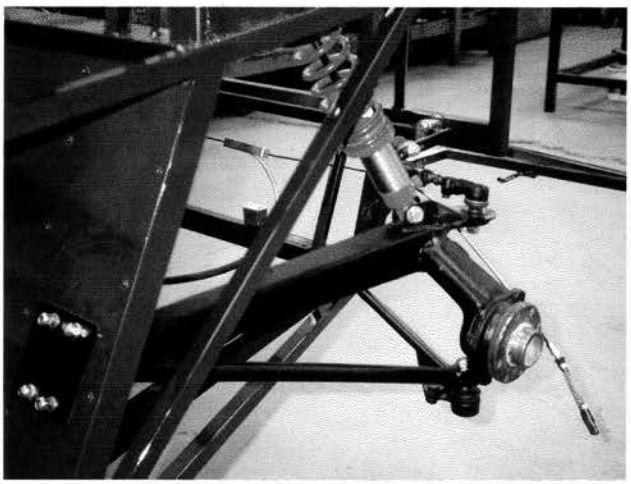
Rear suspension

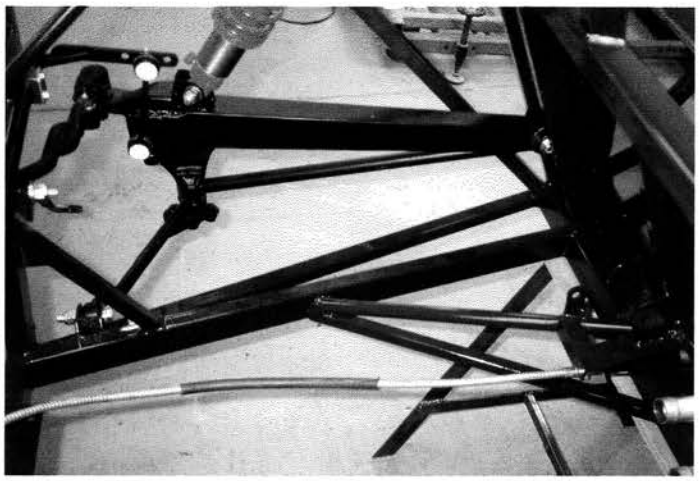
Fit the upper and lower transverse links to the chassis brackets leaving the nuts and bolts loose - as in the case of the front suspension, these should not be tightened until the car is set at its correct ride height. Fasten the bracket which is at the front end of the trailing arm through the slotted holes in the bulkhead, and fit the reinforcing plate on the cockpit side of the bulkhead. Position the studs roughly in the centre of the slots. These slots allow for the adjustment of rear wheel toe-in which must be set before the car is regularly used. Again leave the long bolt through the rubber bush loose until later.



Rear suspension components

Connect and tighten the ball joints on the transverse links to the rear mounting points on the trailing arm. Obviously the top transverse link is adjustable so that the rear wheel camber angle can be adjusted, and again this must be done before the car is used - see the chapter on Setting Up. Fit the AVO spring/damper units into the brackets on the chassis and trailing arms leaving the bolts loose until the car is on the ground.





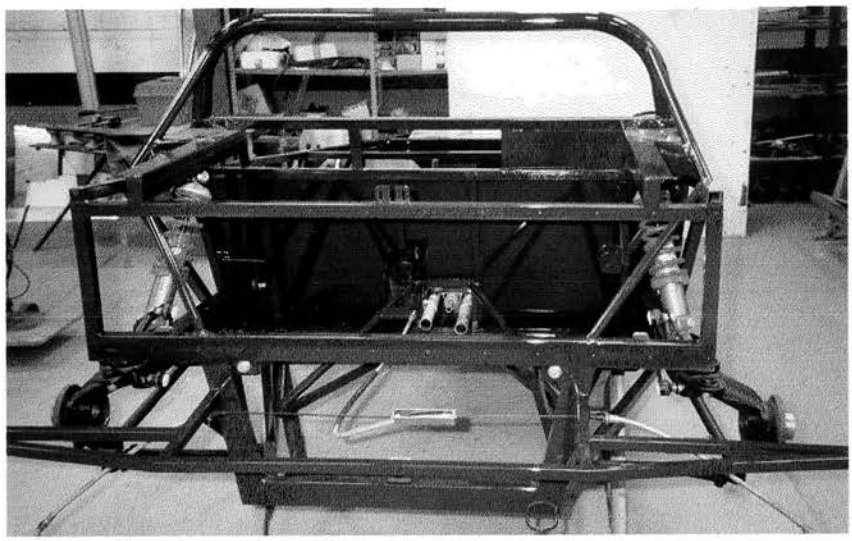
Rear suspension assembled

Handbrake cable and lever

a056

Fit the Metro handbrake lever to the bracket on the centre tunnel. Connect the Metro handbrake cable (Rover part no. GVC 2333. "U" clips for cable : 5 x 13H9506) to the base of the lever. The front end of the outer cable fits into the bracket just behind the rear cockpit bulkhead and the cable passes under the engine/transmission (in the gap between the two) and then to the bracket each side just behind the engine bay rear panel. When the discs, calipers and pads have been fitted, the outer ends of the cable will connect to the calipers as shown in the photograph below.

Bolt handbrake lever to bracket in tunnel



Handbrake cable fitted to chassis

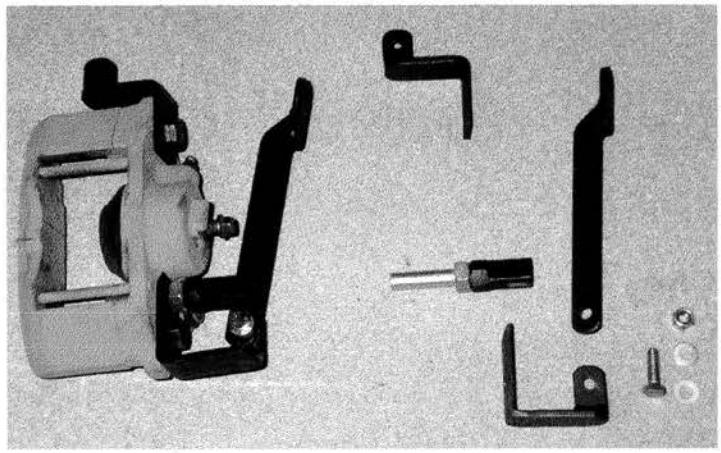
Handbrake and rear calipers

Before fitting the rear brake calipers to the rear uprights, it is necessary to modify them to take the handbrake mechanisms. First make sure that you have the correct type of brake caliper (check the photographs carefully). Although there were two or three different types of front brake caliper fitted to Cavaliers and Astras and they were all interchangeable on the original cars, only the type shown in the photographs will do for our purposes. Fortunately it is by far the most common type. Recondition the calipers or exchange them for reconditioned units. The bracket which is to be fitted to the top of the caliper (bleed nipple is at the top) forms the anchor for the end of the handbrake cable. The bracket to be fitted to the lower caliper bolt provides the pivot point for the lever which pushes the adjustable pushrod against the brake pad. The only modification required to the caliper is the drilling of a hole through the caliper to accomodate this pushrod. This must be done very accurately. Bolt the lower bracket to the caliper making sure that when the lever is fitted to its pivot it will be vertical and the top end of the lever will be in line with the top bracket. At the point where the hole is to be drilled, there is a small pilot hole through the lower bracket.

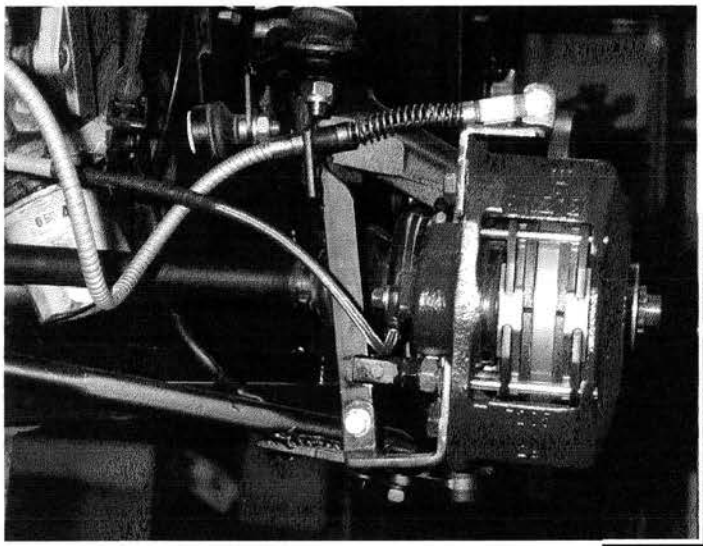
You will now need the use of a pillar drill - or get a local engineering shop to do the job for you. Drill vertically down through the pilot hole and then through the caliper, firstly with a drill of about 6mm, and then a 12mm drill. This method ensures that the holes in the bracket and the caliper are perfectly aligned. Check now that the pushrod slides easily through the hole. Thoroughly grease the pushrod with "Copaslip" or a high temperature/melting point grease, and assemble as shown in the photographs overleaf.

Handbrake and rear calipers cont.

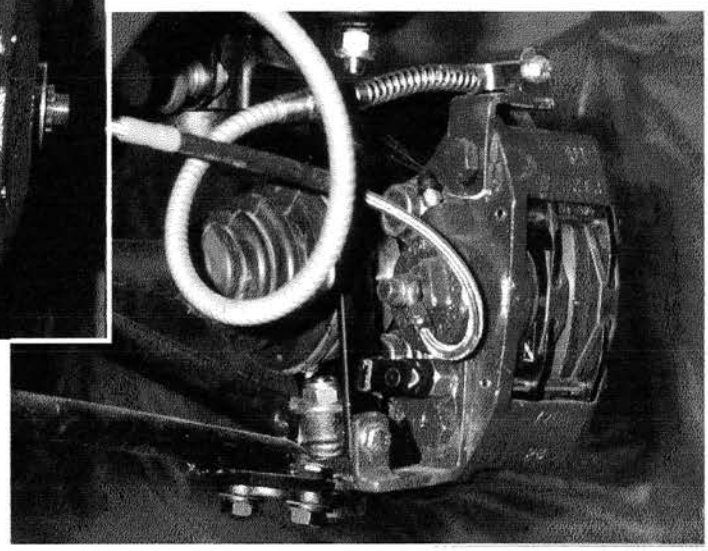
When the disc and caliper have been fitted to the hub, new pads installed and the cable and hose connected, then with the handbrake pulled on there should be a clearance between the head of the banjo bolt in the centre of the caliper and the lever arm of about 5 - 10mm. Adjust this by undoing the locknut on the pushrod and screwing it into or out of the forked end which sits against the lever. When this measurement is correct on both sides, then the amount of handbrake lever travel in the cockpit can be adjusted by the cable adjuster at the base of the handbrake lever. As the brake pads become worn, it will be necessary to re-adjust the pushrods in order to maintain handbrake efficiency.



Handbrake mechanism components



Offside rear brake assembled



Brake pipes and hoses

Do not use any second hand brake pipes or hoses. The ancilliary kit from Car Craft includes top quality steel braided brake hoses and "*Kunifer*" or copper pipes. You will find that some of the short brake pipes are already bent to shape and you should be able to connect these without further bending. The longer pipes (e.g. the front to rear pipe through the centre tunnel) cannot be pre-shaped but they are of the correct length and they must be carefully routed and bent as they are fitted. Any bends which need a radius of less than about 45mm must be formed around a suitable piece of tube or dowel. Be very careful not to kink the pipe, but if you do, then discard it and start again with a new pipe.

Fit the three way connector block to the right hand side of the front bulkhead using a nut and bolt through the pre-drilled hole. The four way connector block fits onto a stud at the rear of the right hand lower chassis rail (offside rear corner of the engine compartment). The *Lucas* brake light switch fits into the centre of this four way connector.

The rigid brake pipes are labled and so you shouldn't have any trouble in connecting the master cylinder hoses to the front and rear connector blocks and the connector blocks to the brake caliper hoses. Note that the right hand master cylinder serves the rear brakes via one of the braided hoses whilst the centre master cylinder serves the front brakes through the front braided hose.

Secure the metal pipes to bulkheads and chassis tubes with "P" clips at intervals of about 30cm or so. The braided hoses to the calipers are fastened to the chassis brackets with standard Vauxhall "U" clips (Part number: 6638709).

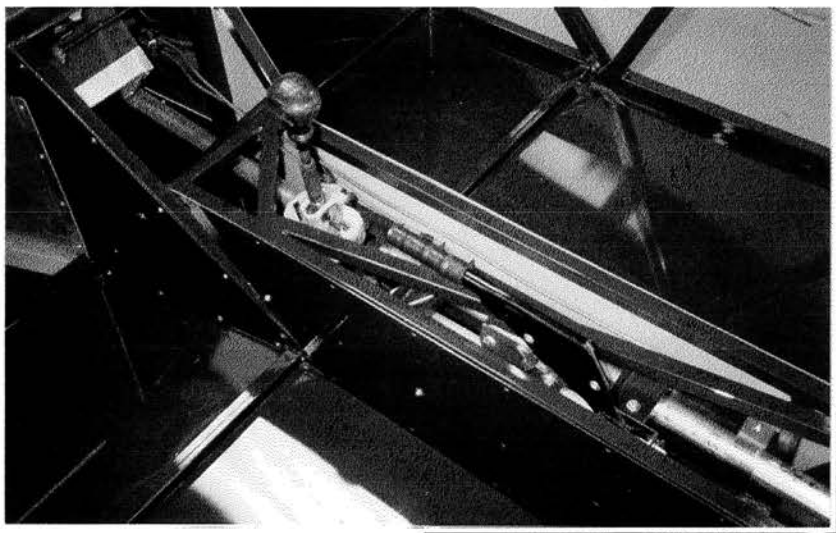
Bleeding the brakes is straightforward and doesn't differ from the method used for a standard Cavalier.

Tunnel

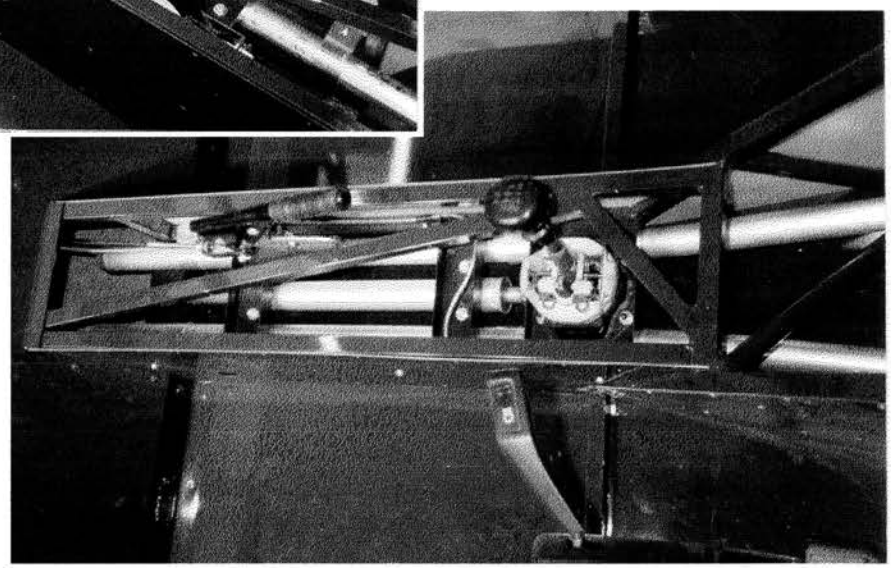
Although the centre tunnel in the cockpit doesn't have a propshaft running through it, it is nevertheless quite "full" when the car is finished. The tunnel carries the two main coolant pipes, heater hoses, brake pipes, clutch pipe, fuel lines, gearlever and linkage, handbrake lever and the wiring loom. Care must be taken therefore to make sure that everything is fitted neatly, that nothing catches or fouls the handbrake or gear linkage and that you don't fit petrol pipes or brake pipes in contact with hot water pipes. In order to keep everything out of the way of the gearlever and linkage, everything apart from the coolant pipes can be fitted into the upper part of the tunnel. The coolant pipes should be secured to the frame tubes half way up the sides of the tunnel, and as tight against the sides as possible. Fit the handbrake lever and cable as previously described, followed by the gear lever and linkage which simply bolts to the brackets welded into the tunnel.

If you are using a fuel injected engine, then you will have two fuel pipes to fit (feed and return). It is normal for the pipe from the tank to the fuel pump to the engine to be of 5/16" bore, and the return pipe from the engine to the tank to be of 1/4" bore. These fuel pipes and the brake and clutch pipes should be secured by "P" clips to the upper tunnel tubes or sides - their exact positioning is not important as long as they are neatly secured and do not foul anything that moves.

Although it will not be connected to anything at this stage, the wiring loom can be placed roughly in position and where it passes through the tunnel, secured in place by "P" clips or cable ties.



Keep things neat in the tunnel



Fitting the engine/transmission

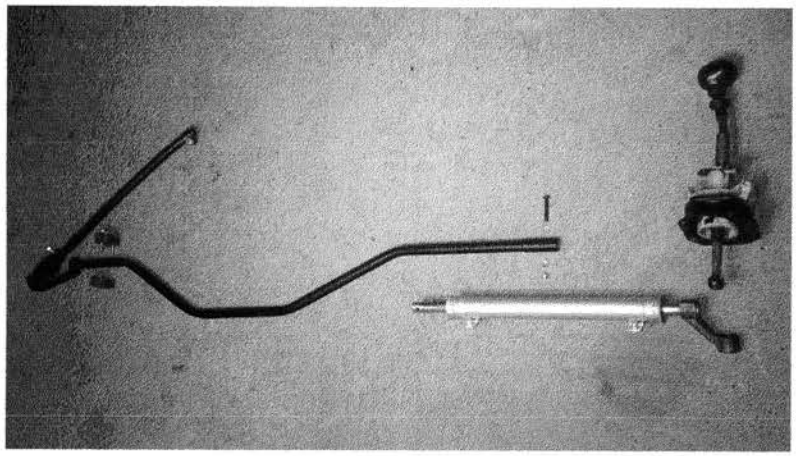
It is possible to fit the gearbox and then the engine separately, but it will be found easier, and it is recommended that they be fitted as a single unit. Likewise the exhaust manifold can be fitted or removed with the engine installed, but again you will find it easier to fit the manifold to the engine before installing the engine/transmission unit in the chassis.

Jack up the rear of the chassis and support it securely on axle stands. Remove the rear wheels. At this stage do not fit any of the mountings either to the chassis or engine or gearbox. The driveshafts must be left out and will be fitted at a later stage. Lift the unit with a suitable engine crane, making sure that when it is off the ground, it is as level and upright as possible. Make absolutely sure that the slings, chains or wire ropes you are using are well up to the job and that they cannot slip - an accident here will severely damage your health, Cyclone chassis or bank balance, (or all three). You will need an assistant to lower the engine whilst you guide it into roughly the right position in the engine bay. Now get your assistant to steady the unit whilst you bolt the right hand engine mounting to the front of the cylinder block and then fit the bolt through the mounting brackets on the chassis. Next fit the left hand mounting which includes the clutch slave cylinder mounting to the front of the gearbox. Finally fit the rear mounting to the gearbox and bolt it to the bracket on the rear chassis crossmember. Make sure that all of the mounting bolts and brackets are tightened before removing the engine crane and slings.

To fit the driveshafts it is necessary to remove the nuts and bolts from the inner ends of the upper and lower transverse suspension links (these should have been left loose anyway). Pull the hub outwards so that there is now enough room to fit the inner end of the driveshaft into the gearbox (tap it firmly in with a lead, wood or hide mallet) and then guide the splined outer end through the centre of the rear hub. Once the hub has pushed all the way onto the splines, the transverse links can be re-connected to the chassis. Fit the large washer and castelated nut onto the end of the driveshaft. You will not be able to tighten it properly until the car is on the ground and you have a helper to stand on the brake pedal, as it needs to be very tight. When it has been tightened don't forget to fit a split pin.

Gear linkage

The gear linkage can be fitted next. This is a modified linkage supplied on an exchange basis from Car Craft. As the mechanism at the base of the gear lever is to be totally enclosed by the centre tunnel, and not exposed to the elements as it is in the Cavalier, the protective rubber covers originally fitted should be left off. Leaving the covers off slightly improves the feel and precision of the gear change. If you haven't already fitted the gearlever and the front part of the linkage into the tunnel then do so now - simply bolt it to the brackets provided. now take the tubular curved part of the linkage which passes underneath the sump and which has a universal joint at its rear end, and push it onto the rear of the linkage in the tunnel. Just in front of the universal joint, the tube is supported in a nylon bearing block. Make sure that the tube slides easily through this block when it has been tightened (and greased). Fasten these two sections of linkage together with the nut and bolt through the pre-drilled holes in the tubes.



Gear linkage components

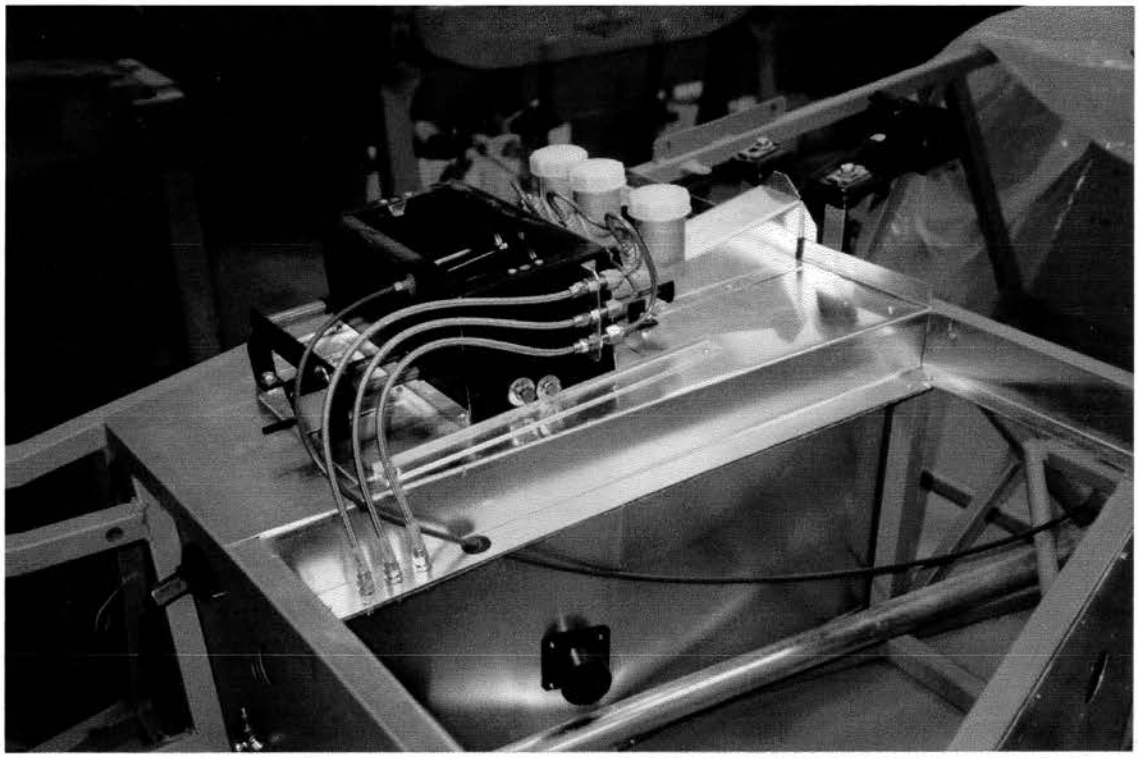
Now push the link which goes from the U/J to the gearbox top cover onto the stub of the U/J on the top cover, but leave the pinch bolt loose for the time being. Pull and push the gear selector shaft (top U/J) until you can feel it is in neutral - in this position it is spring loaded so that it naturally stays in the 3rd/4th gear plane. Move the gearlever in the cockpit so that it is in the neutral position fore and aft and also in the 3rd/4th gear plane. Now tighten the pinch bolt on the top U/J. The gear change should now work correctly. If you cannot now get all the gears easily, then slacken the pinch bolt and adjust the relative positions of the rods until you can.

Correct adjustment and lubrication is quite critical but if you spend a little time on this and get it right you will be rewarded with an exceptionally good gear change.

Pedal assembly

The adjustable pedal assembly is supplied as a ready built unit which is temporarily mounted on the offside footwell top panel. Before this assembly is properly fitted to the chassis it is necessary to fit the other internal aluminium panels. These are not stressed panels and so do not need to be sealed or bonded - just pop-rivet them in place. Now lower the complete pedal assembly and footwell top panel into position and bolt it down to the chassis brackets through the corners of the main pedal box frame. Finally fasten down the edges of the aluminium panel with self-tapping screws. Screws are used in preference to rivets so that when the time comes to trim the footwell area with carpet, the pedal box and top panel assembly can be quickly and easily removed and lifted to the left (leaving the brake hoses and accelerator cable still connected) thus making the trimmer's job much easier. Fit the three braided hoses through their respective holes in the aluminium panel, secure them with locknuts and finally connect them to the rigid brake and clutch pipes. Likewise push the accelerator cable through the hole to the rear of the brake pipes and fit the rubber grommet. Lead the cable through the tunnel in as straight a line as possible, beneath the engine along with the handbrake cable and starter cable and then up behind the engine to the throttle arm. Finally lightly oil all the moving parts and make sure that the pedal adjustment works over its full range and that the hoses and accelerator cable do not become over-tight when the pedals are set fully back.

When connected to the carburettors or injection system the accelerator should work smoothly. If you are using your Cyclone in competition then the regulations require an extra throttle return spring. This may also be a good idea on a road car as the consequences of the throttle sticking wide open at the wrong moment could be catastrophic!

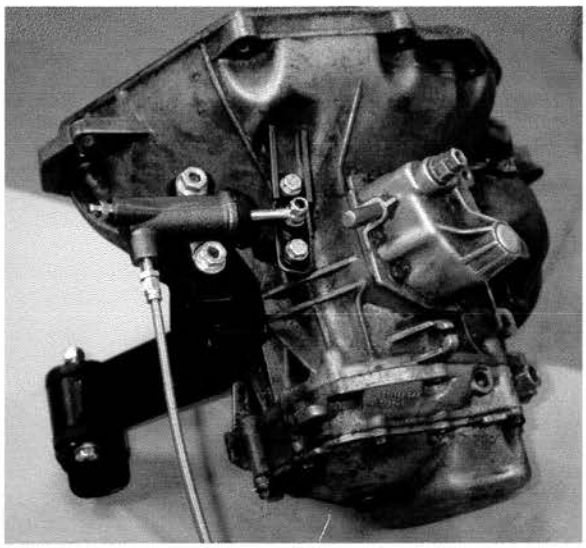


Master Cylinder / Pedal Box Unit fitted

Hydraulic clutch conversion

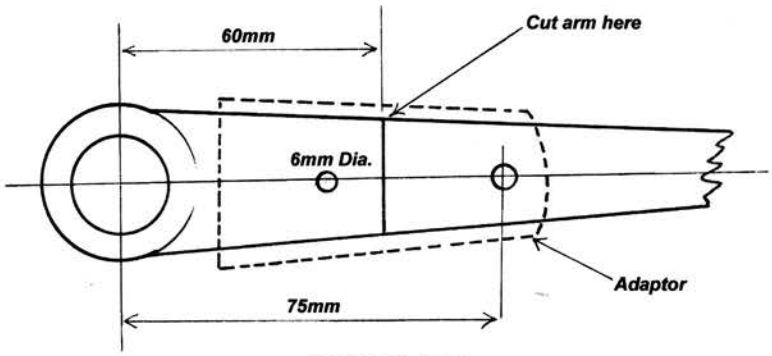
The pressed steel clutch operating arm on top of the Vauxhall gearbox has a forked end to which the original clutch cable was attached. This part of the arm can be cut off leaving a straight arm with two holes in it (one slotted) to which the pushrod pivot plate can be bolted. Some of the later gearboxes have a forged arm which needs a different pivot adapter and different fitting. Cut off the end of the forged arm as shown in the drawing, push on the pivot adaptor and drill a 6mm hole right through the adaptor and arm (the top face of the adaptor has already been drilled). Fasten the adapter to the arm with the 6mm nut and bolt provided. Bolt the slave cylinder into place on the engine mounting bracket. Run the braided hose to the chassis bracket and secure it with the locknut and then connect it to the rigid clutch pipe.

Now bleed the system and check that the clutch operates correctly. No adjustment is needed or provided with this system but check that it is possible to push the clutch arm towards the slave cylinder, thus pushing the piston back into the cylinder about 10mm or so. If there is less than 5mm of inward travel then shorten the pushrod slightly until you get the required travel. It is important that this inward travel is available otherwise you will very quickly develop a slipping clutch. Another thing to check is that the pushrod is aligned horizontally with the arm and pivot. If it is slightly out of line then slacken the three bolts which hold the mounting to the gearbox, and due to the large clearance holes in the mounting plate you will be able to adjust the height of the mounting relative to the engine/gearbox thus adjusting the pushrod alignment.



Gearbox with more common pressed steel arm

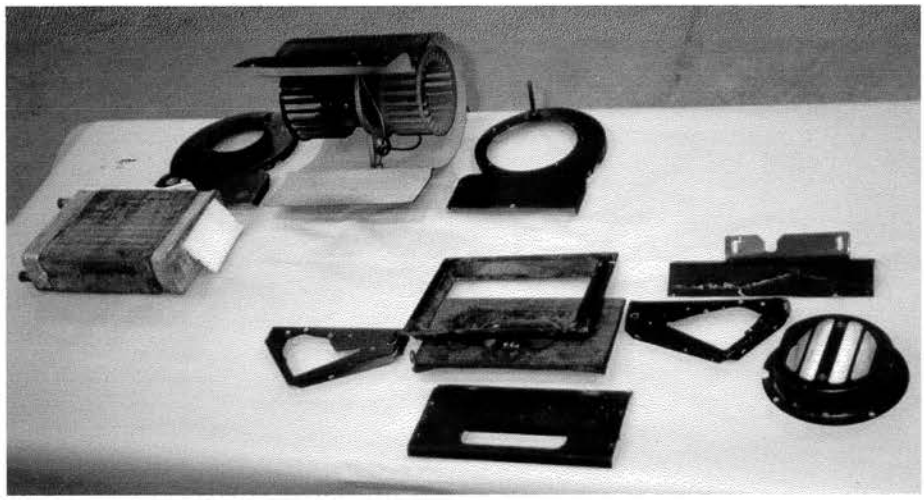
Gearbox with forged clutch arm



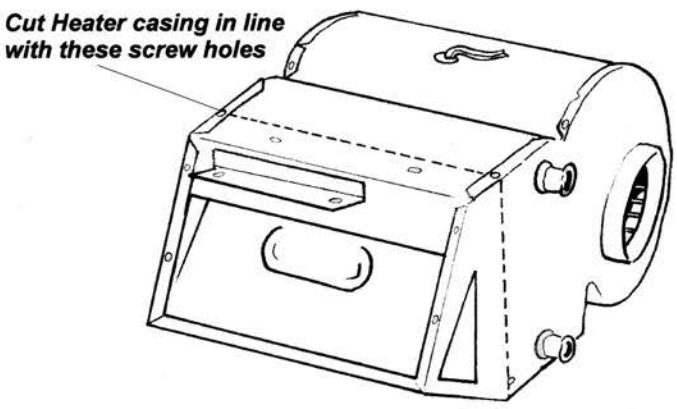
Forged Arm

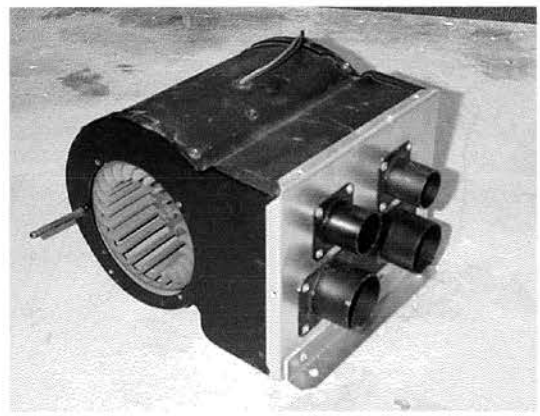
Heater

A Mini heater/demister unit is used and after modification it will be fitted onto the floor against the front bulkhead and directly behind the fuel tank. It is necessary to completely dismantle the unit and cut off and discard the parts of the casing as shown in the photographs and drawings. Also to be discarded are the control panel, front panel, air flap and the screwed-on intake flange on the side panel. On reassembly you will have a casing fitted with a fan and radiator and an open end behind the radiator. The open end is closed by fitting the air distribution panel which is supplied in your kit. This panel is fitted with the smaller diameter demister outlet pipes towards the top (top of the unit is where the wires exit the casing). When finished bolt the heater to the floor through the bracket on the air distribution panel and the triangular bracket on the floor at the left hand front corner of the unit. Place a couple of strips of rubber or foam between the heater casing and the floor/bulkhead to prevent any rattles or vibrations. Connect the lower air outlet nozzles to the footwell outlets with the ducting supplied. The demisters should be connected at a later stage after fitting the body - use Mini demister ducting. It doesn't matter which way around the water hoses are connected to the heater radiator.



Dismantle Heater unit and casing



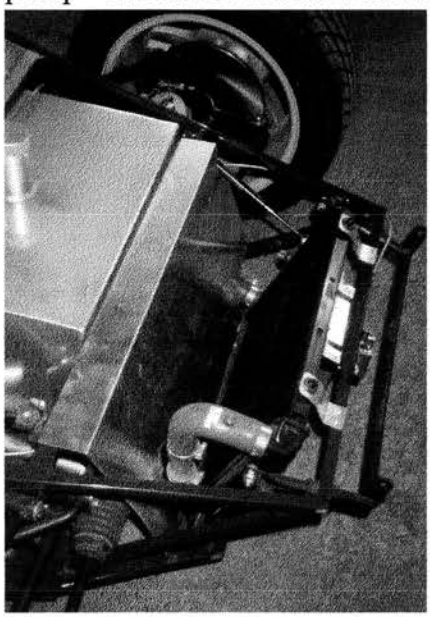


Completed unit

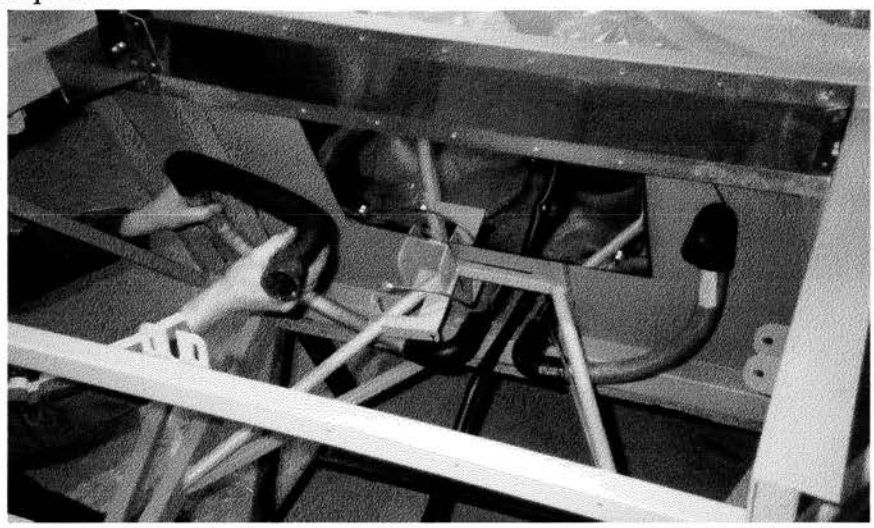
There is no "ram" effect with this system - hot air will only enter the cockpit if the blower is switched on and will heat both the footwells and the windscreen simultaneously. Make sure that the motor runs in the correct direction - look into the fan from the left hand side of the car and the fan should rotate in a clockwise direction. If it runs the wrong way then just reverse the connections to the motor.

Cooling system

As you receive it, the radiator is already fitted with the electric fan and thermostatic switch. Fit the two rubber grommets into the holes in the lower radiator mounting panel and push the pegs on the bottom of the radiator down into these grommets. Secure the top of the radiator to the foremost transverse chassis tube with the two aluminium brackets to which you will have fitted the other rubber grommets. Connect the right hand aluminium coolant pipe to the top of the radiator via a 90° elbow, a short aluminium tube and the 90° elbow with the bleed screw at the top. (If your radiator has a bleed screw fitted to the lefthand top corner the top 90 elbow will not have a bleed screw). The lefthand coolant pipe is connected to the bottom of the radiator with the hose that has a shallow "S" shape. The rear of the right hand coolant pipe has to be connected to the thermostat housing via a curved aluminium tube and two 90° elbows. Depending on which engine you are using you may have to shorten one side of the top 90° hose so that it doesn't press on the bulkhead - it is best positioned so that it is clear of everything and it is quite well supported by just the hoses. On the left hand side use the 90° hose at the bottom, the longer curved aluminium tube, and then the large double bend hose to connect to the plastic tube which runs underneath the inlet manifold. The lefthand aluminium tube is not well supported by the hoses and so needs fastening to the vertical chassis tube with a "P" clip. On most engines the plastic tube beneath the inlet manifold has a 90° bend at the left hand end. If you have an engine which has a straight tube then you will need to replace it with the 90° item (Vauxhall part number: 90322215) or find an alternative hose to connect it to the aluminium tube. The plastic tube has two small take-off points, one should be connected to the bottom of the expansion tank with a length of 3/4" hose, and the other should have the return hose from the heater connected to it via a 1/2" to 3/4" adaptor. This heater hose (1/2" bore) can be routed under the engine (between the engine and gearbox, alongside the handbrake cable), through the tunnel and connected to the top outlet pipe on the heater radiator. The hose from the bottom of the heater goes back through the tunnel and connects to the engine through a 1/2" to 3/4" adaptor. On the 16 valve engines the heater connection is at the left hand end of the cylinder head and on these engines it is important not to shut off this outlet for any reason. If you are building a competition car which doesn't have a heater then connect the cylinder head outlet directly around to the plastic pipe beneath the inlet manifold (this is to maintain correct coolant flow through the cylinder head). On the 8 valve engines the heater connection is made to the top outlet on the aluminium casting which is bolted to the right hand end of the cylinder head just above the water pump - this can be blocked off if required.



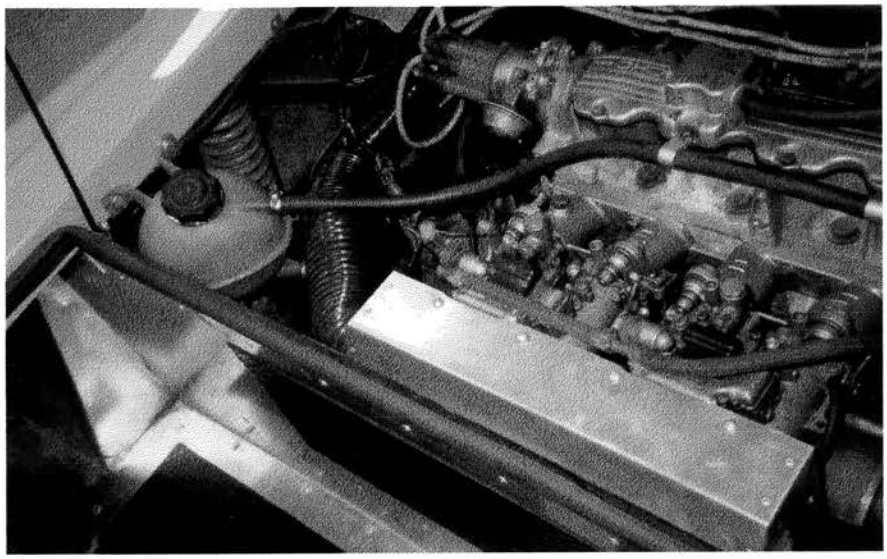
Radiator and fan fitted



Arrangement of main coolant pipes in engine bay

Cooling system cont.

The expansion tank can be fitted to the left hand rear corner of the engine compartment. Fit it as high up as possible (with the cap almost touching the engine compartment lid). The last remaining connection is the small pipe from the top of the expansion tank which connects to a take-off on the thermostat housing on the 8 valve engines, and to the inlet manifold on the 16 valve engines.



Position of cooling system expansion tank

Now is a good time to fit the rear bulkhead. This has already been drilled and all you will have to do is lay a bead of *Sikaflex* around the frame, place the bulkhead panel in position and fasten it with 5/32" pop rivets.

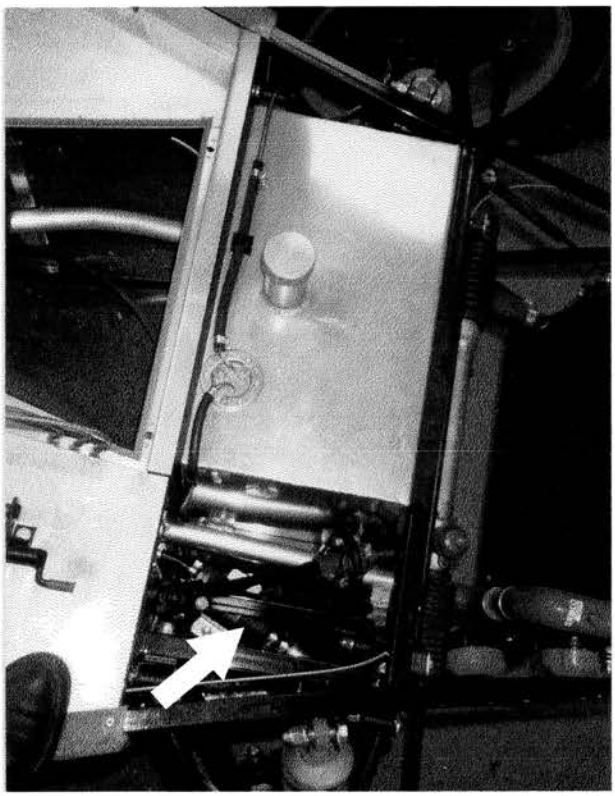
It is better to leave fitting of the aluminium air deflector panel behind the radiator until after the bonnet hinge and body have been fitted.

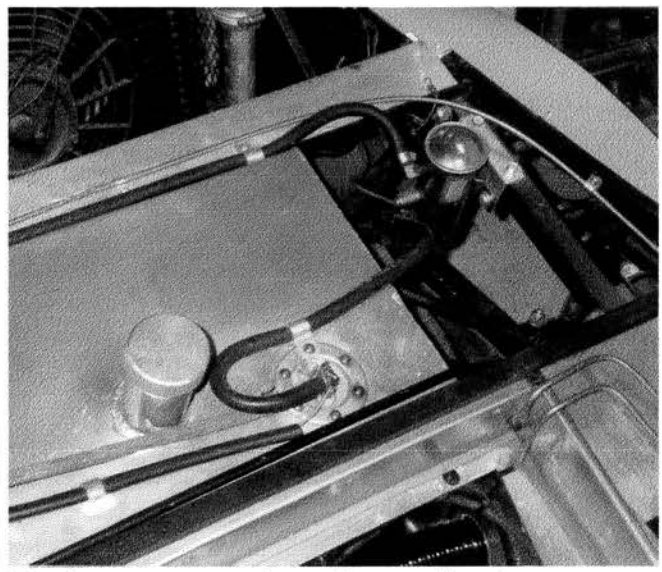
When filling the cooling system leave the bleed screw on the radiator or top hose open until water flows from it. Close the bleed screw and continue filling the system until the expansion tank is about half full. After the engine has been run and achieved its normal operating temperature, let it cool down and then top up the system.

Fuel system

The fuel tank as supplied is suitable for use with engines using carburettors or fuel injection systems. It is internally baffled and the lower large diameter outlet pipe is intended for connection to the roller-vane fuel pump of injection systems. These pumps are not intended to "lift" fuel and so must be mounted as low (on the floor) and as close to the tank as possible. On most production cars they are mounted beneath the floor. Although there is not a lot of room to spare, the injection pump can be mounted on the floor just to the right of the tank. The 5/16" fuel pipe from the pump must be routed through the tunnel. There is just enough room to drill a hole in the right hand lower corner of the front bulkhead just below the coolant pipe to get the fuel pipe through (use a rubber grommet in the hole). It is rather tricky but quite possible to route the copper pipe around the engine compartment to the back of the engine where it should be connected via the filter to the fuel rail (mount the fuel filter on the rear bulkhead). If you use flexible fuel pipe then make sure it is suitable for injection systems - it must be able to withstand very high pressures. You will now have to fit the 1/4" return pipe from the fuel pressure regulator back to the tank. It is best to route this pipe along the left hand side of the tunnel going higher towards the front and passing through the front bulk--head near the top left corner. Connect this pipe with a short length of flexible hose to the pipe which is marked with red paint on top of the sender unit. The unmarked pipe on the sender unit is used as a vent. Fit a length of flexible fuel pipe to this vent and lead it around and down the side of the fuel tank to exit through one of the drain holes in the floor below the tank. This vent hose will ensure that even if the car is inverted fuel will not leak from the tank.

If you intend using carburettors on your car then blank off the large pipe at the bottom of the tank and use the red marked pipe on the sender unit as the feed to the fuel pump. Again mount the fuel pump ("Facet" or similar) in the area to the right of the tank but in this case you can mount it higher up on one of the longitudinal chassis tubes. Route the fuel line back to the engine as for the injection system, but this time there will be no return pipe. Again use the unmarked pipe on the sender unit as a vent.





Fuel pump on carburettor engined car

Tank & pump on injected car. (Pump arrowed just below chassis rail)

Seat belts

If you are fitting inertia-reel seatbelts then the recommended units are **Securon 254** when the seats are to be *Corbeau Clubman Highback* (or of a similar style with four slots for the belts). If you intend to fit none-slotted seats such as *Cobra Roadster Seven* then use **Securon 514/15**. The belts are obtainable through accessory shops, motor factors or direct from Car Craft.

Although these can be fitted (or removed) after the car is otherwise completed, the task of fitting the inertia-reel part of the belt is slightly easier if tackled before the main bodyshell is fitted. These belts are not "handed" and so will fit either side of the car. The "reel" is fastened with a single bolt into the area beneath the steel panel immediately behind the roll-over bar. Before fitting it make sure that the arrows on the adjustable part of the inertia-reel mechanism are set as per the instructions with the belt. After fitting make sure that the belt extends and retracts easily - if not then re-adjust the position of the arrows until it does. When the belt works correctly fit the aluminium cover plate beneath it with self tapping screws. The lower belt fittings should not be bolted to their mountings until the body and interior trim have been fitted.

Note: When bolting the belts into their mounting points make sure that the bolts are not so long as to protrude so far through the captive nuts that they damage either the glassfibre body or anything in the central tunnel.

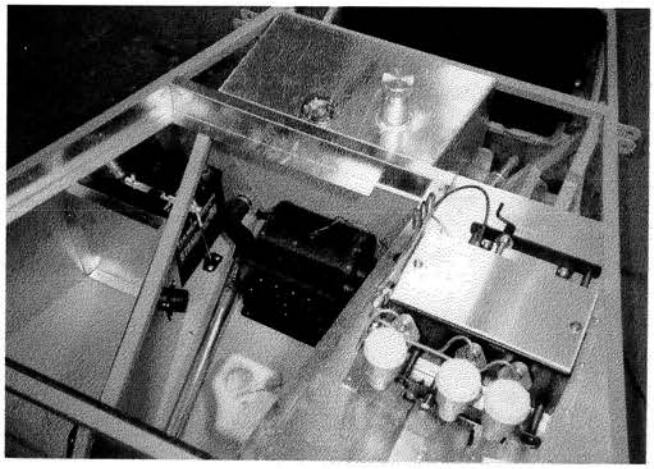
Inertia reel fitted. View from below

Fit aluminium cover to protect inertia reel

If you are building a competition car and fitting a four-point harness on the driver's side, then use belts with short shoulder straps (single seater type). The panel immediately behind the seat headrest is of heavy gauge steel and is intended to accomodate the shoulder strap mountings. Position these mountings by fitting the seat and marking the panel through the slots in the seat headrest. The lower mountings are the same as for inertia-reel seatbelts.

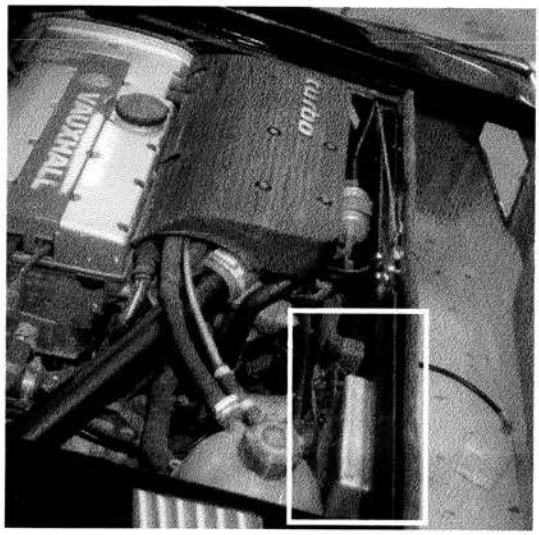
Electrical System

Use a battery type 53526 or 038 (typical applications: Metro, Mini etc.). Clamp it into position in front of the nearside footwell with the clamp and brackets provided. You will have to tilt the battery to get it into the space provided so be careful not to spill any acid. For the long starter cable from the positive terminal of the battery to the starter motor use the cable from a Mini, make one up (9 ft) or obtain one from Car Craft. The earth cable can be connected from the negative battery terminal down to the bolt securing the heater motor bracket to the chassis tube. Position the screenwash reservoir and washer pump (Mk1 Astra) in the middle of the floor panel to the rear of the heater unit - use the original Astra mounting bracket.



Battery, heater and screenwash reservoir/pump

You will already have placed the wiring loom roughly in position - this loom comes with its own instructions on connections and colour codes and by studying these you will be able to work out the best route and positioning for the loom. The fusebox fits up through the rectangular hole in the front corner of the spare wheel tray (under bonnet area) and the block of five relay sockets fastens beneath the panel just to the rear of the master cylinder hoses. These relay sockets accomodate the standard Vauxhall wiper/delay relay, flasher unit and three four-pin relays. Fit the ignition coil near to the nearside top corner of the rear of the cockpit bulkhead so that it is close enough to the distributor for the H.T. lead and engine loom to reach. If you are using the engine with a standard injection system then the E.C.U. and fuel pump relay can be fitted on the nearside of the bulkhead to the rear of the engine - make up and fit an aluminium shield above the E.C.U. to deflect any rain water which might enter through the air vent in the engine cover.



E.C.U. and fuel pump relay fitted to rear bulkhead

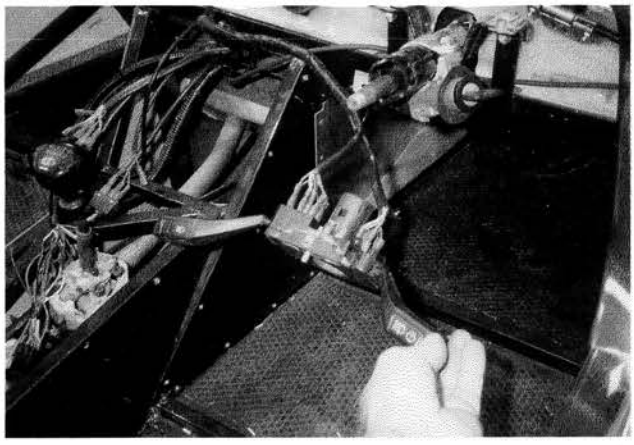
Electrical system cont.

The Cyclone loom has terminals which push directly onto the backs of the various switches, but when connecting the instrument panel it is necessary to join the wires from the original Vauxhall multi-plug onto the wires from the Cyclone loom. The preferred method is to solder the wires together individually and insulate the joint with heat shrink insulation. If you are not confident about soldering the wires then it is acceptable to join them with block connectors where the wires are held by small screws. The wires to the rear lamp units must be joined in a similar manner.

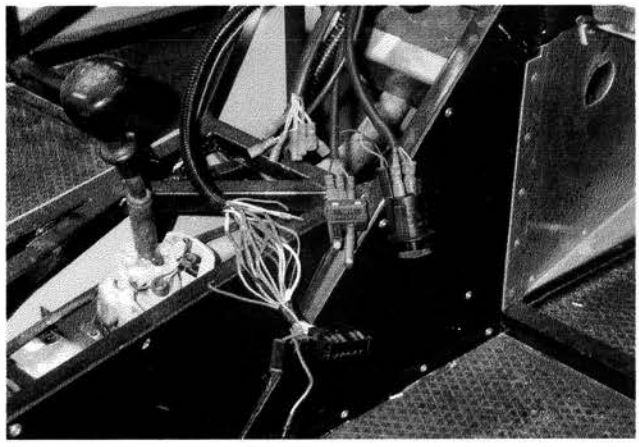
The new wiring loom now incorporates a circuit which illuminates a warning light on the instrument panel should the brake fluid level in either master cylinder fall to a low level. To make use of this you will need to replace the reservoir caps with items from a Metro (Part No. AEU 1796) which incorporate a float and switch mechanism. This facility is an S.V.A. requirement.

Obviously the lights, indicators, repeaters, interior light and wipers cannot be wired up until the body has been fitted. Use repeater lamps of your choice and mount them just below the mirrors. Number plate lights are Ford (**Part No. 6067427** x 2) and should be mounted in the panel above the number plate.

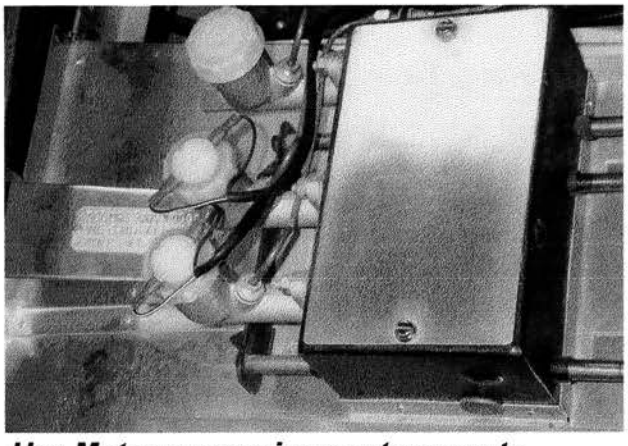
Connect a heavy earth cable between one of the bell housing bolts and the chassis bracket for the rear engine mounting.



Cyclone loom connectors push directly onto switch terminals



Wires from instrument panel muti-plug must be connected into new loom



Use Metro reservoir caps to operate low fluid warning lamp

Initial suspension set-up

If the front and rear ride-height, camber angles and toe-in are set reasonably accurately before the body is fitted, then when you come to fit the main bodyshell you will be able to check that the rear wheel to wheel-arch clearances are acceptably symetrical before securing the body. Obviously the car will become considerably heavier when finished and so the geometry will have to be rechecked and adjusted (accurately) later.

Place the car on a smooth flat piece of ground. Start with the ride-height. Jack up the rear of the car so that both rear wheels are off the ground. Loosen the allen screws which lock the spring platforms into position on the damper bodies. Apply a few drops of oil to the threads on the damper and screw the spring platform up so that it just very lightly compresses the spring. Do this on both sides and check by measuring that the spring platform is at exactly the same height on both sides. Now let the car down onto the ground, bounce it and move it backwards and forwards to settle the suspension - note that the dampers should all be at their softest setting during these operations. Measure the distance between the lower edge of the rear chassis crossmember and the ground - this needs to be 140 - 150mm. It probably won't be so jack up the car again and adjust each rear spring platfom an equal amount then drop the car down again and recheck the height. When you have got it to within the tolerance then follow the same procedure for the front suspension. The height at the front should be measured between the ground and the lower edge of the chassis rail at a point approximately in line with the front bulkhead. The measurement should be 120 - 130mm. Because at this stage there is very little weight on the front of the car you will find that when the car is jacked up the springs may drop out of their top mountings so when you lower the car onto the ground you should check that the springs are seated correctly. With the car on the ground tighten up all of the inner wishbone pivots, the front bushes on the rear trailing arms and the inner pivots of the rear transverse links.

The rear camber angle comes next. If you intend to set this accurately at this stage then you will need a camber gauge and set each side to 0.5° to 0.75° negative (road car) or to 0.75° to 1° negative (competition car). To set the angle approximately, use either a large set square between the floor and the wheel (avoid the bulge at the bottom of the tyre) or a spirit level against the wheel. Adjust the length of the top suspension link until the wheel leans just perceptibly inwards at the top. At this stage the exact camber angle is not critical but try to ensure that each side is equal. Carry out the same procedure at the front but this time the adjustment is made by inserting or removing shims behind the top wishbone mountings. A 2mm shim will alter the camber angle by about 0.25°. Always have the same number of shims on the front and rear wishbone mounting otherwise you will alter the pre-set castor angle. (You may find that side to side the number of shims is not equal) Again if you are setting the angle accurately then it should be 0.75° to 1° negative (road car), 1.25° to 1.5° negative (competition car). Make sure that the wheels are pointing straight ahead when making the adjustments.

Initial suspension set-up cont.

Rear wheel toe-in adjustment is made by moving the front mounting of the trailing arm inwards or outwards after slackening off the four securing nuts on the rear bulkhead. To set front and rear toe-in approximately you will need a length of string which will stretch right around the car. Tie one end of the string to a chassis tube around the rear bulkhead area and at about wheel centre height. Now stretch it tightly around the car so that it passes across each wheel and tyre and tie the other end near to be first one. If the wheel centres protrude further than the outer face of the tyres then go just below or just above them. Turn the steering wheel so that there is an approximately equal deflection of the string each side (wheels straight ahead). Now adjust the front wheel toe-in by turning the track rods an equal amount on each side until the string is only just touching the tyre wall at the rear of each front tyre. You may have to move the steering wheel several times during this adjustment. When you fitted the steering rack you wound each track rod end onto the track rods by an equal amount each side and it is important to make sure that during this toe-in adjustment each side receives exactly the same amount of adjustment. Tighten the locknuts on the track rod ends. Now adjust each rear wheel until the string only just touches the tyre sidewall at the front of each tyre. Because the rear track of the Cyclone is slightly wider than the front track then this "adjustment by string" will result in slight toe-in at the front and at the rear.. For those making accurate adjustments the settings should be 2mm toe-in at the front and 4mm toe-in at the rear. If you are using conventional tracking gauges on the rear wheels then be aware that it is quite possible to arrive at 4mm of toe-in whilst having 6mm of *toe-in* on one side and 2mm of *toe-out* on the other ! (*Not good for handling* !) At least the string method ensures an equal amount of toe-in on each side. Tighten the locking bolts on the top transverse link adjustments and the nuts at the front of the trailing arms.

A reasonable starting point for damper settings is about 6 clicks on the rear and about 8 clicks on the front. When the car is on the road you will be able to adjust them to your own preference - a competition car will need to be one or two clicks stiffer than a road car.

After the first few hundred miles, recheck the tightness of everything and at this stage when the dampers and springs have settled down, recheck the ride height, and you may also need to re-adjust the damper settings.

If you have used your string and set square/spirit level carefully then the car will be perfectly safe to drive gently to a testing station or garage to be checked and set up accurately, but before driving it you will have to recheck and reset the ride height.

If you have the equipment and you are setting everything accurately you will find that if you alter the rear wheel camber then this will affect the toe-in and vice-versa. Altering the front wheel camber also alters the toe-in. Always make a final recheck on all the settings.

Don't be tempted to use excessive camber angles on a road car - this will cause excessive tyre wear and reduce straight line stability. Similarly do not set the dampers too stiff on a road car as the ride will suffer and heavier shock loads will be imposed on the suspension components and the chassis.

REAR CAMBER ANGLE.

a

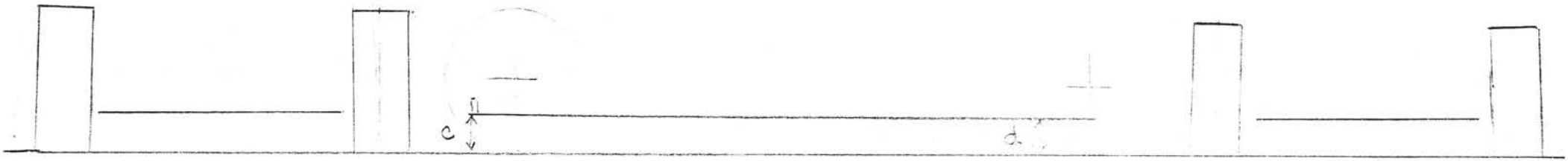
RIDE HEIGHT

b

FRONT CAMBER ANGLE.

REAR. c = 140 - 150mm

FRONT. d = 120 - 130mm



a = −0.5° to −0.75° (ROAD)

a = −0.75° to −1.0° (COMP)

b = −0.75° to −1.0° (ROAD)

b = −1.25° to −1.5° (COMP)

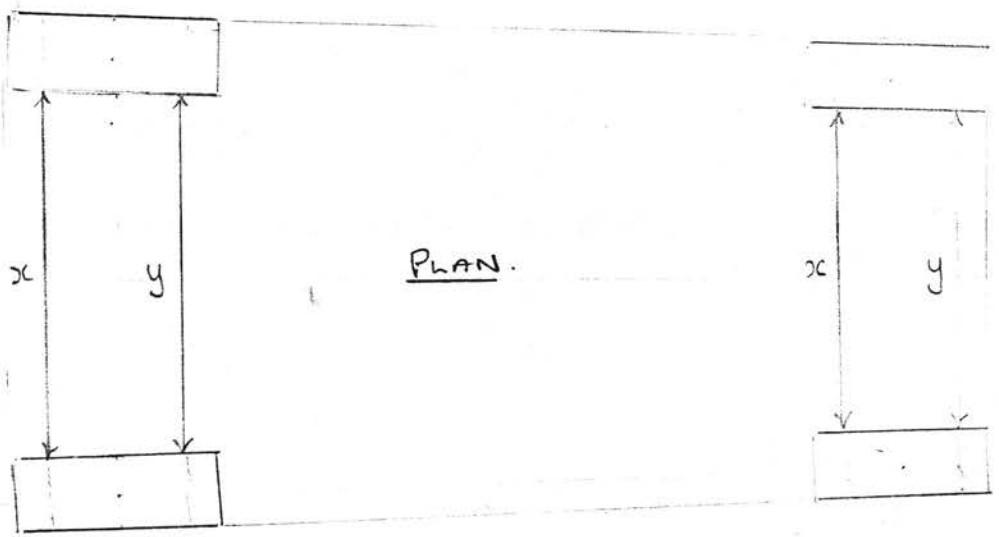
TYRE PRESSURES

REAR: 24 P.S.I

FRONT: 18 P.S.I

REAR WHEEL TOE-IN

x − y = 4mm



PLAN.

FRONT WHEEL TOE-IN

x − y = 2mm

Fitting the bodyshell

You will find that the edges and apertures on your Cyclone body panels have already been trimmed fairly accurately at Car Craft. In most instances they have been left so that they will need a little extra trimming in order to obtain a really good fit.

Start with the main bodyshell. Two people can lift and fit this but it is a little easier with three. Place the bodyshell on the ground behind the chassis. One person stands each side of the body and lifts it with one hand under the wheel arch and the other under the lower edge of the body side just in front of the air intake aperture. Lift the body fairly high and move it forwards over the chassis. When it is just to the rear (about 6") of its final fitted position, lower it down. If there is a third person available then he can guide the front of the body, pulling the sides slightly apart to clear the chassis. As the body is lowered it should be pushed forwards so that the roll-over bar fits into its cover. The lower parts of the body sides should be "sprung" over the lower chassis rails. Push the body firmly forwards as far as it will go - check that the transverse panel below the rear window aperture sits tightly against the chassis tube at the top of the bulkhead. If the body doesn't seem to go far enough forward then check the cutouts around the jacking points, you may need to enlarge them slightly. Another possibility is that the boot floor needs a little extra trimming. Don't fasten anything at this stage. The front vertical corners of the body sides should now push around the chassis tubes. The lower front corners need to be fitted in as tightly as possible to the chassis tubes whilst the top corners will be slightly further outwards and will be positioned exactly (later) to line up with the sides of the bonnet. If there is any undue tightness then check the inside faces and corners of the moulding and remove by sanding any lumps or bumps in the resin or glass.

Pull the top edges of the body slightly apart and fit the windscreen. You will note that the windscreen glass has been bonded into the frame but the rubber finisher which fits around the glass has been left off. This finisher should not be fitted until after the car has been painted otherwise it will be very difficult to mask around the windscreen, and the edge where the rubber meets the paint will look untidy (the finisher should cover the paint and the glass). Bolt the frame to the brackets on the chassis with the two bolts on each side and make sure that the front lower edge of the windscreen frame moulding lines up exactly with, and sits on the transverse chassis tube onto which the steering column is mounted. Now temporarily push the body sides back into position so that they sit against the sides of the screen frame. Moving to the back of the car, check the clearances around the wheel arches. It is possible to adjust the rear of the body sideways one way or the other by a couple of centimetres. When you are satisfied that both rear wheels sit into their wheelarches by about the same amount and that the body is pushed tightly forwards then it is time to temporarily fix its position. Working on the transverse panel beneath the rear window aperture, fit a temporary spacer between the top face of the chassis tube and the fibreglass. Use a strip of cardboard or something about the same thickness as the fibreglass flange at the bottom of the rear window frame. Later when the spacer is removed the flange on the rear window frame will slot into here. Make sure that the transverse panel is perfectly straight and flat by checking across it with a straight edge. Now drill a hole at each end of the vertical rear face of the panel and secure it to the chassis with self-tapping screws (these are temporary fixings and will eventually be replaced with rivets). Now that the body is held relatively firmly in its fore and aft position and the rear end is secured laterally it is time to move back to the front end to make a good fit between the body sides and the screen surround. This can take a little time to get just right but by careful use of a hacksaw blade, file and production paper, and by trial fitting of the mirrors and the bonnet, you should get everything to fit. When trial fitting the bonnet place some spacers of about 5mm between the bottom flange of the bonnet and the top of the body sides and just place the bonnet in position.

Fitting the bodyshell cont.

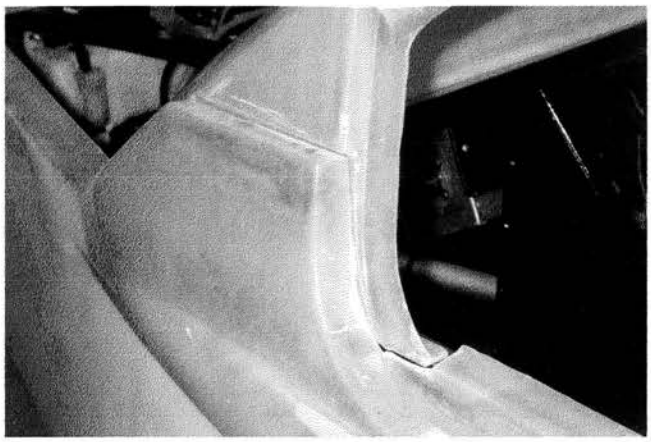
Fit the two bolts with large washers through each side of the fibreglass screen frame into the bonded-in brackets in the body sides. When these bolts are tightened the bottom end of the weatherstrip flange around the screen frame should line up with the outer edge of the cockpit top side-rail. As mentioned earlier the front lower corners of the body sides should be fitted as tightly as possible to the chassis (to allow as much steering lock as possible). Press these corners firmly in and secure temporarily with self-tappers.

As you will have realised by now, you should not fix anything permanently until you are quite satisfied that everything will fit together, look right, and have the right clearances and gaps and you are sure that you will not need to undo or remove it again.

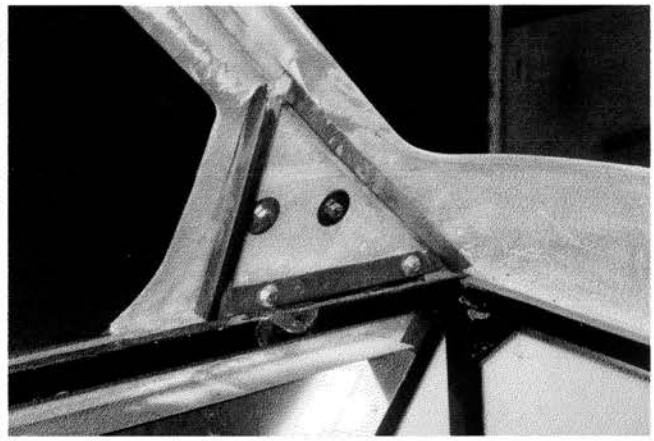
The front top corners of the body sides are positioned by placing the bonnet on and centralising with reference to the chassis - again temporarily fix with self-tapping screws. If the inner edge of the fibreglass body flange doesn't line up with the inner edge of the chassis tubes then trim it so that it does - it will also look neater if you sand a slight radius on this edge. If you have got everything to fit correctly so far then the fibreglass along the cockpit sides should be as tightly in towards the top chassis tubes as possible and sitting down on top of the tubes. Secure the cockpit sides with a screw downwards in each corner. There will be, in fact, a slight gap between the vertical faces of the cockpit side tubes and the fibreglass due to the radius on the inside corner of the moulding. Screw the boot floor to the supporting frame with four to six screws placed as near to the rear panel as possible. Now bolt the longitudinal support angle along the top sides of the engine bay. The bolt holes have been drilled oversize so that there is a degree of vertical adjustment available. If the underside of the fibreglass flange which sits on this support is particularly uneven, then sand it level before fitting the support. Slot the aluminium angle which acts as a rain channel/finisher between the body support angle and the fibreglass body flange. The rear end of this aluminium angle is notched so that when the bootlid is closed, the bootlid transverse frame tube will sit in the notch. Because of the complex nature of the body mould it has been found that the top fibreglass panel at each side of the engine compartment can tend to sag along its length. Sight along it from the rear and if it has sagged then this can be corrected by pushing the body support angles upwards in the centre before tightening the bolts securing them to the chassis. Now drill four equally spaced 5mm holes downwards through each body flange, the aluminium channels and the body support angles. Countersink each hole and then fit and tighten the 5mm countersunk screws and nuts to secure the body to the support angles.

If by now you are quite happy with the fit of the body then you can start to fix it permanently. Start with the boot floor. Drill 3/16" holes through the boot floor into the supporting frame every 15-20cm and rivet it down using the 3/16" large headed rivets. Replace the original temporary self tapping screws with rivets last of all. Use the same type of rivets to secure the lower body sides onto the lower chassis tubes again at 15-20cm centres. Along the top of the cockpit sides and the top of the front side panels use 5/32" rivets and countersink the holes so that the rivet heads do not protrude. Also use the 5/32" rivets to fasten the transverse panel at the front of the engine bay. When fitting the rivets along the top of the cockpit sides use a "G" clamp to hold the body flange down onto the tube as you fit each rivet. Unfortunately this flange tends to distort upwards after the body has been removed from the mould and consequently needs pulling down so that it sits as flat as possible on the chassis tube. If after fastening this flange down the top of the flange still isn't horizontal then there is enough thickness of fibreglass to enable you to sand it level. Try to get it as level as possible as a stainless steel capping is to be fitted on top of it at a later stage.

Fitting the bodyshell cont.

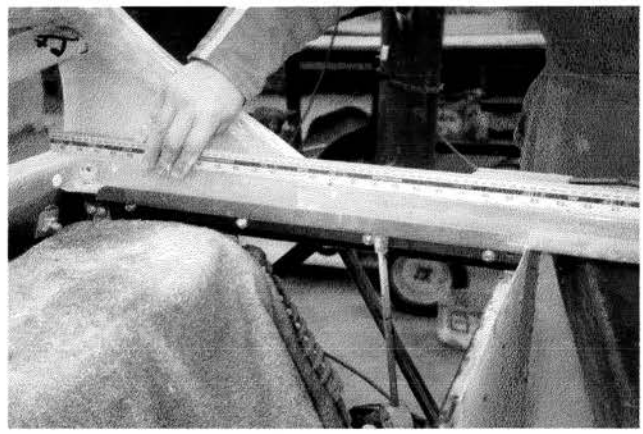


Screen frame to body joint should look like this

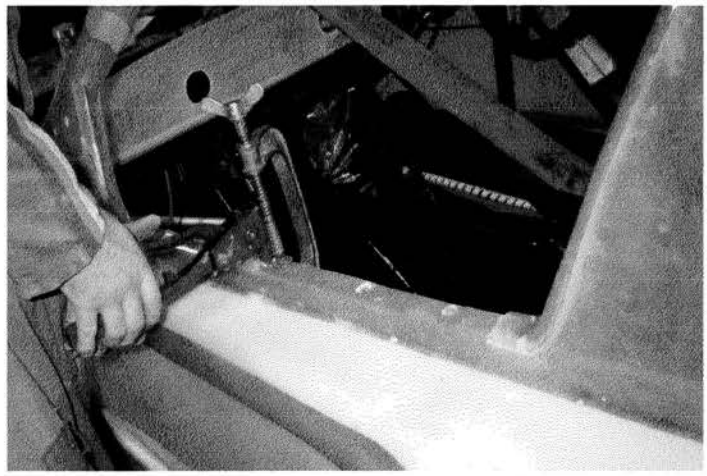


Screen frame bolted to chassis and body

Fit aluminium angle between body flange and support angle



Positioning the body support angle



Use a "G" clamp to hold fibreglass down whilst rivetting cockpit sides to chassis

Fitting the bodyshell cont.

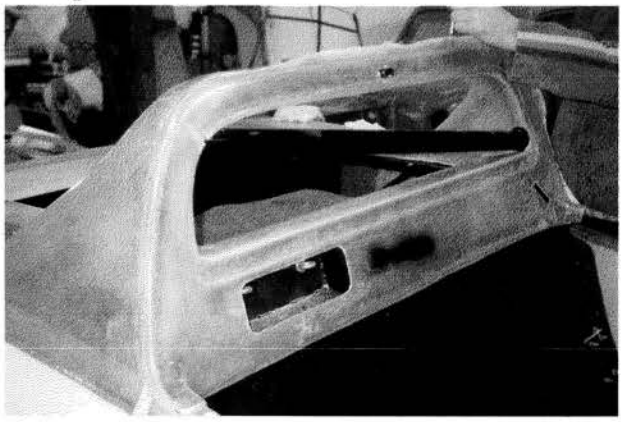
The joint between the screen frame and the body sides can now be made permanent. Sand around the joint, roughen up the area each side of the joint (about 20mm each side) and sand or grind a slight "V" into the joint itself. Cut strips of glassfibre tissue about 25-30mm wide. Mix a small quantity of resin and hardener and brush it into the joint, place the strips of tissue in place and stipple down with more resin. Do not use tissue along the top of the joint where the mirrors sit otherwise you may find it difficult to make the mirrors fit properly. Wipe a small amount of filler or sealer into the "V"-ed out joint and sand back to the original shape. When the resin on the front and rear parts of the joint has hardened, lightly sand it and skim over with body filler.

Where the front vertical corners of the body sides fit around the chassis tubes, you will find that there is a slight gap. It is not possible or desirable to rivet this vertical flange so you will have to render it water-tight by filling the gap with body filler or silcone sealer. This unfortunately can be a messy job but it has to be done. Similarly make sure that the joint between the floor and the body sides is water-tight by wiping seam sealer over it. Where the top flanges of the body have been riveted to the chassis use body filler to cover the counter-sunk rivet heads.

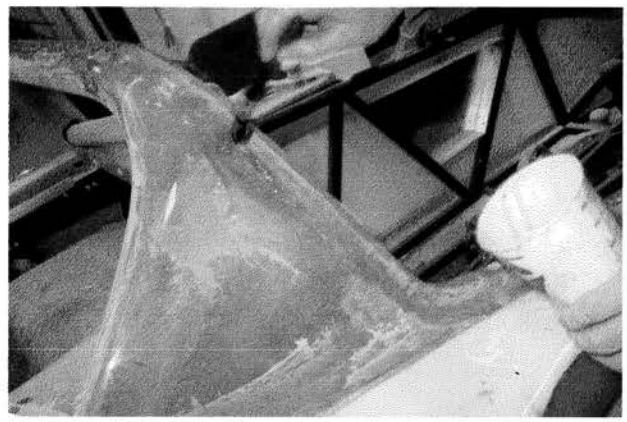
The aluminium panels which fit behind the rear wheels should be riveted to the boot floor and bonded to the body sides with glassfibre mat and resin. Similarly, the closing panels which fill the gap between the rear cockpit bulkhead and the body sides should be riveted to the bulkhead and sealed to the body sides with resin and mat (an alternative here is to use expanding foam as a sealer). The aluminium panel immediately in front of the rear wheels is to be a removable panel fitted with self-tapping screws and can be fitted later. The air intakes in the body sides provide ventilation for the engine compartment and also a useful site for oil coolers, intercoolers and additional radiators on competition or turbo cars.

Fitting the rear window frame

The frame is to be bonded into place using glassfibre mat, tissue and resin. Start by making a trial fitting. Before it will sit tightly against the body you will have to mark and cut out a small rectangular hole in the centre of the top section to allow the bracket for the roof centre section catch to protrude through it. As the frame is fairly translucent, when you have placed it roughly in position, you will be able to see the bracket through the fibreglass and so mark out and cut the hole. When cutting fibreglass panels to size or cutting apertures in panels don't worry too much if you don't get it quite right as it is fairly simple to fill gaps or extend edges with filler or mat/tissue and resin. When the frame is in position trim the inner body flange which protrudes through the window aperture so that it is level with the frame. Try to get this area that the glass will be bonded to as flat and level as possible - you can check it by sitting the glass in position. When you are satisfied that you have made the frame as good a fit as possible, then clamp it in position, drill six to eight 1/8" holes at equally spaced intervals through the roll-over bar cover into the flange on the window frame and temporarily fit self tapping screws to hold the frame in position. Remove the screws and the frame. Roughen the smooth flanges on the window frame with coarse production paper (40 grit). Cut a strip (or strips) of glassfibre chopped-strand mat about 1" wide and long enough to go around the roll-over bar cover from one cockpit side to the other. Now mix a small amount of resin and hardener. Brush the resin first onto the underside of the roll-over bar cover where the window frame flange will fit. Brush resin onto the window frame flange (*not the window frame aperture*) and then lay the strip of mat around the flange and stipple on more resin. Fit the frame into the body, sandwiching the resin and mat between the two - when pressed right back into position, some of the mat should protrude from the joint all the way round. Whilst the frame is pressed into position refit the self tapping screws so that it will be securely held until the resin has set. When the resin has completely hardened, remove the screws. Now you can sand off the excess resin and mat from around the joint. Sand or grind a slight depression all the way around this joint and roughen the surface of the glassfibre each side of it. Cut a strip of glassfibre tissue about an inch wide and again long enough to extend right around the joint. Mix more resin, brush it around the joint and then place the tissue on the resin and stipple it down with more resin. When this has hardened it will have formed a very strong joint. Lightly sand over the joint and finish by smoothing over with body filler and carefully sanding to shape. The lower edge of the window frame can be fastened to the rear cockpit bulkhead with six or so 1/8" pop rivets evenly spaced across its width. The gaps around the window aperture can be sanded and filled with body filler. If the roll-over bar cover tends to sag away from the window frame in the centre then before using any body filler secure it with two or three pop rivets (slightly counter-sink the holes). When you have finished there should not be any visible joints, cracks or gaps and the window glass should sit as flat and level as possible in the frame. The glass will not in fact be fitted until after the body has been painted.



Sandwich the resin and mat in the joint and secure the frame temporarily with screws



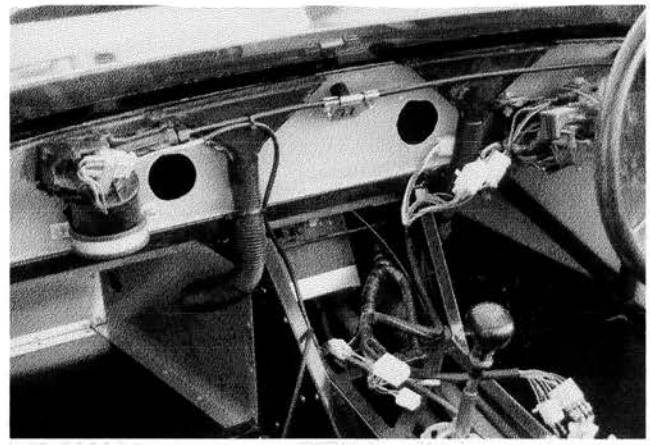
Apply a strip of glassfibre tissue around the joint

Dock Road, Lytham, Lancashire FY8 5AJ Tel / Fax : 01253 738367

Windscreen wipers, washers and demisters

You will need the wiper motor, rack, tubes and wheel boxes (the complete system) from a Mini. You will also need the two plastic fan shaped demister vents and their ducting. Early Minis had single speed wipers - try to get the two speed variety as this will also give you an intermittent wipe facility when used in conjunction with the standard Vauxhall switch and relay. You can identify the motors by counting the number of wires going into the motor - the single speed has just two wires whilst the two speed has three wires. Remove the large nylon gear wheel from the motor and send it to Car Craft for modification. You will see when you remove this gear that it has the angle of sweep stamped on it (usually 110°). This angle is too great for the Cyclone screen and so the modification reduces it to 90°. Reassemble the cleaned and greased mechanism making sure that the tube runs at the top of the wheel boxes - this is opposite to the way they are fitted in a Mini. Drill and file out the holes in the windscreen frame to take the wheel boxes. Carefully reshape the tube connecting the motor and wheel boxes so that it will follow the curvature of the fibreglass screen surround - make sure that you don't kink the tube or put any sharp bends in it. Fit a tubular spacer about 17 - 18mm long onto each of the wheel boxes and push the wheel boxes into their holes in the screen frame - secure them using their chrome nuts with either a fibre or copper washer between the nut and the screen frame. Fasten the motor to the nearside of the screen frame with the standard rubber covered "U" shaped clamp. Sandwich rubber or foam between the motor and any part of the fibreglass that it comes into contact with otherwise noise will be transmitted into the cockpit. Now that everything is lined up remove the chrome nuts from the wheel boxes and push them back through the fibreglass. Place the Mini demister vents in position - the flange around the top of these vents should sit on the ledge where the bottom of the windscreen glass meets the fibreglass surround. You can hold them temporarily in place with masking tape whilst you now re-fasten the wiper wheelboxes in in place. You will find the tube between the wheelboxes will now effectively clamp the demister vents in place.

Mini wiper mechanism - Fit spacers to wheelboxes



Wiper mechanism secures demister vents

The ideal washer jet is the one from a Fiat Panda (Fiat Part No. F/7694567) and this should be fitted just to the right of the centre wheelbox. Drill a hole just big enough to make the jet a push-fit, and when you finally fit the jet after the car has been painted, smear a little silicon sealer around the hole to ensure it stays in position and doesn't let rain water in. When you are happy with the wiper, washer and demister set-up you will again need to remove the nuts from the wheelboxes and remove the washer jet in readiness for body preparation and painting. When the time comes for final assembly you will need two wiper arms (Trico TWA2) and two 15" wiper blades.

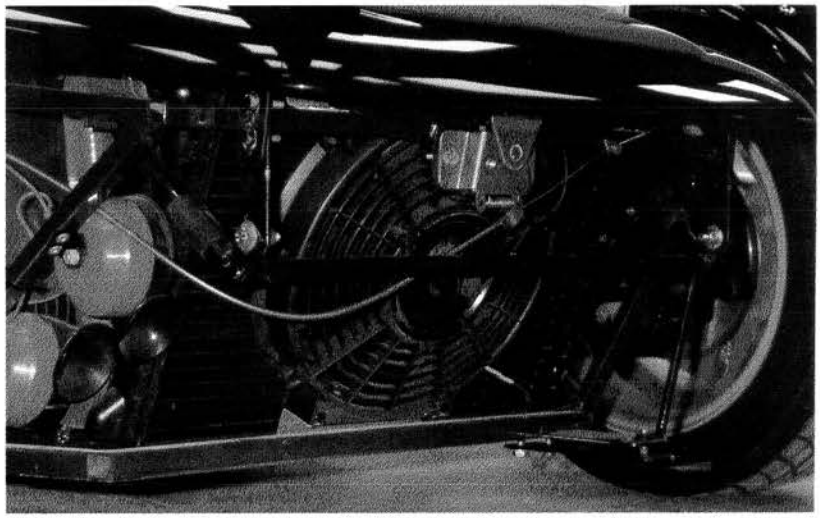
Bonnet

If you removed the bonnet hinge and gas-strut assembly before painting the chassis then it should now be refitted. Fit the two slotted brackets at the rear corners of the underbonnet area. Bolt the bonnet catch to the front of the bracket which is welded to the centre of the front chassis cross-tube (the slotted holes allow for adjustment). The bonnet release cable should be fitted through the bracket in the offside oddments compartment, routed along the chassis and connected to the bonnet catch. Fasten the bonnet catch striker plate to the front of the bracket in the centre of the bonnet frame cross-tube (at the front of the bonnet). The two rear catch plates have already been fitted in approximately the correct position at the back end of the bonnet. These plates have been fitted with just one nut and bolt through a slotted hole so that when the bonnet has been fitted and the plates adjusted then you can run a drill through the other two holes in each plate and bolt it permanently in position. Temporarily place or tape 5mm spacers along the tops of the body sides so that when you place the bonnet in position it will sit on the spacers. At the front end of the bonnet frame are fitted two adjustable (via nuts and bolts through slotted holes) links which should now be fastened to the hinge mechanism with 8mm bolts, washers and *nyloc* nuts. Tighten these nuts and bolts just enough to eliminate any sideways movement - if they are too tight the mechanism won't work properly. At this stage the front of the bonnet should be held up and clear of the body sides by the hinge mechanism. You should be able to lift the bonnet from the rear and when you lower it the small horizontal bars in the rear catch plates should drop into the slots in the brackets mounted on the body. You will have to adjust the side to side position of the catch plates to centralize the rear of the bonnet. If the bonnet tends to spring to one side when you lift it clear of the catch plates then you need to slacken and reposition the vertical links at the front end. You can also adjust the fore and aft position of the bonnet with these vertical links. When everything appears to be lined up then carefully try to push the front end of the bonnet down into the closed position. If you are very lucky the rear catch plates will slide down into their grooves and the catch mechanism at the front will lock the front end down. It is more likely that you will have to adjust the height of the rear catch plates so that when the bonnet is closed it is held down tightly at the rear. Similarly you will probably need to adjust the height of the latch mechanism at the front until it just clicks into the locked position as the bonnet is pushed down into the closed position. When you are happy that everthing works and lines up as it should then drill through the two additional holes in each of the rear catch plates and fit the 5mm nuts and bolts. The bonnet will need removing again for preparation and painting but if you just remove the pivot bolts which hold it onto the hinge mechanism then the adjustment should not be affected.

Catch plates at rear of bonnet

Slotted brackets locate rear of bonnet

Bonnet cont.



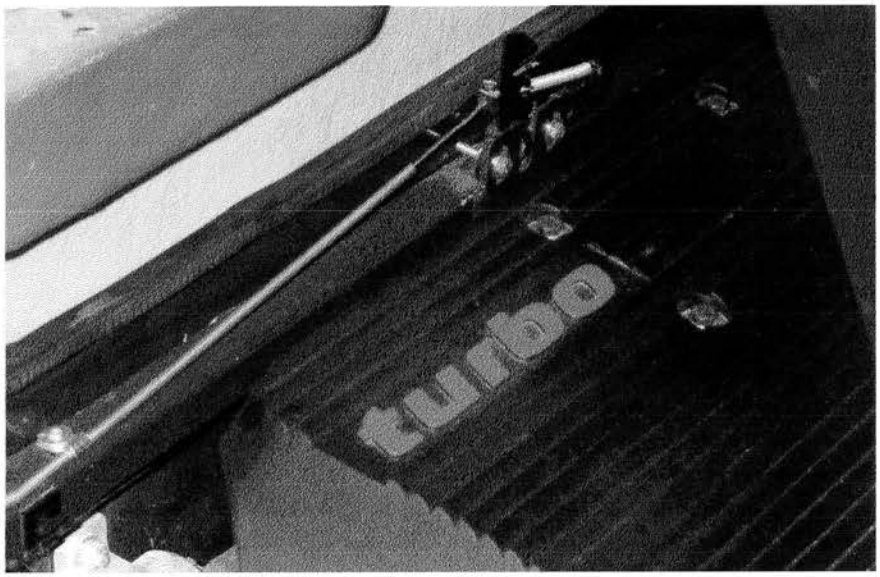
Bonnet catch mechanism

Nosecone

Before removing the bonnet make a trial fitting of the nosecone. With the front of the bonnet released and the rear resting on the slotted brackets, slide the nosecone into position. In the bottom of the nosecone should be two large diameter holes through which will protrude the lower radiator mountings. If the holes haven't already been cut then you will have to mark and cut them. It also makes the nosecone easier to fit and remove if you file the ends of the protruding plastic radiator mountings down a little. The nosecone should now slide easily into position. Close the bonnet and make sure that the outer edges of the nosecone align with the bonnet. If the nosecone is a little too far forward then remove small amounts of fibreglass from the top rear corners to allow it to move further back. Secure the top of the nosecone with four countersunk screws - one at each rear corner and one on each side towards the front. Mark the positions of the holes necessary for the bolts which secure the front towing hook. Remove the nosecone and drill these holes. The grills will be fitted after the car has been painted.

Bootlid/Engine cover and minor panels

Fitting the bootlid is considerably easier than fitting the bonnet. Fit the bootlid release cable through the rear bracket in the oddments compartment and route it around the top chassis rail to the rear of the engine bay. Bolt the bootlid catch to the slotted holes in the support bracket and connect the bootlid cable to it (you will have to cut the cable to length). Note that for the cable and catch to work properly the outer part of the cable must be firmly anchored to the chassis tube about 15-20cm away from the catch. Push the two bootlid hinges onto their pivot pins on the rear bulkhead and get an assistant to hold the bootlid roughly in place (in the open position) whilst you fasten the hinges to the brackets on the bootlid frame. Now carefully lower the lid and check the fit. Slacken the nuts holding the hinges and re-position the lid until it sits square in the aperture and then retighten the nuts. Fit the rubber seal across the top of the rear engine bay bulkhead. Adjust the height of the catch so that the lid will lock shut with a little pressure applied over the position of the catch. When the catch handle is pulled the bootlid should just lift clear of the catch due to the pressure of the rubber seal. The bootlid, like the bonnet will need removing for preparation and painting.



Engine cover/bootlid catch and cable

The rear skirt should bolt straight into position as it has already been pre-fitted at Car Craft, but it is a good idea to fit it so that you can check that the exhaust tailpipe exits in just the right position through the hole in the rear skirt.

Minor panels cont.

Fit the front mudguards to their brackets (suggest small 5/16" dia. chrome bumper bolts). Position them so that the rear lower edge of the mudguard is about 15cm from the road surface. You may also have to squeeze them into a slightly tighter curve and fit them under slight tension so that you obtain an equal tyre clearance all around the mudguard. After the mudguards have been removed from their moulds, they tend to "open" out a little and assume a slightly bigger radius than intended, hence the need to "squeeze" them in. You will also find it necessary to fit small mudflaps to the rear of the mudguards to prevent the sides of the body getting "peppered" with stone chips. Use fairly stiff mudflap material and sandwich it between the rear mudguard bracket and the fibreglass. The mudflaps need to extend to within about 5cm of the road. Be careful when tightening the securing bolts not to crack the fibreglass - you may need to fit a couple of large washers between the top brackets and the fibreglass.

Front mudflaps are essential

Fit the two cockpit side mirrors and check whether they need any filling or any removal of fibreglass to give a good fit with the screen frame and bonnet.

Windscreen frame interior surround and Dashboard

Making the windscreen frame interior surround and dashboard fit can be a tricky and time consuming job. Start with the screen surround. The forward edge of the moulding should obviously sit along the joint between the windscreen glass and the fibreglass frame. The rear edge of the moulding should sit as near to the inner edge of the rubber weatherseal as possible. To check this you will need to temporarily fit the weatherseal - it is quite a tight fit and you may have to tap it on with a rubber mallet or something similar. Secure the interior screen moulding with one countersunk self-tapping screw about halfway down each screen pillar (drill and screw into the steel frame). At the top of the moulding if you have your sunvisors (Mini or Fiat 126) you can mark the mounting holes for these and use the same screws to fix both the sunvisors and the screen moulding - make sure that the screws go into the steel frame. This screen moulding can be easier to fit if you split it in the middle and fit it in two halves, in this case you will have to fit some sort of finisher over the centre joint or disguise it with the interior mirror. Don't worry too much if you can't get a really good fit against the weatherseal, as when the fibreglass behind the mouldings is painted matt black, you really won't be able to see any slight gaps.

Dashboard cont.

There are already three brackets screwed to the front edge of the dashboard and when the dashboard has been properly trimmed at the ends, the brackets are fixed to the fibreglass windscreen frame (holes already drilled). Trim a little off each end of the dashboard until it fits nicely with the interior screen surround. Make sure that the aperture in the dashboard for the steering column cowling is centralized over the steering column. In your body kit you will find some small section rubber moulding which will push onto the ends of the dashboard and form a neat joint between the dashboard and the screen surround. After trimming the ends of the dashboard you may have to file or sand them to a uniform thickness so that this rubber moulding can be pushed on (it can be temporarily fixed with sellotape). The left hand side of the dashboard should sit on top of a small bracket on the cockpit side rail whilst the right hand side should fit underneath a similar bracket on the right. When the dashboard is fitted and secure, there should be a small gap (10-15mm) between the front of the dash and the windscreen glass - this is to allow warm air from the demister vents to blow through. When the dashboard is finally fitted, the bottom lower corners should be bolted or screwed to the chassis brackets. If you intend fitting a glove box lid then now is the time to make and fit it. As with everything else you must now remove the dashboard and surround for preparation and painting.

Headlight pods, indicators, repeaters and rear lamps don't really need trial fittings but do so if you feel the need of a bit of "practice".

I don't propose to cover the preparation and painting of the car in any detail as it is quite a specialised procedure and requires a high degree of skill and experience to produce a first class result. If you have the necessary skill and experience (and equipment) then you don't need me to tell you how to do it. If you don't have the necessary, then I strongly suggest that you have the job done professionally. You can however carry out some of the early preparation work. For a start examine the whole body carefully for signs of air bubbles in the gelcoat - these can be seen just below the surface and if you prod them with the sharp end of a small screwdriver the thin gelcoat will break away leaving a small crater. Scrape the crater out and fill it with body filler or polyester stopper. On cars using coloured gelcoats this obviously cannot be done and quite often if the car is put into an oven after spraying or even left in hot sunshine, the air bubbles under the gelcoat will expand and form blisters or even burst through the gelcoat. The apertures in the body for air intakes/outlets, rear lamps, etc., all need their edges straightening and smoothing. Make sure that the flange around the rear wheel arches is a nice uniform width and sanded smooth. Similarly smooth the cut edges around the nosecone, bonnet, bootlid and windscreen frame.

The rest is now down to the expert (could be you of course) - he will remove any ripples in the panels, rub down and give the whole car one or two coats of spray filler, rub down, stopper, apply two pack primer, rub down, stopper, spot prime, apply base coat, apply lacquer, flat down, buff and polish. Now all that you have to do is reassemble everything without scratching your shiny Cyclone !

AFTER PAINTING

Rear window and finisher

Before starting to fit the rear window make sure that you have to hand a roll of masking tape (about 25mm wide), kitchen roll, some degreaser or white spirit and a couple of heavy lengths (about 1.5m) of wood or metal. The glass is bonded into the frame with a black adhesive/sealer (*Sikaflex* or similar) and you must be careful not to get this on the paintwork. If you apply too much sealer then when you push the glass down into position the sealer will be squeezed out and will overlap onto the glass and paintwork. To avoid this possibility, carefully apply masking tape around the inside and outside outlines of the window frame, you should also apply it to the window glass along the edge of the painted black surround. Roughen up the recess in the frame and wipe it over with degreaser, similarly wipe the black surround on the glass. Apply a bead of sealer around the frame (not too heavy - just enough to form a watertight seal) and try to apply it so that it is nearer to the inner edge of the recess than the outer edge. Press the glass into position. Work around the edge of the glass pressing gently until you are satisfied that the sealer has been compressed all the way around. Centralize the glass so that there is a slight gap between the edge of the glass and the frame. The gap may be slightly uneven due to the way that the glass has been cut, but it will be covered later with a rubber finisher. This finisher is of a " T " section with a very short vertical to the " T ". Before taping the glass in position to set, just try placing the finisher around the glass and make sure that it will sit flat with the vertical part in the gap between the glass and the frame. If you find that it is too tight on one side or the other then push the glass around until it fits properly. Provided that you haven't used too much, then there shouldn't be any sealer in the gap where the finisher sits. When you are happy with the positioning of the glass then prevent it from sliding down or moving by applying some strips of masking tape. Finally lean the two heavy lengths of metal, wood or whatever between the cockpit floor and the glass so that they maintain a slight pressure to push the glass into the frame. Leave at least overnight to set. When set remove the masking tape - if any sealer was squeezed out from between the glass and the frame it should only have adhered to the masking tape. Now apply sealer into the gap between the glass and the frame so that the rubber finisher can be stuck in place. Again don't use too much sealer or it will squeeze out onto the paintwork. Position the joint in the finisher so that it will be behind one of the seat headrests. Use masking tape to hold the finisher in position until set. If you do happen to get sealer on the paintwork, then wipe it off before it sets with white spirit or degreaser. If sealer gets onto the glass, then it is easier to remove it with a razor blade when it has set.

Keep slight pressure on glass until sealer has set

Completed rear window, surround and seat belt guides

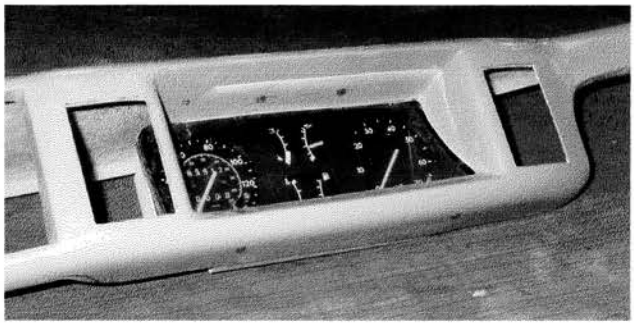
Windscreen finisher

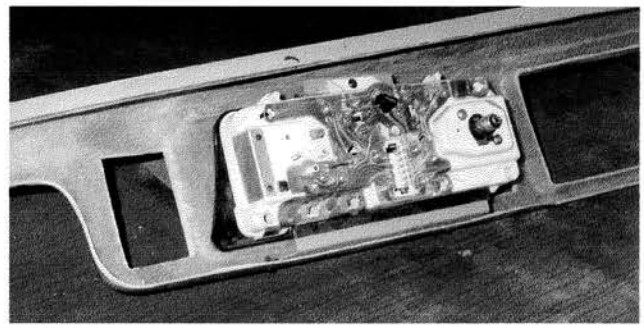
Fit the finisher around the windscreen in exactly the same way. In order to give more clearance for the wiper arms and water from the washer jets, this windscreen finisher is not continued across the bottom of the screen but stops about 50mm in from each lower corner.

Windscreen finisher doesn't continue across bottom of screen

Dashboard assembly

The Cavalier instrument panel is secured to the back of the dashboard moulding by two brackets. The top bracket is screwed to both the dashboard and the instrument pod, the lower bracket is screwed to the dashboard and the instrument pod sits into it. Remove the top bracket from the dashboard moulding and secure it with the self-tapping screw provided to the top of the instrument pod. Now position the instrument pod on the lower bracket which has already been secured to the dashboard moulding. Using a short phillips screwdriver fit the two self-tapping screws through the top of the dashboard moulding into the top bracket on the instrument pod. The instrument pod should now be firmly secured to the back of the dashboard moulding. The instruments should in fact be offset slightly towards the left hand side of the aperture in the dashboard in order to give the driver a better view of the rev counter.





Cavalier instrument pod fitted to dashboard

Before fitting the dashboard into the car make sure that the wipers, washers and demister vents have all been reassembled. You should also at this stage fit the mirrors and the indicator repeaters into the panels just below the side mirrors. When fitting the mirrors use silicon sealer on the base of the mirrors to make sure that water cannot enter the car. Fit the three small brackets onto the front edge of the dashboard moulding and fit the small section rubber moulding to each end of the dashboard - secure it with a little "Superglue" if necessary. Now fit the dashboard into position. When the dashboard has been secured then the fresh air vents can be fitted. The flexible ducting has already been fitted and sealed to the vents as this would be virtually impossible to do after the vents are fitted to the dashboard. If it has not already been done then the ducting must be slightly crushed into an oval section so that it can be pushed through the holes in the dashboard. The vents should be fitted with their air controls at the bottom and the vent with the longest ducting goes on the nearside. As the ducting is pushed through the hole in the dashboard and the vent is pressed into position it should click into place. If it is a little too tight then remove it, slightly file out the hole in the dash and try again. When in position the forward end of the ducting fits over the metal tube on the lower part of the windscreen frame and although it is not a tight fit on this tube, it forms a seal by pressing against the fibreglass screen frame moulding.

The glovebox interior can now be fitted (you may want to trim it with vinyl first). Push the glove--box up from under the dash and press it into position over the fibreglass flange on the dashboard. Whilst holding the box in position drill a 1/8" diameter hole through the centre of each side flange and into the box. Secure the box with a self tapping screw on each side. It should now be possible to fit the two halves of the windscreen surround by sliding the lower parts between the dashboard ends and the screen frame and then securing them with self-tapping screws, the sun visors and mirror.

Dashboard assembly cont.

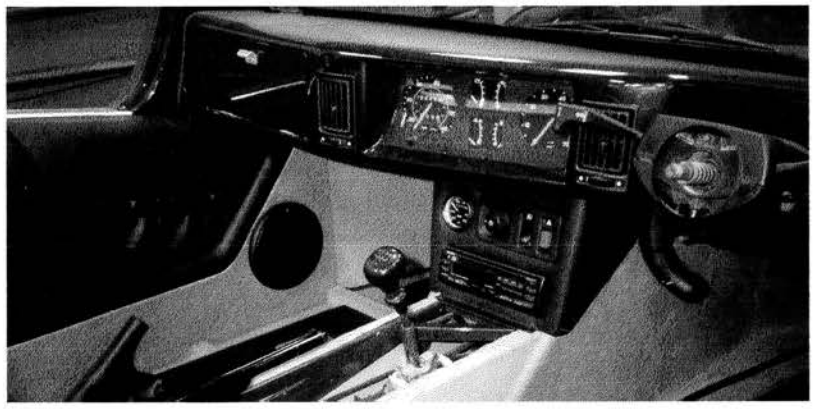
The speedo cable should be routed through a hole in the side panel in the nearside footwell - the hole should be just above and in front of the position where the demister ducting enters the footwell. Make the curves in the cable of as large a radius as possible and do not kink it. Push the cable into position on the back of the speedo. Connect the wiring to the back of the instrument panel. Fit the wiper, indicator and ignition switches to the steering column and then connect the wiring. Don't forget to connect the wire to the spring loaded brass plunger which connects to the horn button.

Speedo cable routed through nearside footwell

Cowlings need shortening

The upper and lower parts of the steering column cowling can now be fitted but before trying to fit them they must be modified by cutting as much excess plastic from the forward part of them as possible whilst leaving the lugs for the securing screws in place. Even when cut down these cowlings are a tight fit and can be rather tedious to fit on early cars (later cars have more room for them). Fit the steering wheel and don't forget to fit the large spring on the column behind the wheel boss.

The centre console which fits between the bottom of the dashboard and the top of the tunnel is supplied as a blank panel so that you can arrange whatever switches, additional instruments, radio, etc., to your own liking. As a minimum you will need the standard Cavalier light switch, hazard switch, rear foglight switch and a heater fan switch. When you have cut all the necessary holes in this panel you will probably want to cover it in vinyl or paint it before fitting it. When you finally fit this panel secure it to the tunnel with a self-tapping screw at each lower corner and to the lower edge of the dashboard, again with self-tapping screws. This console should obviously be fitted as far forward as possible both at the top and at the bottom.



Finished dashboard should look like this

Roof

The detachable hardtop and doors as supplied are fully assembled, fitted with windows, locks, handles and seals. The exterior surfaces of the panels are bare fibreglass and will require preparing and painting to match your car, at which stage you will need to temporarily remove some of the seals and rubber mouldings. You will notice that the rear vertical edges of the sidescreens do not have seals - when closed, the slot between the rollover bar cover and the sidescreen creates an effective "extractor vent" which promotes airflow through the cockpit and keeps the sidescreens mist free. Rain water will not enter through this slot but you must obviously not aim a hosepipe at it from the rear. The centre section of the roof features what looks like a high level brake light. This is in fact designed as a stop for the roof side-panel to rest against when in the open position. A reflective panel in the form of a "lens" is supplied with the roof and should be fitted (self-adhesive) after the roof is painted. There are two small rubber pads which should be stuck to the upper-rear sides of the "brake light" which will prevent the paint from becoming damaged by contact between the roof and "brake light" when the roof is open.

Before preparation and painting you must first fit the roof to the car and make any adjustments necessary. Begin by fitting the small, chrome painted, "L" shaped catch-plate to the bracket at the centre of the roll-over bar. Mark and drill two 1/8" diameter holes into the bracket and secure the catch-plate with the self-tapping screws provided (fit it with the horizontal part of the"L" at the bottom). Now enter the tongue on the front of the roof centre section into the slot on the top of the windscreen surround - when doing this keep the back end quite high and push the panel forwards ensuring that you don't push the seal on the windscreen surround forwards at the same time. Now lower the rear end onto the rollover bar cover and fasten down with the knurled thumb screw. The screen surround seal will now be compressed as will the sponge seal at the rear. There is a certain amount of adjustment available on the position of the rear catch, so if the catch appears to be too far forwards or backwards, slacken the two securing screws and reposition it. When correctly positioned the catch should tend to pull the roof section into its slot. Fit the offside roof and sidescreen assembly onto the centre section by entering the rear hinge pin into its socket, pushing the roof forwards against the pressure of the spring in the socket, lowering the front end down and letting the front hinge-pin pull back into its socket. Carefully close the "door". Now do the same with the nearside assembly. Check the gaps along the top of the windscreen frame and also that the whole roof is centralised. The side-to-side positioning and "squareness" of the roof can be adjusted by altering the position of the rear catch and, if need be, by removing material from one side or other of the front "tongue". When the roof is finished and painted the front rubber moulding will be stuck on, and as this is the same width as the slot in the screen frame it will thus firmly locate the roof centre section laterally.

Apply masking tape along the stainless steel cockpit side cappings in the areas behind the door locks. Working on one side at a time, close the door and get a helper to press down so that the seals are evenly compressed front and rear. Now ascertain the position in which you will need to fit the aluminium lower catch-plate and mark this position on the masking tape with a marker pen. This is rather tricky but spend time and be as accurate as possible. You will see when you operate the door handle that the hook which engages on the catch-plate is intended to pull the door down tightly on its seals - allow for this movement when positioning the catch-plates. You will now need to drill two 1/8" diameter holes through the stainless steel, fibreglass moulding and into the chassis tube. Make sure the body side is well protected from contact and possible damage from the electric drill when doing this.

Roof cont.

Secure the catch-plate with the two long self-tapping screws provided. The door should now close and pull down onto its seals when the handle is operated. If it pulls down too tightly or not tightly enough there is a *small* amount of adjustment available inside the catch mechanism itself. (It is possible to slightly adjust the height of the "U" shaped hook).

When you are satisfied with the fit of the roof, take it off the car, remove the rubber mouldings from the front and the side of the centre panel and the rubber seals from the lower edges of the sidescreens. The roof can now be painted. After painting refit the the seals, fit the "lens" into the rear of the centre section, fit the two small rubber pads onto the sides of the "brake light" and fit the self adhesive mouldings into the channels in each roof side panel to cover the row of rivets.

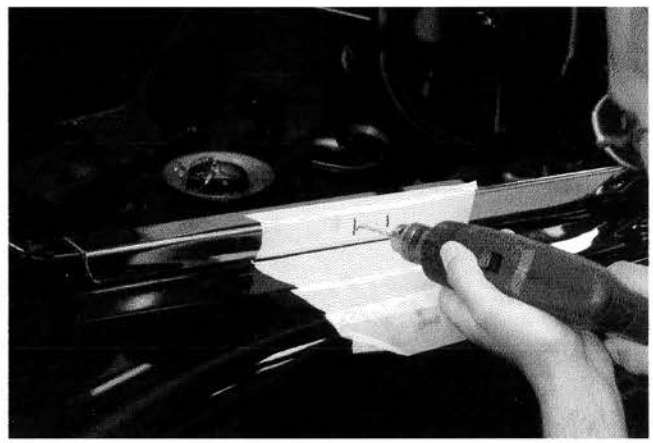
To stow the roof away into the boot, first lay out the vinyl stowage bags on the floor. It doesn't really matter which way you slot the roof centre section into its bag but when you have done this place it on its side in the boot against the rear engine bulkhead with the hump of the "brake light" facing the rear of the car, and the lens of the brake light against the aluminium inner wheel arch (either side) . Slide the other roof sections into their vinyl "envelopes" with the exterior door handles upwards and at the top of the open "envelope". Close the flaps onto the Velcro fastenings. Fit the roof sections into the boot, again with the door handles at the top and facing the back of the car. Place the first roof section to one side (away from the "brake light" on the centre section). One hinge pin on each roof section protrudes upwards slightly and this must be passed under the rain channel at the side of the boot aperture. Place the other roof section on the opposite side of the boot. You will probably find that stowing the roof is a little awkward the first time as it is quite a tight fit, but when you have done it a couple of times it becomes easy.

Fitting the centre section

Enter the rear hinge pin into its socket first

Roof cont.

Fitted roof in closed position



Mark and drill holes for catch-plates

Storing side sections

It will fit in the boot !

The Cyclone instruction manual is not quite finished but here are some notes to help you complete your car.

Mesh Grills.

The aluminium structure of the mesh grills is "angled", that is to say that as air passes through it then the air will be deflected one way or the other depending on which way around that the mesh is mounted. Although the grills are labelled, double check that when they are fitted then they will deflect the air in the right direction. The grill in the nosecone whould tend to deflect the air downwards towards the bottom part of the radiator which otherwise tends to be shrouded by the number plate. This nosecone grill is secured by an aluminium strip fastened over it's lower edge with pop rivets through the fibreglass behind the number plate mounting panel. If you make sure that the mesh is a good fit up the sides and across the top of the nosecone, and you keep it pressed upwards when securing the bottom edge then it should not require any other fastenings.

The large engine bay ventilation grill on each side of the car should be fitted so that the mesh "scoops" in the air. If these are fitted the wrong way around then there will be virtually no airflow through them. The leading edges of these grills have a 90° fold so that you can use self-tapping screws with large washers to secure then to the aluminium closing panel which seals the rear cockpit bulkhead to the body sides. When you have secured the leading edge, press the mesh into position around the aperture (fold it around the fibreglass at top and bottom). The rear edge of the mesh is held in position by trapping it between the aluminium splashguard which fits immediately in front of the rear wheel, and the fibreglass body.

The air outlet grill in the bonnet firstly needs careful shaping so that it will sit almost perfectly in position before fixing. It's lower edge is secured by an aluminium strip riveted to the transverse tube in the bonnet frame. The only way of securing the top edge of the grill is to use silicon sealer/adhesive to bond it to the fibreglass. You may have to arrange weights or props to hold it tightly in position until the sealer has set.

The grills in the engine cover are also held in position by aluminium strips rivetted to the tubular frame. Make sure that the mesh is so angled that it deflects rain water.

Fit a steering wheel of 320mm (12" or 13") diameter wish a hub to fit the standard Mk2 Cavalier steering column.

When choosing seats, the backrest and overall width are fairly critical.
Suitable seats are: Corbeau "Clubman Highback".
Cobra "Roadster Seven".

The storage area under the bonnet is large enough to accomodate a spare wheel fitted with a 195/50/15 tyre should you wish to carry one. A relatively lightweight car like the Cyclone fitted as it is with relatively large, lightly stressed tyres (presumably in good condition) is unlikely to suffer punctures. This storage space is therefore better utilised for carrying luggage than for carrying the considerable weight and bulk of a spare wheel which might never

be used. Carry a can of "Tyre Weld" or similar tyre inflation/sealer - it's much cheaper.

When setting brake balance on a road car make sure that the front wheels tend to lock up before the rears on a dry road. Try to experiment on a deserted stretch of tarmac - road or track. A competition car can obviously be set up for the prevailing conditions at the time and for driver preference. To adjust the brake balance, remove the aluminium cover from the pedal assembly, slacken the small locking screw on top of the balance bar and wind the balance bar towards the centre of the car (towards the master cylinder for the front brakes) to increase front brake bias, or towards the master cylinder for the rear brakes to increase rear brake bias. You should be able to turn the balance bar by hand but if it is a little tight then remove the rubber grommet from the right hand side of the pedal box and use a screw driver through the hole and onto the slotted end of the balance bar. As a starting point set the bar about 10mm off-centre towards the front master cylinder. Adjust the bar about two full turns in or out at a time until you are happy with the balance. Don't forget to tighten the locking screw when you have finished. On a road car there should not be any need for further adjustment after this initial set-up. If you are trying to get optimum braking on a competition car then you will find that the wetter and more slippery the conditions then the less front brake bias will be needed.

STEERING.

The chassis mounted lower steering column bearing has now been changed to a nylon bearing mounted in rubber in the front bulkhead. This bearing also acts as a weather seal. When fitting the column into the bearing coat the bearing surfaces with graphite grease. A jubilee clip is fitted to the column to prevent the inner part of the nylon bearing from riding up the column and droping out of the outer bearing.

FUEL SYSTEM.

On the petrol tank sender unit the pipe marked red is to be used as a fuel feed to the pump on a carburettored engine or as a fuel return on an injection engine. The unmarked pipe is to be used as the vent.