

Triple C
Challenger

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TECHNICAL MANUAL

BUILDING A CHALLENGER

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INTRODUCTION

These instructions are intended to cover the building of an J series Challenger (i.e. Jaguar running gear).

They are listed in the recommended order of build. It is not absolutely essential to follow our advice, as part of the fun of building a kit car is its individuality, BUT if in doubt ring us.

This chapter is divided into sections dealing with the major modules of the build. Each section opens with a contents page so that any particular operation can easily be located. The first item covered in the section lists the parts supplied in the basic kit and the parts required to complete that section of the kit.

It is recommended that the builder buys a copy of the Haynes Workshop manual on the XJ6 series as this will be referred to throughout the text.

Much of the work can be carried out at the factory if required as explained in the options list below.

SPECIALIST SERVICES OFFERED

As a measure of our commitment to both our product and our customers satisfaction we have recently concluded deals with two major sub contractors of the highest standing to supply us with certain specialist items for the Challenger.

TRIM

We have appointed Callow & Maddox of Coventry to produce a complete trim set for the Challenger. This will be made from genuine original Jaguar materials and will be very keeping with the original concept. Callow & Maddox will also be producing fully adjustable leather seats in matching material

Callow & Maddox have been associated with the trimming of Jaguars for over 25 years and did considerable work with the original E-type. They have also recently been commissioned to trim the 1989 limited edition Jaguar

EXHAUSTS

Double 'S' Exhausts of Devon have recently designed and produced a complete exhaust system for us in high quality stainless steel. The system are covered with a lifetime guarantee.

PAINTWORK

We have appointed Queensberry Road Garages as our official paintshop. They have immense experience of both repairing and spraying GRP cars as they are Reliant Scimitar dealers of long standing.

WHAT YOU ACTUALLY GET IN THE KIT

The Challenger can be purchased in various stages of completion. The most popular options are listed in the brochure where a detailed description follows. If none of these options suit your needs then contact Derek Robinson to discuss your particular requirements.

In each case the customer has to purchase the basic/body chassis as described below and the appropriate modules as described in the brochure.

BASIC BODY/CHASSIS UNIT

(available in left and right hand drive)

The basic kit supplied represents a very advanced package. Even at this stage it actually looks very similar to a finished car.

The chassis, designed exclusively for the Challenger by Steve Green and Paul Crabb is a mixture of semi monocoque and space frame much as was the original car.

It is jig-built and bracketed to accept all necessary components before being sprayed in molten zinc to British standard No 2569 ensuring a life in excess of any other car manufactured.

The body comes finished in a special flexible white gel coat, ready fitted to the chassis at the factory to ensure a perfect fit everytime.

The bonnet, boot and doors are all hung and fitted in our workshops including all necessary cables, catches and release mechanisms.

The purpose built window frames and wind up windows are also fitted as standard.

In addition the basic/body chassis also includes the following g.r.p. panels:

Engine bay mud shields, Front bulkhead panel, 2 door drip trays and 2 headlamp tunnels

OPTIONS - MODULES

These modules refer to the NON JAGUAR PARTS essential to supplement the parts stripped from the donor vehicle.

MODULE A

Non donor parts required to convert the basic body/chassis kit into a rolling chassis

MODULE B

Non donor parts required to convert Module A into a running car

MODULE C

Non donor parts to convert Module B into a almost road worthy car.

SECTION A - THE CHASSIS

A.1. Brief History

The original chassis was designed by Derek Robinson in conjunction with Tom Royal (an automotive design engineer from Cornwall). It was originally conceived to take mainly Ford running gear with either Rover or Ford drive trains. The chassis itself was a multitubular chassis with a steel fire wall.

This chassis was then modified in conjunction with advice from Frank Costin to produce a mark 11 version but still based on the original Ford/Rover set up.

During this production run Frank Costin started work on the Jaguar based version of the Challenger. Frank designed special wishbones, a special steering rack and planned the rear end layout using the Jaguar diff, shortened drive shafts and wishbones. At the same time two of Frank's staff Paul and Steven Crabb set about designing a pure space frame chassis, this time based on all Jaguar running gear. In technical terms this chassis was outstanding but in practical terms it was not quite so successful.

The production costs in manufacturing a chassis consisting of 243 different tubes were horrendous and this version was rapidly replaced by a Mark II Jaguar version. This time the design and the initial construction was entrusted to Paul Crabb, by this time working full time for Triple C, and Steve Green of Goodyear's technical department.

Details of the current chassis are given in Section A2.

A.2. The Current Chassis

The Mark II Jaguar chassis has been completely redesigned by Paul Crabb (formerly of Costin Drake Technology) and Steven Green (Goodyears Technical Department) and incorporates a host of improvements over its predecessor. The Mark I chassis has been designed as a pure space frame but this had proved difficult to manufacture and suffered from limited cockpit room.

The Mark I chassis also incorporated rose jointed wishbones and tie rods with the differential solidly mounted to the chassis. This was fine from the purist's point of view but was not sufficiently refined for road use.

The new brief then was to greatly improve the cockpit space, to simplify the manufacture of the chassis structure and suspension system, to incorporate modern levels of refinement and ride quality but still achieve good handling and road holding.

One disadvantage in using a space frame chassis on a road car is that many interior panels have to be added to form a complete cockpit. These do not carry any useful load stresses and are therefore dead weight. The new chassis is of semi monocoque construction with sheet steel forming the central tunnel, floor, sills and footboxes. The direct mounted differential and rose jointed rear radius rods have been dispensed with and replaced by a modified XJ6 subframe mounted on silent bloc bushes. This arrangement utilises the four standard damper units and is located by rubber bushed radius rods.

The front rose jointed wishbones have also been dispensed with and replaced by XJ6 wishbones, still using the XJ6 uprights as before. The geometry, however, bears no relation to the Jaguar set up and was completely redesigned from first principals by Steve Green. The Jaguar design included an unacceptable level of anti-dive geometry which was specifically to allow for very low suspension frequencies without "bottoming". This is ideal in a luxury saloon but not desirable in a sports car.

Front and rear roll centres were arranged to suit the mass distribution of the car, together with camber change matching carefully the characteristics of the Goodyear Eagle NCT tyres offered as original equipment. A small amount of anti-dive geometry has been added, which also gives castor correction under heavy braking.

The custom manufactured steering rack is mounted in front of the axle in a position which gives virtually zero bump steer. A stiffer anti roll bar is now used giving an amount of understeer as well as reducing roll angle.

Rear suspension geometry is modified to guard against "lift off oversteer", no anti roll bar is fitted to the rear to ensure maximum traction when cornering.

Front and rear suspension frequencies have been calculated to give good ride and handling qualities, and are designed specifically never to coincide within the working load range of the car, thereby eliminating any tendency for pitch.

The overall benefits of the mark II chassis have surpassed all the requirements of the brief:

- * Chassis torsional stiffness has been increased
- * Kerbside weight has been reduced
- * Accident protection is improved, particularly from side impact
- * Ride quality and refinement are now well up to modern standards
- * Handling is light, positive and very stable. The car can be cornered to the limits of adhesion without losing its road manners.

A.3. Detailed chassis construction

The chassis is a mixture of semi monocoque and space frame. The engine compartment is a space frame constructed from 16 gauge ERW tube.

This frame is itself made up of several flat frames. Where possible these frames are firstly jig constructed before being positioned on the main chassis table for tacking into position. The foot boxes and central tunnel are cut from 18 gauge steel before being rosette welded into position. This creates an effective fire wall between the engine and driving compartments. The floor and sills are framed by folding 18 gauge steel into the correct shape before being rosette welded into position.

The centre tunnel which acts as a torque tube has three sides of steel as indicated above but the fourth side under the car is a fully triangulated tubular section. This is for two purposes, one to complete the torque tube (without it these would be little resistance to the torque generated) and secondly to allow reasonable access to the gearbox, propshaft, handbrake etc.

The driving compartment is completed by a further tubular bulkhead behind the seats. Onto this bulkhead and the main monocoque is fitted further space frame to support the modified XJ6 rear subframe which in turn carries the differential inboard discs, drive shafts, wishbones, with coil over springs and dampers. The lower wishbones are further located to the main chassis by two radius rods.

At this stage all necessary brackets and mountings are jigged fitted to the chassis whilst it is held in position on the chassis table. Accuracy is absolutely essential.

The chassis is then removed from the table and fully welded. It is then checked on completion for accuracy by our quality controller.

The chassis is then sent to a specialist metal refinishers where it is flamed sprayed in molten zinc to British Standard No 2569 ensuring a life expectancy in excess of far most manufactures

It is then returned to the factory for the fitting of the body.

SECTION B THE BODY

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SECTION B - THE BODY

B.1 BACKGROUND INFORMATION

The original mould was taken from a 1961 Jaguar E-type 3.8 Roadster (owned by John Wilkinson, a partner in Triple C Challenger). This was done with Jaguar's written permission although we were asked, due to the similarity of the two products, to point out to potential customers that the car was NOT made by Jaguar.

Originally the laminating process was sub contracted but this was soon taken "in house" to ensure both a continuity of supply and the necessary quality control.

We are currently on our third set of moulds, this set being by far the most authentic and the rear arches are now also as per original (the first two sets of moulds having flared arches to accommodate a wider track). The body is dimensionally and visually exactly as John's original car. Sales are buoyant with a fourth set of moulds now being produced to meet demand.

B.2 General Description

The basis of the challenger comprises a one piece moulded glass reinforced plastic (GRP) body shell which is fitted to the chassis at the factory. It is not possible to buy the complete body and chassis as separate units as it is not feasible for the home constructor to successfully fit the body to the chassis with sufficient degree of accuracy, as this requires two separate body jigs. Whilst the chassis carries all the major structural loads, the body is used to carry or transfer the remainder and when the body and chassis are correctly mounted, each contributes to the strength and torsional stiffness of the other.

Construction of the body is generally laminated 2 oz chopped strand mat. A high quality polyester resin is used for the lay up of all components giving a panel thickness of approximately 0.125 ins. In the more highly stressed areas core mat is extensively utilised which has the additional benefit of absorbing sharp knocks and avoiding star cracking.

The body shell is laminated basically as 5 separate mouldings but these are bolted together whilst still in the mould. Before the shell is fully cured strips of chopped strand mat are applied to the joints with polyester resin to form a complete homogenous structure.

The doors and boot lid are double skimmed panels formed by bonding the two separate panels together whilst still wet. This greatly improves the strength and visual appearance of these panels.

The bonnet is stiffened by strengthening panels and also extensive use of core mat. In the event of accident damage it is possible to purchase whole or part panels to enable speedy repairs.

SECTION C

FRONT SUSPENSION

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C.1. **Parts List**

Items required from the factory:

Modified lower wishbone spring pan (Exchange)

Lower wishbone sleeves

2 front adjustable shock absorbers

2 coil springs

Nuts and bolts (see text)

Items required from the donor car:

Complete Jaguar XJ6 front suspension assembly

(to be stripped as shown in fig C1)

Items required by factory for modification

2 spring pans (item 73 - fig C1)

(Please state if Series 1 or 2)

SECTION C - FRONT SUSPENSION

C.2. General Description

The front suspension is of the fully independent type with unequal length upper and lower wishbones, incorporating coil springs and damper units.

The Jaguar wheelhub is mounted on two taper roller bearings on the short stub axle which in turn is attached to the stub axle carrier. This is pivoted between the upper and lower wishbones and carries a fabricated tie rod lever through which the steering linkage is attached. The Jaguar tie rod lever is not utilised.

A front anti roll bar is fitted which is supplied from the factory. The anti-roll bar is bolted to the chassis and is connected at both ends to the lower wishbones.

C.3. SUSPENSION AND STEERING GEOMETRY

As the Challenger sets its own steering geometry, along with its own springs and dampers it shows none of the Jaguar's handling characteristics. It is necessary to retain the shims in the top ball joint for adjustment of castor angle. (see Fig C4)

At this stage of the build it is only necessary to align the wheels so that they are parallel to each other (i.e. dead ahead). The castor angle is adjusted later, along with the camber angle.

For interest, however, the main concepts are explained below.

As the suspension is ultimately set when the car is completed the detailed explanation of setting the suspension is left to section R.

Front wheel alignment (toe-in)

The front wheels are considered to toe-in when the setting of the wheels is such that the distance between the front of the wheels is less than at the rear of the wheels, when measured in the same plane. The correct 'toe-in' is given in 'Technical Data'. (see Fig C6)

Front Wheel Camber Angle

This is the angle of inclination of the road wheel from the vertical when viewed from the front (see Fig C5). Inclination outwards at the top of the wheel is termed 'positive camber', and inclination inwards is termed 'negative camber'. If the road wheel is set vertically, the camber will be zero.

Castor Angle

Viewed from the side of the vehicle, this is the angle at which the pivoting axis of the front suspension assembly is inclined from the vertical. Inclination rearwards is termed 'positive castor', and inclination forwards is termed 'negative castor'. If the pivoting axis is vertical the castor angle is zero (see Fig C4)

Series I has four castor shims and on build up are placed two either side of the ball joints. Series II, however, only have three castor shims and all three are put to the front of the ball joint.

C.4. Preparation

The XJ6 front suspension assembly comprises a pressed steel crossmember to which is attached the steering mechanism and the upper and lower suspension wishbones. The front suspension incorporates coil springs, hydraulic telescopic dampers and an anti-roll bar fitted between the lower wishbones.

As the Challenger is considerably narrower than the XJ6 it is not possible to utilise the cross member en block. In addition the large weight difference means that the front springs and shock absorbers are also not used. The wishbones are, however, incorporated into the new set up.

It is advisable to remove the front suspension assembly complete from the XJ6 before stripping (see Haynes P162 section 12). Ensure car is safely balanced before proceeding.

The complete unit should now be stripped. An exploded diagram of the XJ6 front suspension is shown in fig C1. This is also used to indicate which parts are to be kept and which can be discarded.

It is essential to take great care in removing the front coil springs as they are under tension on the front cross member and thus contain a great deal of potential energy. It is essential to use a substantial spring compressor as explained by Haynes on page 160 section 6.

It is recommended that the Jaguar stub axle assemblies are stripped and cleaned before assembly (see Haynes P159 +) (see fig C1 for details of parts to be reused).

As the Jaguar steering arms (item 36 - fig 1) are not used these should be discarded and replaced with the fabricated arms supplied. They should be lock wired into position.

At the same time it is advisable to fit new brake pads, brake discs and overhaul the brake calipers if required (see Haynes 109) (see also section E).

The Jaguar balljoints are utilised although it is advisable to overhaul the bottom swivel if required (see Haynes P161).

Ensure that your challenger is on four axle stands and safely balanced before proceeding with build up.

C.5. Build Up

Fit all the wishbones to the chassis. Make sure the lower wishbone insert bushes supplied with the kit are in place. Top and bottom wishbones are handed differently for Series I and II. XJ6's Series I top wishbones are handed and must sit towards the rear slightly (e.g front arm slightly longer than rear arm) Series II lower wishbones are handed (see Fig C7) and they also must sit towards the rear - this means changing them from side to side as they come of the XJ6.

The front damper with coil spring fitted is bolted to the bottom wishbone using 7/16ths bolt and nyloc nut. Connect the top of the shock absorber mount in position, make sure that the dampers clear both the chassis and the bottom plate otherwise you will get strange noises when driving.

Attach the stub axle to the top and bottom wishbones using the standard Jaguar ball joints.

NOTE :- Do not allow the weight of the car to rest on the suspension without the springs or solid links in place. If this happens the top balljoint can easily be damaged.

C.6. The anti roll bar

Items required from the donor car

lower wishbone mounting blocks and attaching bolts

Upstands and rubber bushes

Items required from the factory

Rollbar

Rollbar support beam

4 x 3/8" u.n.f. x 3" , 4 x 3/8" u.n.f. x 1" bolts

Roll Bar clamps

nuts and washers

Mounting rollbar

Make sure the roll bar carrier is sitting central under the chassis with the back edge positioned 5/8" forward of the lower wishbone chassis mount. Clamp in place and drill the chassis accordingly and bolt up (see fig C7)

Mounting Procedure

Series 1 spring pans will require the front edge cutting away locally to allow the wishbone mounting block to bolt underneath. The section of flanged area cut away lies in line with the two holes in front of the springpan. Fit the upstands and rubbers so that the lower wishbone and roll bar are now joined (see Fig C7)..

SECTION D

REAR AXLE AND SUSPENSION

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D.1. Parts list

Items required from the factory

2 radius rods

4 springs

Modified cage, wishbones and driveshafts

Items required from the donor car:

Complete rear end assembly from an XJ6

Nuts and bolts

Items required by the factory for modification

Rear crossmember (item 1 - fig D.1.)

Wishbones (item 6 - fig D.1.)

Driveshafts (item 37 - fig D.1.)

SECTION D - REAR AXLE AND SUSPENSION

D.2. General description

As the track of the E type is 8 ins less than the XJ6 it is essential to have the the rear cage, drive shafts and lower wishbones shortened at the factory. The rear end can be fully assembled off the car before being refitted to the chassis. The modified cage is located by eight fully bushed brackets to avoid undue road noise and does not use the original pick up points. Shortened drive shafts having a universal joint at each end transmit power from the final drive output shafts to the road wheels. The rear cage, drive shafts and lower wishbones need to come to TRIPLE C CHALLENGER for modification. This can not be carried out by the customer as it requires jig welding and can not be carried out while the customer waits. These items can, however, be supplied on an exchange basis including new universal joints.

D.3. Preparation

It is necessary to dismantle the drive train from the cage (see Haynes P 163). Be careful not to lose the camber control shims as some of these will be required later. The lower wishbones and drive shafts need to be shortened - see above.

The hubs are then fitted and end float set (see Haynes P104).

Ensure that the body/chassis is secure on stands.

D.4. Build up

The rear axle assembly is rebuilt as per Haynes manual pages 162+ but using the shortened cage, drive shafts and lower wishbones. Four coil over dampers are supplied by the factory as part of Module A (see Haynes P162). Fitted under the driveshaft flange next to the disc, 2 shims are used per side. Each shim adjusts the camber by 1/4 degree.

It is important to ensure that the top shock absorber bush is fitted with the correct sleeve (item 48 Fig D.1) as in many cases this has been lost in the original XJ6 at some stage of its life.

The whole assembly is mounted to the car using an hydraulic jack. The bushes are secured to the brackets on the rear cross beam using 12 mm bolts.

The two radius rods are now fitted ensuring the chamfered side is nearest to the differential unit. This end is fitted with the special 1/2 inch UNF bolt originally on the Jaguar axle. The front of the rod is secured to the chassis bracket with a 12 mm bolt and it is often helpful to sharpen the end of the bolt to ease fitting.

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THE BRAKING SYSTEM

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E.1. Parts list

Items required from the factory

One complete set of pedals and housings

Chrome handbrake lever

New brake pipes and hose

Items required from the donor vehicle

Complete XJ6 braking system

XJ6 handbrake cable.

XJ6 accelerator cable

SECTION E - THE BRAKING SYSTEM

E.2. General description

The braking system is exclusively derived from the XJ6 and operates hydraulically on all four wheels. Thus all J series cars utilise Jaguar disc brakes on both the front and rear of the car.

The handbrake operates through a mechanical linkage to the rear calipers which incorporate automatically adjustable handbrake mechanism. The handbrake lever is not from the XJ6 as that is not in keeping with the car but available from the factory to mount on the transmission tunnel.

The master cylinder is of conventional tandem construction with one section providing hydraulic pressure to the front wheels and the other to the rear wheels. In event of either section becoming inoperative the other section operates normally. The brakes are servo assisted.

E.3. Preparation

It is recommended that the front calipers are overhauled (see Haynes P 109) and that new discs and pads are fitted. All of this is normally done before the stub axle/hub assembly is fitted to the car.

It is recommended that the rear brake calipers are overhauled and new discs and pads fitted before the diff is fitted into the car (see Haynes P 111).

It is advisable to overhaul the brake master cylinder before fitting (see Haynes P.112).

It is also necessary to fit the wiper motor and linkage before the pedal box

E.4. Build up

As outlined above it is advisable to fit the front calipers, brake discs and pads before the stub axles are fitted to the car.

It also assumed that the rear brakes have been overhauled as advised above.

The braking system is built up as per the original XJ6 and is fully covered in Haynes Chapter 9.

The pedal box assembly should be mounted as follows.

Position the pedal box over the holes in the top of the footbox, making sure that the front edge of the footbox hole lines up with the front inside edge of the pedal box. It is located sideways by lining up the side of the brake pedal box with the edge of the hole in the footbox.

The pedal box is fixed by drilling through the front angle and front top tube in the footbox and through the rear angle and top sheet of the footbox. It is recommended that four 5/16" bolts with nylocs are used. The servo should be mounted after the pedal box is fitted.

The servo fork end might require splaying out to fit over the pedal. The brake pedal uses a thick walled tube to take the torque created by the cranked pedal. Early brake master cylinders use a remote reservoir, which causes mounting problems. So now only late series II master cylinder are used. The bonnet inner shield will foul the master cylinder and should be locally cut away to allow clearance. When mounting the master cylinder to the servo, ensure that the actuating rod has a small amount of free play. Lack of clearance will probably make bleeding the system impossible. Lack of clearance on a bled system could result in total brake lock up after reaching working temperature.

The clutch master cylinder mounting is straightforward.

Note:- If triple carbs are being used then a different pedal box must be fitted to the one normally supplied.

Mounting the throttle pedal.

The throttle pedal uses the XJ6 throttle cable unmodified (Jaguar part no CBC 1903) The cable enters through the rear angle bracket (i.e. the one used to fix the pedalbox down with), the 5/16" hole is drilled centrally in the angle bracket. The throttle pedal pivot is located by measuring 4 3/4" forwards of the cable hole and 5/8" down from the top of the pedal box (check and make sure this corresponds with the pedal supplied). A 5/16" hole is carefully drilled squarely through the side of the footbox and top tube. The pedal is mounted using a long 5/16" bolt with greased flat washers in between rubbing faces. The bolt is not clamped up, it is loosely fixed with either a new nyloc nut or double locked plain nuts.

Run the brake lines as shown (see Fig E6). Ensure that the brake pipes are firmly secured to the chassis using Girling brake pipe clips.

IT IS ESSENTIAL TO USE NEW BRAKE LINES.

Connect the front brake hoses directly into the calipers.

Bleed the brakes. .

E.5. The handbrake

The handbrake lever is mounted on the centre tunnel towards the left hand side. A hole 4.75ins x 1.375 ins has been cut in the centre tunnel located as in fig E9. Two holes are drilled through the side of the top tube in the tunnel to correspond with the holes in the handbrake lever itself. The handbrake lever is spaced away from the tube to allow movement of the lever. Make sure the lever has got full free movement, and lever has been drilled to accept modified handbrake cable.

Modifying the handbrake cable

The original handbrake cable may be used. The inner is shortened to achieve approximately the dimensions given in fig E10. The cable that passes through the forked end attached to the diff is modified. This may be done by the method suggested in fig E.10 or by swaging or soldering a new nipple onto the end of the cable. It is advisable to check that you are modifying it to the correct length.

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THE FUEL SYSTEM

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F.1. Parts list

Items required from the factory

- One fuel tank kit
- One fuel line
- Hoses and clips to suit
- One in line fuel filter

Items required from donor car

- One electric fuel pump

SECTION F - THE FUEL SYSTEM

F.2. General description

The fuel tank is mounted in the left hand corner of the boot. A conventional breather pipe ventilates the tank outlet and the gauge sender unit is screwed into the sidewall of the tank. An electric pump is required to be fitted in the boot.

NOTE:- N/S/R light and bumper can not be fitted with the tank in situ.

The fuel line should be run through the centre tunnel and be made of 5/16" or larger kunifer tubing. An in line fuel filter should be fitted. This fuel line should be connected at both ends by special flexible fuel pipe to its respective unions.

F.3. Preparation

It is advisable to check the operation of your fuel pump before fitting. It is quite possible that the contact breaker points will require attention. (see Haynes P47)

F.4. Build up

The fuel tank is fitted into the left hand corner of the boot with the petrol outlet on the right hand side. The tank is secured to the body bulkheads by three bolts (see Fig.1). The rubber filler neck is pushed through a hole in the petrol flap box and mated onto the tank with one large jubilee clip. A breather pipe should be fitted from the beather tube on the filler neck to the breather tube on the tank. The top of the rubber filler neck should be secured with a fixing plate and self tappers.

Mount your fuel pump near to the petrol outlet on the tank (see Fig.2) and run your fuel line down the transmission tunnel to a convenient place near to this pump.

It is advisable to use 5/16ths in metal tube for your main fuel line with flexible tube at either end to mate with the engine and the fuel pump

It is recommended that an in line fuel filter is used. .

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THE STEERING SYSTEM

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G.1. Parts list

Items required from the factory:

2 fabricated steering arms, 4xM12 fine bolts with drilled heads for lock wiring, washers. (NOTE Series 1 and 11 are not the same)

Steering column attachment bolts and plate washers

Steering column to steering extension link universal joint

Steering column extension link (exchange from the factory)

Steering rack, 4x2"x5/16ths UNF bolts, washers and nyloc nuts

2 universal Joints

2 MGB track rod ends

Items required from the donor car:

Complete XJ6 steering column, lock, indicator switch

NOTE:- Only Series 1 steering columns allow enough space to accommodate the larger speedo and rev counter.

SECTION G - THE STEERING SYSTEM

G.2. General description

The steering unit is of a rack and pinion type being specially made for the Challenger by Supra. The rack housing and tube are mounted directly onto the front chassis frame as shown in Fig G1.

The customer needs only to supply the XJ6 steering column extension and universal joint to the factory for modification. This is on an exchange basis as part of Module A.

G.3. Preparation

The only part the customer needs to provide is the complete steering column and extension.

Don't forget to ensure that you have both the steering lock and the key - it is almost impossible to obtain a key to match a lock without a pattern. Make sure that the indicator stalk is still attached to the column.

G.4. Build Up

Mount the steering rack onto the chassis mounts already pre-drilled using the nuts and bolts supplied. Mount the steering column on the brackets attached to the bulkhead frame. (Note:- Series I column uses the back holes. Series II uses the front.) The column is centralised on the top bracket and holes drilled to coincide with the slotted holes in the column. Some series 2 steering columns require holes drilling inside the original slotted holes in the column as the original ones are spaced too far apart. The two sections of fabricated column are supported in the middle by a nylon bush in a fabricated bracket. This is attached to a bracket welded to the chassis. The column is loosely attached with all the universal joints. The column support is clamped to the bracket allowing it to align itself. Two 1/4" holes are drilled and the centre support is attached.

Steering arm mounting

There are different steering arms for series 1 and series 2 hubs. The type of hubs used must be stated before ordering. The track rod ends fit in from underneath. The arms themselves are simply bolted on using the top caliper mount and the original Jaguar steering arm mount in the centre of the hub. The top caliper mounting bolt may be used in the lower caliper mount. Series 1 steering arms are supplied with two 7/16" unf bolts with drilled heads for wirelocking, series 2 use are supplied with M12 fine bolts. (See Fig G2)

SECTION H

THE ENGINE AND GEARBOX

Section	Description	Page
H.1	Parts list	
H.2	General description	
H.3	Preparation	
H.4	Build up	

LIST OF ILLUSTRATIONS

Fig.No.	Illustration	Page
Fig H1	XJ6 engine gearbox mount	
Fig H2	Challenger gearbox mounting	
Fig H3	Shortening the gearbox spigot	
Fig H5	Jockey wheel	
Fig H6	Locating the Jockey wheel	

H.1. Parts list

Items required from the factory

1 fabricated gearbox mount

Items required from the donor car

Complete engine and gearbox with mountings

NOTE:- The power steering pump and viscous fan can be discarded. Most customers also discard the XJ6 air filter arrangement, along with the warm air "cold start" attachment to the exhaust manifold.

SECTION H - THE ENGINE AND GEARBOX

H.2. Description

The Challenger chassis has been designed to take any of the XJ6 engines except the 2.8.

If you have now changed your mind concerning the fitment of automatic or manual, please consult with the factory and we will advise you as to what modifications are necessary. It is also possible to fit certain other engines (early Jaguar etc) but substantial modifications may be necessary and it is not recommended unless the purchaser has access to full engineering facilities.

H.3. Preparation

Obviously the newer the engine, the better the chance of it being in good condition. Having decided on your choice of power train the unit should be cleaned, stripped and overhauled if necessary. If you are buying an engine and gearbox from a scrapyards then try to contact the previous owner of the vehicle to ascertain its condition before parting with any money. It is not advisable to buy an engine that has been out of its mother car for a long period of time whatever the scrapyards say!

If fitting the XJ6 engine you will need the standard XJ6 mounts and part of the gearbox mount - so make sure they are not discarded.

If your engine isn't up to scratch then factory reconditioned units are available. Please ask for a quote.

Don't be in a rush to fit the engine and gearbox as it is far easier to work on the unit before it is installed in the car.

H.4. Build up

The gearbox mount.

From the XJ6 it is necessary to utilise the gearbox spigot and one side mounting rubber (see Fig 1) and the nuts and washers off bolts on the rubber block. It is also necessary to use the fabricated gearbox mount supplied in the kit.

The 1/2 inch UNF thread on the gearbox spigot is cut down to the flat plate, this thread is best cut by using a standard die or die nut, the 1/2 inch UNF side is then cut to allow approximately 3/4 inch of thread left. (see Fig H3) This can be carried out at the factory for a nominal cost.

The rubber mounting block used is from later type cars. There are two per car, only one is required (see Fig H1).

When the engine and gearbox are in the chassis, screw the spigot into the gearbox. Attach the fabricated bracket to the spigot with 1/2 inch UNF nyloc nut and washer. Sit the fabricated bracket onto the rubber block with the steel backing plate or rubber block sitting on the cross tube in the chassis. The slotted hole in the fabricated bracket is to allow the rubber block to swing in and out to ease positioning. The gearbox end is positioned so that the speedo mount is clear of the side upright tube, two 9/16th inch holes are drilled in the cross tube to take the 3/8ths bolts which attach the rubber mounting block. (see Fig H2)

NOTE:- To help speedo clearance, positioning the mount as far to the left helps and does not hinder anything else.

The engine mountings

The front engine mountings are taken straight from the XJ6. The lower section of the mount is discarded and the rubber block bolted directly to the chassis whilst the upper part of the mount is secured to the engine block. If triple carbs are to be used then the

engine mounts have to be cut down to one rubber thickness. Because of this a new threaded stem has to be attached to the side that used to have the rubber.

/Engine ancillaries

The engine can be fully dressed prior to installation with the gearbox attached. Parts of the power steering jockey pulley are utilised to tension the fanbelt.

The viscous fan is replaced by an electric unit supplied by the factory. If your engine has the larger diameter alternator (5/8") this will also have to be discarded (see below).

Fitting

The engine and gearbox are fitted as a combined unit and it is essential to use a suitable engine hoist. These can normally be hired from a local tool hire firm.

Modifying the jockey wheel

The jockey wheel off the power steering pump is modified to act as a tensioner for the water pump fan belt. There are several ways to mount a modified jockey wheel which can be undertaken by the customer. The parts required from the jockey wheel are shown in Fig H5. The factory currently locate the modified tensioner, on the water pump casing (see Fig H6).

A service exchange unit is available from the factory at a modest cost.

NOTE:- Some jockey wheel pulleys cannot be turned on to the other side. These then have to be spaced out and larger bolts used when mounting.

Fitting the alternator

The type of alternator used has a small diameter body (5" as opposed to larger 5 5/8" dia. alternator), this allows it to fit in between the chassis tubes. The original mounting bracket is retained as is the XJ6 sliding adjuster although this will require a new pivot hole drilling and its length shortening to allow the alternator to sit as close as possible to the engine. The front mounting plate on the alternator may require rotating so that the other hole acts as the pivot, this is easily done by removing the pulley wheel, unbolting the mounting plate and moving it round. The holes should align themselves. The alternator belt used is the mintex PWFT 864C.

SECTION I

THE COOLING SYSTEM

Section	Description	Page
I.1	Parts list	
I.2	General description	
I.3	Preparation	
I.4	Build up	

LIST OF ILLUSTRATIONS

Fig.No	Illustration	Page
I1	Chassis radiator mounts	
I2	Radiator tie rods	
I3	Bottom hose connecting pipe	

I.1. Parts list

Items required from the factory:

Electric fan

Lower hose joining pipes

Top hose

Radiator tie rods (exchange)

Items required from the donor car

XJ6 radiator

Wing valance to bulkhead crossbraces

Hoses (check carefully for any deterioration)

SECTION I - THE COOLING SYSTEM

1.2. General description

The cooling system utilises the XJ6 radiator with a header tank which is pressurised and thermostatically flow controlled. The header tank is attached to the inlet manifold. (larger engines only) A pressure cap should be fitted to the expansion tank whilst a plain cap is fitted to the header tank (see Haynes P 37). The expansion tank used is off Rovers, Maxi's etc, and mounted on the near side inner wing.

As the radiator is mounted well in front of the engine it is essential to use an electric fan of adequate size which should be fitted as per the manufacturers recommendations. (see below)

1.3. Preparation

It is advisable to flush the cooling system before installation (see Haynes P 38). It is necessary to remove the lower drain plug on the radiator and block off with a 1/2" u.n.f. bolt. It should be noted that XJ6/12 radiators vary slightly from model to model in size and in their lower mounting points.

1.4. Build up

WARNING : Make sure you have got clearance between the bonnet and radiator when the bonnet is fully closed !!!.

The radiator is bolted directly onto the front chassis plates (see fig I1) using the original rubber spacers and nuts. Depending on your particular radiator it may be necessary to redrill these plates or drill new holes in the bottom of the radiator plate. The radiator sits 1 1/4" forward of the bonnet support bar and approximately vertical. The radiator should not be sloped back too much as there will not be enough clearance between the bottom radiator hose and the bonnet bar support tube. The bottom hoses are standard XJ6 joined together by a special water pipe available from the factory. This hose lies parallel with the bonnet bar, it can be fixed on by clamping angle brackets to the tube with jubilee clips then bolting the angle brackets to the chassis tubes that it runs close to. It should be positioned to allow clearance on the lower wishbone and more importantly clearance on the steering column's lower U/J. The top hose is made up from convoluted radiator hose. The top of the radiator is secured by 2 special tie rods which can be made from the original wing valance braces (see Haynes P15). These are available as a service exchange item within Module B.

Electric fan

The XJ6 viscous fan is dispensed with and replaced with an electric unit which is sited inboard. This is supplied in Module B and is easily wired into the factory supplied engine wiring harness.

NOTE:- There is a fixing kit and instructions with the electric fan. This requires the fan to be secured through the radiator core. Poor sitting may result in the bolt shafting through the core resulting in a loss of coolant.

SECTION J

THE CLUTCH MECHANISM

Section	Description	Page
J.1	Parts list	
J.2	General description	
J.3	Preparation	
J.4	Build up	

LIST OF ILLUSTRATIONS

Fig.No	Illustration	Page
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J.1. Parts list

Items required from the factory:

Master cylinder

Flexible hydraulic pipe

Items required from the donor car

Clutch slave cylinder

Complete clutch

SECTION J - THE CLUTCH

J.2. General Description

The Jaguar set up requires an MGB clutch master cylinder (part no 4223-105)

J.3. Preparation

As the engine and gearbox are fitted as one unit the clutch should be fitted to the engine before installation to the car.

NOTE:- It may be false economy to fit a part worn clutch assembly. A replacement necessitates engine/gearbox removal.

J.4. Build up

The MGB clutch master cylinder bolts directly onto the pedal box. The forked end is attached to the pedal with a 5/16" clevis pin and split pin. The flexible hose (factory item) which is used is an all in one hose from the slave cylinder to the master cylinder. When fitting, screw the flexible into the slave cylinder first, then attach the banjo end to the master cylinder making sure you use a copper washer each side of the banjo.

SECTION K

THE PROPSHAFT

Section	Description	Page
K.1	Parts list	
K.2	General description	
K.3	Preparation	
K.4	Build up	

K.1. Parts list

Items required from the factory:

Propshaft
Nuts and bolts to suit

SECTION K - THE PROPSHAFT

K.2. General description

The propshaft is made specially for the Challenger and is part of Module B

K.3. Preparation

It is a good idea to keep the prop bolts from the donor car. This is only necessary at the differential end.

K.4. Build up

It is advisable, but not always necessary to fit the propshaft with the sliding joint to the rear of the car for extra clearance at the rear of the tunnel. New nylocs must be used.

SECTION L

ELECTRICAL EQUIPMENT

(Part 1 - The wiring loom)

Section	Description	Page
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L.2	General description	
L.3	The wiring loom	
L.4	The dashboard	

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L2	General layout	
L3	Behind the dash wiring loom	
L4	Boot wiring loom	
L5	Engine compartment	
L6	Engine harness	
L7	Headlamp flashing relay	
L8	Wiring of speedo/rev counter	
L9	Jaguar ignition switch	
L10	Indicator switch	
L11	Inhibitor relay wiring	
L.12	Borg Warner model 65	
L.13	Overdrive wiring	
L.14	Auto gear selector positioning	

L.1. Parts list

Items required from the factory

Wiring harness (two sections)

Fuse box (Lucas part no.54038068)

Flasher unit (Lucas part no.SFB 114)

Hazard warning unit (Lucas part no.SFB 130)

Securing clips and ties

Volvo 244 flasher relay or S2/3 XJ6 flasher relay

Rewired XJ6 Series 1 instrument panel (service exchange), speedo and rev counter

SECTION L - ELECTRICAL EQUIPMENT

L.2. General description

All versions have 12 volt electrical systems in which the negative battery terminal is earthed. The battery is mounted directly behind the radiator (see Fig L9). The fuses are located on the main bulkhead behind the dashboard.

Wiring Harness

This loom comes in three sections:

1. The main loom running from the rear of the car to the front.
2. A dash loom which is wired into the customers own instruments.
3. An engine loom

These looms are supplied complete with all plugs and connectors and require little knowledge of car electrics to safely install. The Series 1 XJ6 uses a floor mounted dip switch which is considered unsuitable for the Challenger and so is replaced by converting the flasher switch into a flasher/dipper switch by using either a Volvo or a Jaguar S2/3 relay.

L.3. Preparation

Lay out the main loom on the garage floor and match it to the wiring diagram shown in Fig L2. Ensure that you can identify each section of this loom before proceeding and that you fully understand which part belongs in the boot, which in the cockpit and which in the engine compartment.

L.4. Build up

Having identified these parts you will now have to feed a large part of the loom through the bulkhead close to where the steering column is routed. This can be achieved by passing the loom from the engine compartment via a hole (11/2" x 3/4") cut in the G.R.P. part of the bulkhead. Do not feed the boot section through this hole.

The boot section of the loom is routed into the cockpit via a hole in the left hand rear corner of drivers side foot box, down the inner edge of the vertical tube at the front of the central tube (gearbox tunnel). The cable is then run along the bottom of the gear box tunnel and exits via the rear bulkhead approximately 11/2" from the floor level, through the pre-cut hole.

It is then taken out the rear edge and enters the boot through a hole in the spare wheel area. It can then run along the right hand side of the boot to the o/s rear light cluster and hence across the back of the boot to the n/s rear light cluster. The fuel pump wires are run under the fuel tank to the pump.

The section in the engine bay is further subdivided into two, one plug and a single connector join onto the separate engine harness and the remainder is laid out along the chassis to feed the front lights etc. The bulkhead section runs behind the dash and feeds the fuse box, flasher and hazard units, heater fan and wiper motor. It also contains the indicator block and ignition key lock block which are plugged directly onto the indicator block and ignition block off the steering column. The plugs on the steering column have to be cut and replaced by the appropriate connectors (factory supplied). There are also four multipin connectors which plug into the rewired dash.

Instruments are taken from a series 1 XJ6 and rewired by our electrician to plug into the 4 multipins on the main loom. This is done as part of the wiring loom cost.

The main instrument panel wiring harness, in addition to the four multipin plugs, mentioned above also contains the the wiring for the back of the speedo and rev counter and the warning lights. The XJ6 warning lights are not used but instead four Durite warning lights are utilised. (2 green, 1 red, 1 amber)

SECTION M

DASHBOARD - WASHER/WIPERS AND HEATING

Section	Description	Page
M.1	Parts list	
M2.	General description	
M.3	Preparation	
M4	Dashboard build up	
M.5	Washer and Wipers	
M.6.	Heater Assembly	

LIST OF ILLUSTRATIONS

Fig.No.	Illustration	Page
M1	Dash top trimming	
M2	3 wiper system	
M3	Wiper motor mounting	
M4	Dash top vent location	
M5	Centre console hinges	

M.1. Parts list

Items required from the factory:

Dashboard

Dashboard top

Dashboard top side trims.

Windscreen wiper kit

Spitfire heating system .

Items required by customer:

XJ6 series 1 speedo/rev counter

Screen washer kit

Wiper motor and nut

SECTION M - THE ELECTRICAL SYSTEM

M.2. General description

The GRP stepped dash needs to be covered in vinyl and/or metal (see real E type for ideas).

Screen washers are compulsory in the UK and so must be fitted. A double jet can be conveniently fitted in the centre of the bulkhead about 4 ins from the screen. This can be taken off the donor car.

A three windscreen wiper system is fitted using the motors from Maxis, Marina's etc.

The heating system is taken from a Triumph Spitfire and is located on the near side bulkhead (see fig M6) The heater unit requires some modification before fitting. (see fig M5) A modified heater kit is available from the factory complete with ancillary parts to effect a fully working heater system.

M.3. Preparing Dash Front

Get the dash to fit between the door pillars and then cut out and drill all pre-scribed holes and apertures. Cover with black vinyl and then attach speedo/rev holding rings. At this point see that the clocks fit and turn into position. Then riveting into position fit the centre console brackets. (see Fig M5). Also fit the dash side support brackets

M.4. Dashboard Build Up

Fit dash by resting it on the steering column. Keeping it horizontal, clamp both ends of the dash to the pillars. Support the centre of the dash (there should be approximately 6" between the dash and the tunnel). Make sure the dash is horizontal and vertical, and the same distance from the bulkhead all the way along. If the recessed part of the dash does not touch the bulkhead then pack it out, then drill and secure with self tappers. Now attach the side brackets.

The dash top is not fitted till wiring, clocks, centre console etc, are all in place.

Position a strip of 3/8" plywood on the underside of the dashtop approximately 17" long and 2" wide. Drill a number of holes in it and attach it to the dash top with P40 Place it approximately 3/4" from the fro

IF heater is to be fitted then cut out the heater vents. This is done by measuring 10" between the inner holes, eg. 5" either side of the mirror rod slot. Drilling 5/16 hole then putting on the vent top and marking out the place for the second hole. These should be 1" from the edge. The vent is then placed on the dashtop and the aperture is marked out. The slot is then cut out. The lower portion of the heater vent is then checked to make sure it goes through the hole (a small piece of the louver heater vent edge may be cut off to allow it to fit). (see Fig M4)

Fixing Dashtop to Dash front

- 1) Trim dashtop, cut out slot for the mirror rod.
- 2) Trim a straight edge off dashtop that fits against dashboard front so that it is straight with the edge 0.75" from the rounded part of the front. (see Fig 1)
- 3) Secure the prepared dashtop to dash front by inserting two self tappers through the G.R.P and into each end of the bonded in plywood.

NOTE:- Each end of the dash can be secured if you wish, with a couple of strips of aluminium attached to the dash top and door pillars. (They will then be covered up with the final trim).

M.5. Washer and Wipers

1) The washer jet taken off the donor car should be fitted to the pre-drilled hole just in front of the middle wiper arm.

2) The wheel boxes (Lucas 72866) are fitted pointing out towards the front of the car with the help of the rubbers (Lucas 60600439). Some cutting of the panels may have to be made to get the wheel boxes to fit. When in place, fit the tubes and finally the motor

3) The wiper tubes are pre-made at the factory. The nut that attaches the first tube to the motor must be brought to the factory on an exchange basis.

4) The wiper motor normally taken from a Marina, Maxi, etc. is located on the bulkhead just above the drivers footwell. It is attached with its original bracket to the bulkhead. (The position will become clear when the wiper tubes are fitted).

M.6. Heater

Position heater on passenger side footwell, mark and cut out bulkhead panel, attach heater with 4 x 1/4 UNF bolts through casing. Cut 2 x 1 3/4 holes through inner bulkhead for ducting to demister vents, cut holes in outer footwell sides and fit ducting across bulkhead to drivers side footwell and from heater through engine side of bulkhead to passenger footwell. Fit water on/off valve (KL No A03401) into inlet side of heater (water flow goes from rear of inlet manifold through heater and returns to water pump). On/off air control is via cable slide assembly situated in drivers compartment, seal and attach panel/heater assembly to bulkhead.

SECTION N

THE EXHAUST SYSTEM

Section	Description	Page
N.1.	Parts list	
N.2.	General description	
N.3.	Preparation	
N.4	Build up	

LIST OF ILLUSTRATIONS

Fig.No	Illustration	Page
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N.1. Parts list

Items required from the factory:

Complete stainless exhaust system and mounts

System Comprises

2 Down pipes

1 Silencer box

2 Pipes from box

2 Muzzlers

1 Muzzler mounting rubber mount

1 muzzler mounting metal bracket

2 Rubber rings

2 Sealing rings

6 Exhaust clamps

SECTION N - THE EXHAUST SYSTEM

N.2. General description

Although it is possible to fabricate your own exhaust system it is generally agreed that it is simpler to purchase a ready made system from the factory.

Currently we offer a stainless steel system, using the original manifolds going into a central silencer before branching out at the rear into two E type chrome mufflers. A full fitting kit is supplied with the exhaust.

N.3. Preparation

Firstly secure the Challenger on four axle stands. It is recommended that to get the required working height, commercial type stands to be used. For a few pounds these can be hired from your local hire shop. Be Safe - Be Sure

A tube of exhaust sealant is required to ensure a gas tight fit

N.4. Build Up

NOTE:- Leave all joints loose until complete system is in place

Insert sealing rings (with exhaust sealant) into the two manifold down pipes. Connect silencer box extension (twin pipes) into the two down pipes, fit exhaust clamps. After suspending the silencer with the rubber rings, which hook over chassis mounted bolts each side of the silencer.

Now connect the two pipes from the silencer to the muzzlers and fit the four exhaust clamps and rubber mounting block and metal bracket. The exhaust system is now complete and can be manovered into its optimum position. Now offer the muzzler up to the underside of the boot and ensure they are centra; before marking and drilling into the boot. You can now secure the muzzlers and tighten the complete system.

Run engine and check system for leaks.

SECTION O THE BODY

Section	Description	Page
O.1.	Parts list	
O.2.	General description	
O.3.	Paintwork	
O.4.	Trimming	
O.5.	Build up	

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O1	Seat belt mounting points - 1	
O2	Seat belt mounting points - 2	
O3	Seat belt mounting points - 3	
O4	Seat runners	

O.1. Parts list

Items required from the factory

Seat belts

Bumpers

Badge bar set

Overiders

SECTION O - THE BODY

O.2. General description

The basis of the vehicle comprises of a moulded glass reinforced plastic body shell bonded by a series of bulkheads to the space frame chassis.

Whilst the chassis carries all the major structural loads, the body contributes to the strength and torsional stiffness of the whole.

For further details of the body and its construction see section B.

Although the car is supplied with the doors, boot and bonnet all prefitted it is as well knowing how to make final adjustments.

O.3. Painting

As supplied in the basic kit the car comes finished in a white gel coat which will require painting. It is recommended that the car is painted in two pack polyurethane or acrylic paint which, as it is highly poisonous, should only be attempted if the proper equipment is available (namely a spray booth, breathing apparatus, fire extinguishers etc).

Before painting any extra holes required should be cut (see Section P Lighting).

The car can be supplied fully painted

O.4. Trimming

Assuming your car has now been painted it will now need trimming. Either this can be done for you at the factory or we can supply you with a trim kit for home fitting. This kit comprises of all the trim to finish the car, namely the carpets and underlay, the vinyl sill covers and underlay, the door panels and the boot carpets.

Seats can also be supplied either trimmed or untrimmed.

As there is a wide range of materials available the customer is advised to take some care before making a decision as to what in some ways is the most important part of the car.

O.5. Build up

Fitting seats

The seats are fitted using standard XJ6 runners irrespective of seat type (tall people may attach the seat to the floor to gain an extra inch clearance, though it is recommended to try the seat with an seat runner under it. The pull bar for adjusting the seat is bent to make the sides right angles with the front, the ends are bent down to allow the pull bar to sit close to the floor, see fig O4.

The hole pitch and position recommended is shown in fig O4. It is important to get the runners parallel and the same distance fore and aft, hence it is recommended that the holes are marked out on card/tin/wood as accurately as possible and then this jig is used to drill through the cockpit floor. The holes should be opened out to 3/8" this allows some play.

Before fitting your carpets it is advisable to check exactly the positions of your seat belt mountings and to ensure that the thread is clean by screwing in the correct size bolt (7/16ths UNF).

Once the carpets are fitted this is extremely difficult to do.

The positions of the seat belt mounting holes are shown in Fig. 1,2,3. Special seat belts are available from the factory.

The bonnet can be refitted by sliding the attached bracket back onto the chassis bolt and by reconnecting the bracket to the bonnet on the other side. The bonnet stay is fitted to left hand side of the engine compartment bolting to the inner panel of the bonnet approximately 12 ins from the back of the wheel arch and to the chassis inner tube about level with the wheel arch back.

The bumpers should be fitted after the side lights and lined up to give a close fit between the bumpers and the side light units. The front bumpers and badge bar are fitted as one unit and this requires two people at least.

NOTE:- N/S/R bumper and lights can only be fitted with the petrol tank out.

SECTION P

THE LIGHTING SYSTEM

Section	Description	Page
P.1	Parts required	
P.2	General description	
P.3	Preparation	
P.4	Build up	

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P.1. Parts required

Parts required from the factory:

Front side lights/indicators

Rear side lights/indicators

7 inch halogen headlights

Headlamp nests

Headlamp wiring extensions

Rear number plate lights

SECTION P - THE LIGHTING SYSTEM

P.2. General description

The front side lights/indicators are genuine Jaguar E type and can be obtained from us.

Reproduction rear side lights/indicators can be supplied by us although genuine E type rear lights can be used but are difficult to obtain at a reasonable price.

The rear number plate light is a standard Lucas chrome unit, also supplied by us.

The headlights are 7 inch sealed halogen units obtainable from us along with the headlamp buckets. A wiring h/light extension harness will be required on both sides. This can be taken off almost any British car.

NOTE:- The headlight buckets have to be cut down to stop the tyres catching at high speed cornering. They must be cut down so when the headlamp is fitted, the plug can still fit onto the bulb. A flat plate is then usually stuck on (e.g. sikaflex) cut to size. This must be waterproof.

P.3. Preparation

P.4. Build up

Rear sidelights

Position lights on body to match the holes in the lamps and car bodywork. Fit the bulb holders into these holes from inside the boot and fit an earthing strap with a terminal on it between the two holes. Use self tapers to connect unit to body. Do not forget the earths for the bulb holders. If real lights are being fitted, then a lot of extra cutting will have to take place. Care must be taken not to over cut.

Front sidelights

The cut outs are already on the body moulding.

Headlights

Drill marked holes in back of tunnel and rivet on headlamp nests. Fit headlamps using a headlamp wiring extension.
Connect the lights to the main loom as shown in the wiring diagrams.

SECTION Q

FINISHING OFF

Section	Description	Page
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Q.2	General description	
Q.3	Preparation	
Q.4	Build up	

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Q1	Position of front bumpers	
Q2	Position of rear bumpers	

SECTION Q - FINISHING OFF

Fitting Bumpers

1) Build up the bumpers with overrides before application. Front bumpers also need badge bar fittings. Line up the bumpers as close to the lights as possible so they still follow the body curves. Mark where the captive nuts are, then drill the body.

Before finally fitting, attach the rubber seals.

NOTE:- This operation requires two people and it is recommended that the body be protected with masking tape.

Fitting Hood

1. Bolt fibre glass front section to hood frame using 4 6 mm setscrews.
2. Bolt mounting bracket to hood frame through frame fulcrum point using 3/8 UNF setscrews and nyloc nuts. Install setscrews from outside so that the nuts are to the interior of the car.
3. Fasten toggles to fibre glass moulding ensuring that the moulding is cleaned up to allow the toggle's flat face to sit flat on the front moulding and to be adjustable within the scope of the slotted holes. Secure using 6 mm setscrews.
4. Mount frame to car sitting mounting brackets on flat top section of inner wheel arch adjacent to driver's right and passenger's left shoulder. Do not bolt down at this stage.
5. Open out hood frame and clip toggles to mirror rod block and pillar cappings.
6. Adjust toggle hooks to achieve a good "pull down".
7. Push hood frame mounting brackets to their most forward point so the frame is just touching the 'B' post and secure the hood frame brackets using 1/4 UNF sets together with the reinforcing plate which fits from inside the inner wheel arch.
8. Trim the fibre glass moulding to the contour of the windscreen top chrome with the seal temporarily in situ.
9. With the hood frame in this position insert a pencil in the hole in the bottom of the part of the frame which hangs down below the mounting brackets. Scribe on arc on the inner wheel arch adjacent to the drivers right and passengers left hip. Lower hood frame to stored position and scribe another arc in the same place on the inner wheel arch.

Where the two arcs cross drill a 5/16 hole and secure the frame using 5/16 UNF sets and repair washers and spacers as required.

The hood frame can now be raised and lowered, automatically returning to the correct closed and stored position.

10. Secure fabricated steel which is shaped to the contour of the rear edge of the side window to the frame using domed headed 1/4 UNF sets.

It is important that this moulding closely follows the contour of the window and is equivalent from it throughout its length. This will ensure a good seal at this point. Check the operation of the hood frame to ensure no fouling of the bodywork when lowering the frame.

11. Mark the centre of hood cover and the rear and fit a 'tenex' fastener.
12. Mark centre of body at rear on the hood fixing flange and fix stud.

13. Fit remaining tenex fasteners symmetrically from the centre at distances of 10", 10", 5" and 5" from each other, working outwards.

14. Fix studs to body to correspond with these fasteners but do not over stretch the hood as this will cause wrinkling of the rear window.

15. Fix hood cover to car.

16. Apply contact adhesive to a 2" strip at front of the fibreglass moulding and to front of hood cover and then, usually with 2 helpers, stretch hood cover and secure to moulding.

Ensure the material is pulled down at the sides near the windscreen pillar cappings so that the fibre glass moulding cannot be seen and the cover fits as close to the side window as possible.

17. Secure hood to moulding at side adjacent to back edge of side windows with contact adhesive pulling down well and extending slits in material as necessary to achieve a good fit. The material should be lapped right around the moulding and will be additionally secured with the side frame clip on seal which is clipped to the flange of this moulding.

18. Stow hood and then complete sticking the hood material to the channel which sits down on to the windscreen top chrome.

19. Install hood front seal in this channel.

20. Erect hood and stick flaps inside the car to the hood frame cross members.

21. Fit final studs and tenex fasteners to flaps inside the car adjacent to the hood frame mounting brackets.

SECTION R

SUSPENSION SETTINGS

The suspension should be finally set when the car has been completed. It is advisable to set the suspension to the correct settings, drive the car and then recheck all settings and retighten all bolts.

Settings:

FRONT

Ride height	211 mm (see below)
Castor angle	3.5 degrees positive on level ground
Camber angle	0.5 degrees negative to 0 degrees
Toe in	10-15 minutes toe in

REAR

Ride height	225 mm
Camber angle	0.5 degrees negative
Toe in	10-15 minutes toe in

Setting the ride height

(For the front measure from lower edge of centre cross tube on front bulkhead. For rear measure from underside of the tube running across the rear of the main cockpit.

Support rear diff, with no roll bar fitted at front. Set running height at the front equal for both sides. Connect the roll bar. Now remove the support from the diff and support the front and set the ride heights equal at the rear.