REAR SUSPENSION - DE DION

7.1. The De Dion kit as supplied by Caterham Cars includes all the parts necessary to assemble the De Dion axle including differential, hubs and brakes, drums on earlier cars, discs from early 1988.

It is possible to source some of the components second hand including the differential unit itself and the hub assemblies which are Ford Sierra items. The driveshafts, however, although using Sierra constant velocity joints, are specially manufactured for the Seven.

7.2. Installation of Differential

2.1 Before fitting the differential unit, the locating lug on the top rear of its casing must be removed since this can foul the De Dion tube at the full extent of its travel. No more than 3/4" should be removed from the lug . If too much metal is cut away there is a danger that the differential casing will be holed.

2.2 Fit the plastic breather pipe to the top of the diff unit ensuring the 'pips' are aligned.

2.3 Attach the propshaft to the nose of the differential using four special blue bolts, without washers, which are torqued to 42 lb ft using 'loctite' to make absolutely certain they do not

come loose in service. Before fitting this however, check that other end is a smooth sliding fit into the back of your gearbox. If not call Caterham at once.

2.4 Noting that the propshaft is an extremely tight fit in the transmission tunnel and its forward universal joint will only fit through one way up, insert it into the tunnel and hang the differential from its upper mounting using the 1/2" x 11" bolt, not securing at this stage.

2.5 The lower, forward mounting is attached to the chassis using two special 12mm x 65mm , 1/2" shank bolts with plain washers under the bolt heads. The differential has to be located centrally in the chassis and this can be achieved using the thin 7/8" diameter washers in equal numbers each side. Take care not to force too many washers between the chassis and differential since the small amount of free movement allowed by the rubber bushes will be eliminated, causing excessive noise and vibration to be transmitted into the car. However, all the play should be taken up by the washers.

It is advised that as a double check on the central location of the differential, you measure the distance between the outer edge of the differential and the inner edge of the outer chassis tubes which should be identical within 2mm.

2.6 Remove the 11" bolt from the upper mounting and centralise with washers in the same way. Tighten this to 40 lb ft.

2.7 Tighten the two lower mounting bolts to 40 lb. ft.

2.8 The rear mounting points on the differential are redundant on the Seven.

7.3. Assembly of De Dion Tube

It is perfectly possible to install the De Dion tube and the rear suspension with rear wings and petrol tank in place, but access is made considerably easier if they are removed, in particular the wings which are bolted on.

3.1 Place the De Dion tube into the chassis noting that the outer 'ears' face forward and the 'A' frame mounting downward. This is a tight squeeze between the differential and petrol tank.

3.2 Fit both driveshaft assemblies into place inserting their inner (unthreaded) ends into the differential taking care not to damage the seals. These are handed left (nearside for a RHD car) and right (offside).

3.3 Fit the rear taper roller bearings into the hub carriers. These bearings are identical and supplied as matched pairs. The outer housings should be pressed into the hub carriers using either a vice or gently tapped into place using a hammer and suitable drift taking care not to damage the bearing face.

Note that each bearing outer housing should be fitted with its smaller inner diameter innermost into the hub carrier.

The inner races and the hub itself should be liberally packed with grease and the races then pushed into place. The seals can now be pressed carefully into position. (see diagram 7.3.3.)

3.4 Position one of the cast aluminium De Dion ears (these are not handed) over one of the driveshafts and attach to the De Dion tube. Bolt this into place using the 10mm x 40mm bolts with plain and spring washers into the tapped holes which are rearmost on the De Dion tube ear. It is possible that these bolts will not go fully home due to the depth of thread available. Should this be the case, add an additional plain washer in order to space out the bolt. Do not fully tighten at this stage, but when you DO, use Loctite to ensure these bolts do not work loose in service.

Note that the countersunk small diameter holes in the ears are redundant and are for manufacturing purposes only.

3.5 Drum Braked Cars

Position the rear hub carrier into a brake back plate and slide the hub over the end of the driveshaft taking care not to damage the bearing seals. The brake back plate should be positioned with the hydraulic slave cylinder uppermost and the handbrake cable locating guide to the lower front. Bolt the hub through the backplate and onto the De Dion ear using 10mm x 55mm bolts, plain washers and nylocs at the front and 10mm x 65mm bolts and nylocs to the centre.

The plain washers should be positioned against the alloy ear, but are not needed on the steel De Dion tube. All these bolts, including those fitted in 3.4 above, should be tightened to 35 lb ft.

3.6 Drum Braked Cars

Slide one of the rear hubs onto the splined end of the driveshaft and ease into position through the seals into the hub carrier. Place a thick 22mm x 45mm diameter washer over the remaining thread and secure with the respective large nyloc nut (LH white insert, RH green insert), noting that the lefthand nut has a lefthand thread. These should be tightened to approximately 30 lb ft for the time being and will be quite stiff to wind up. The final torque on these nuts is 200 lb ft and this is most easily achieved with the car standing on its wheels and the brakes applied.

3.7 Disc Braked Cars

The assembly of the rear discs onto the De Dion axle is basically similar to the instructions contained in 7.3.5 and 7.3.6.

The De Dion ears are different however and include an additional flange to locate the brake calipers which operate onto the top of the disc. (see figure 7.3.7.)

The drive flanges are specially modified Ford items in order that brake discs identical to those fitted at the front can be attached.

The discs are bolted to these flanges using 4 3/8" x 5/8" UNF crown head bolts each side using Loctite and torqued to 30 lb ft

The hub carrier and bearing assemblies are identical to the drum braked car and are bolted to the De Dion ears in the normal way using 10mm x 55mm bolts plain washers and nylocs at the front and 10mm x 65mm bolts and nylocs at the rear tightening to 35 lb ft and not forgetting to tighten the rearmost bolts fitted in 7.3.4.

3.8 Disc Braked Cars

The rear hub flanges with discs fitted should be slid onto the splined end of the driveshaft and secured as in 7 3 6.

3.9 Disc Braked Cars

The brake calipers ars handed and should be fitted with the handbrake cable abutments towards the front of the car. Slide over the disc, separating the brake pads, and bolt into place on top of the De Dion ears using the 10mm x 55mm bolts with the spacers fitted between the ear and the caliper. Loctite should be used and the bolts tightened to 35 lb ft.

3.10 This operation should now be repeated for the opposite side

7.4. Assembly of Rear Suspension

4.1 Hang the rear spring/damper units from their mountings at the top of the spaceframe, noting that a washer/rubber bush/washer combination should be both above and below the mounting and secure with a 3/8" UNF plain nut, noting that there are two of these each side. Do NOT fully tighten at this stage.

4.2 Twist the damper units so that the adjusting screws face inward toward the centre of the car and slide a greased 1/2" x $5\frac{1}{2}$" bolt through the De Dion tube from the rear and secure the damper to the tube using a plain washer either side of the bush with a thin nyloc nut.

4.3 Fit the radius arms to the chassis (offset inwards) at the forward end of the wheelarch using 3/8" x $3\frac{1}{2}$" plated caphead bolts passed outward from the cockpit and secure with plain washers on the outside of the radius rod bushes and nyloc nuts. Do NOT tighten at this stage. It may be necessary to trim the wing flange to gain adequate clearance around the radius arm front mounting.

4.4 Attach the rear end of the radius rods to the brackets on top of the De Dion tube using 1/2" x $2\frac{1}{2}$" bolts and nylocs passed outward from the centre of the car, not tightened as yet.

4.5 The 'A' frame can now be fitted (either side up) to the

General View Rear Disc Brake Assembly

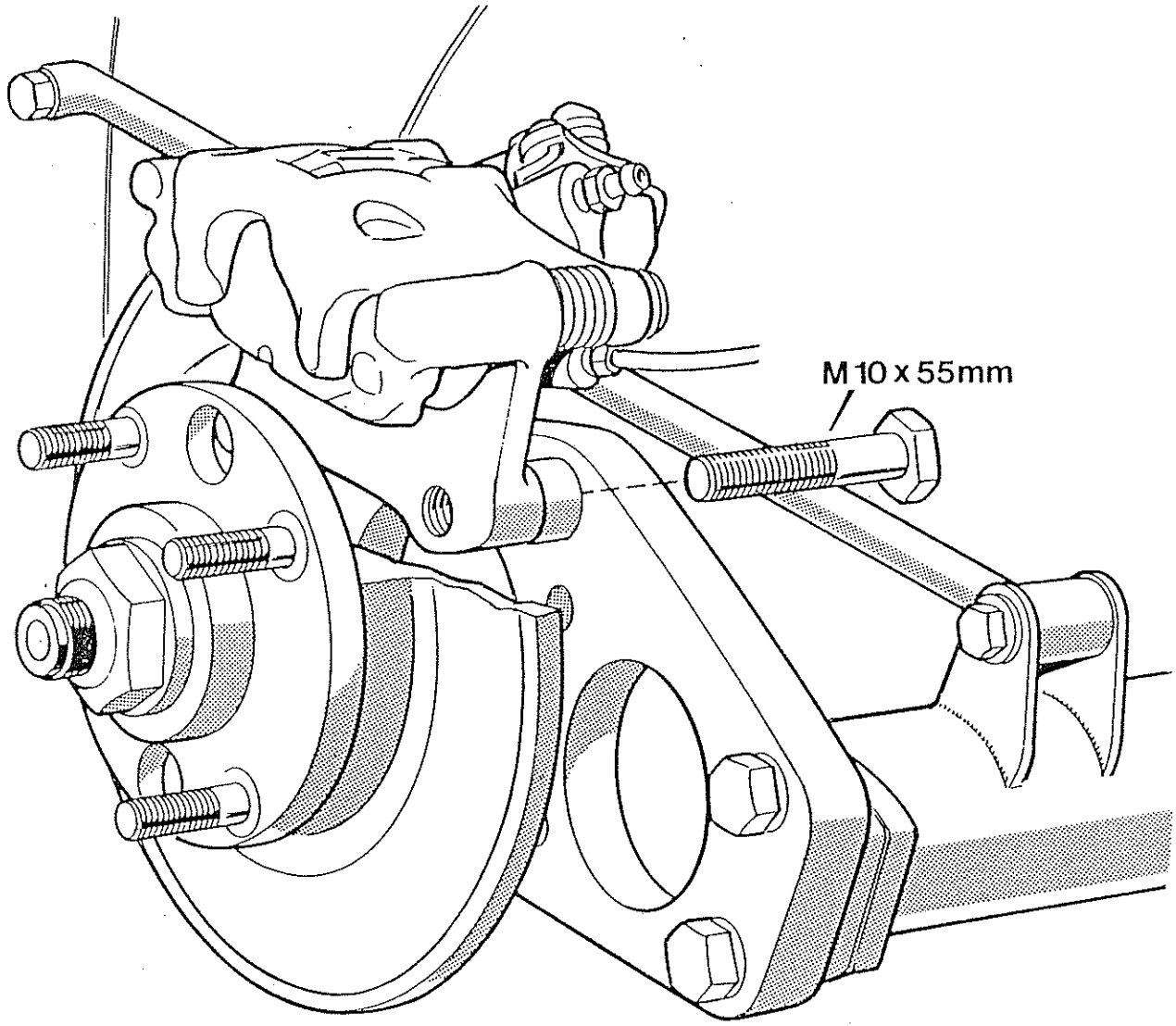


Fig. 7.3.7A

De Dion Rear Hub Assembly - Disc Brakes
(viewed from above)

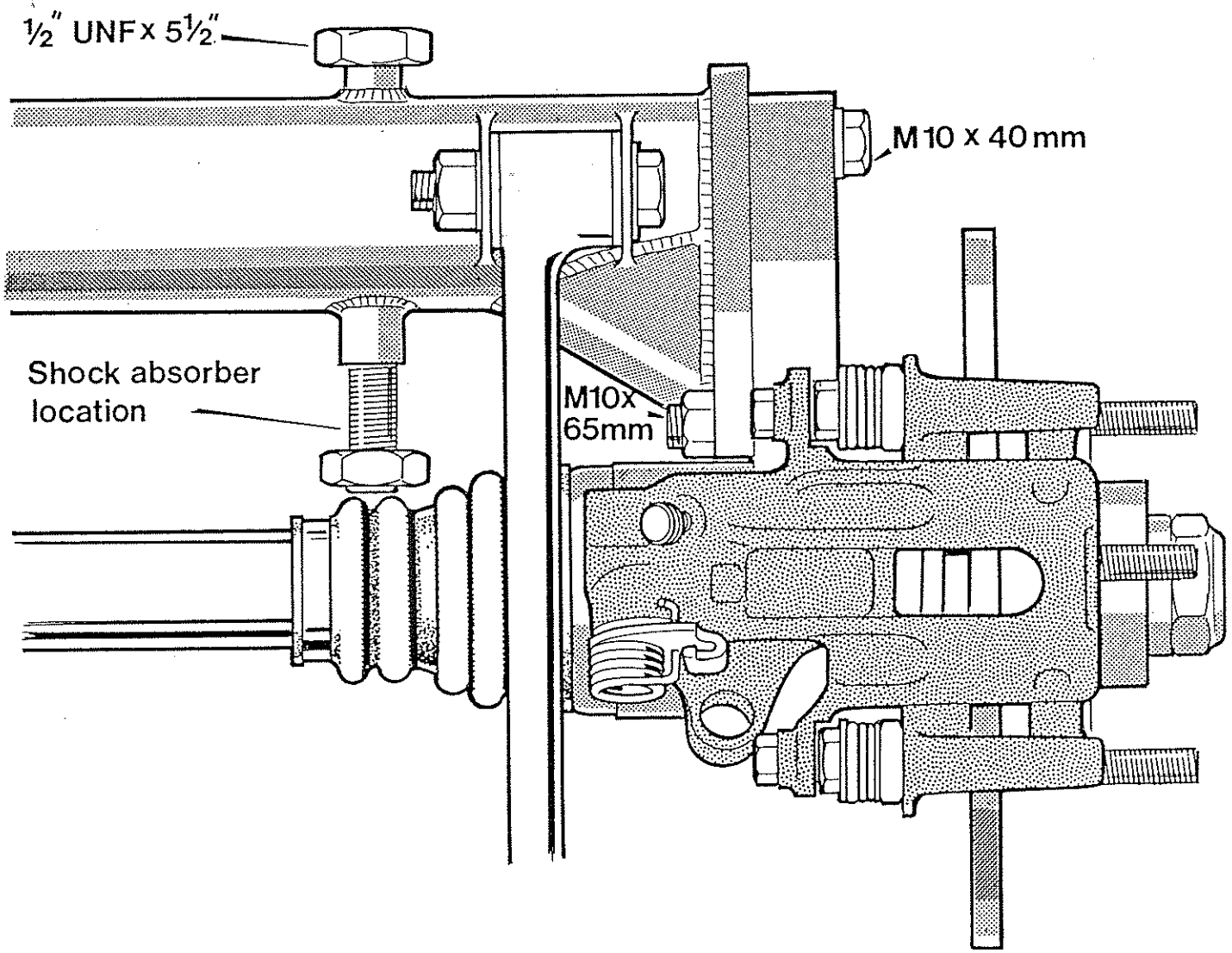
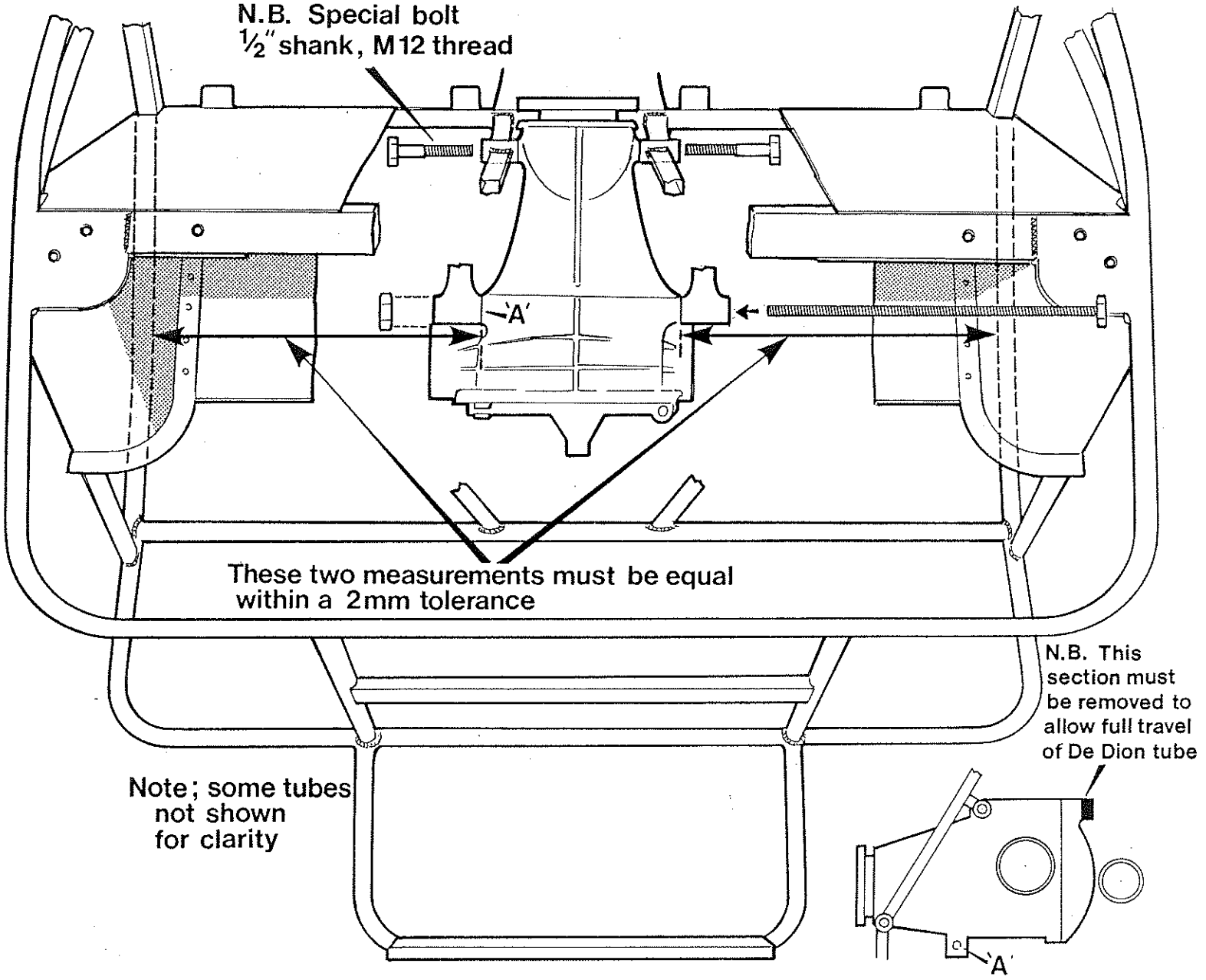


Fig 7.3.7B

Position of Differential Unit



lower chassis tube at the front of the rear axle bay, using 1/2" x 4" bolts, plain washers and nylocs. This should be carefully centralised by using thin washers between the outside of the 'A' frame and the inside of the chassis, and you should also ensure that all side to side free movement is eliminated. Again, do not fully tighten yet.

4.6 Fit two rubber/metal half bushes into the socket at the rear of the 'A' frame and fit this up into the bracket hanging downwards from the De Dion tube, securing with a 1/2" x $4\frac{1}{2}$" bolt and nyloc. This will be a somewhat tight fit since the bushes need to be compressed into their socket before the resultant assembly can be fitted to the De Dion tube and we recommend using rubberlube on the bushes to aid compression. It may be helpful to use two thin strips of metal each side of the De Dion bracket in order to 'shoehorn' the 'A' frame into position.

4.7 To check that the De Dion tube is centralised in the chassis measure the gaps between the De Dion ears and the outer edge of the chassis tubes which should be identical to within 2mm.

7.5. Final Assembly

5.1 Fit the brass brake pipe union to the threaded stud protruding from the De Dion tube, input uppermost, and attach using a 1/4" UNF nyloc nut and spacer.

5.2 Bend the steel brake pipes to fit as tightly as possible to the De Dion tube and attach to both the union and respective slave cylinder or brake caliper, tightening to 5-7 lb ft. This tubing is readily bent by hand, but take care to avoid any sharp kinks or bends of less than 1" radius since this can lead to weakening and possible brake failure. Due to the design of the calipers (disc braked cars only) a small amount of movement needs to be taken up as the pads wear and therefore the brake pipes where they enter the caliper should not be bent tighter than a 3 to 4 inch radius.

5.3 Secure the brake pipes to the De Dion tube using the long ty-wraps provided and check carefully that the pipes do not foul any part of the suspension or chassis. The pipe must run along the top of the tube, not the front.

5.4 Drum Braked Cars

The handbrake cable can now be fitted. This is double ended and is designed to be attached to both rear drums and to be pulled from the centre by the separate forward cable attached to the handbrake lever itself. (see Miscellaneous section). Feed the centre of the cable (inner only) up through the transmission tunnel and note that location points are provided for the cable outers at the differential end of the tunnel.

Unscrew the knurled nyloc adjusters on the cable to ensure plenty of slack. Fit each end of the cable into the respective brake drum, noting that the cables are above both 'A' frame and

lower chassis rail. The nipples on the end of each half of the cable fit into the rear brake shoes which do not need to be removed, merely sprung out of place. The cable outer is secured by the brake back plate.

Do not remove the clip on the shoe retaining pin as this is not necessary and may lead to the pin falling between the backplate and the aluminium ear where its retrieval is difficult.

Lastly, the rubber grommets which have been fed over both ends of the cable should be attached to the chassis diagonal tubes using Ty-wraps. This prevents the cables from contacting the driveshafts or the chassis tubes as the suspension moves.

5.5 The brake drums can now be fitted.

5.6 Disc Braked Cars

The handbrake cable is supplied with different fittings at the caliper ends to those supplied with drum braked cars and is therefore not interchangeable.

Feed the inner ends of the cable through the abutments in the caliper and hook over the brake levers. Otherwise adjust as in 7.5.4.

5.7 In order to avoid any incorrect preloading of the rubber bushes in the suspension, the securing bolts should be tightened with either the wheels on the ground or the car's weight taken by the De Dion tube. Axle stands are ideal for this purpose.

5.8 Tighten firstly the damper mountings to the chassis using the lower 3/8" UNF nut until the rubber bush assumes the same diameter as that of the washers holding it. Lock this nut with the second identical one and lastly place a black rubber cap over the protruding thread.

5.9 Tighten all the bolts through rubber bushes securing the rear suspensionn as follows.. The 1/2" bolts should be tightened to 40 lb ft and the 3/8" bolts to 35 lb ft.

5.10 Finally, with the wheels on the ground and the brakes on, torque the rear hub nuts to 200 lb ft. Since most domestic torque wrenches do not reach this figure, it may be necessary to visit your local garage for assistance.

Rear Hub Assembly - De Dion Rear Suspension
(Viewed from below)

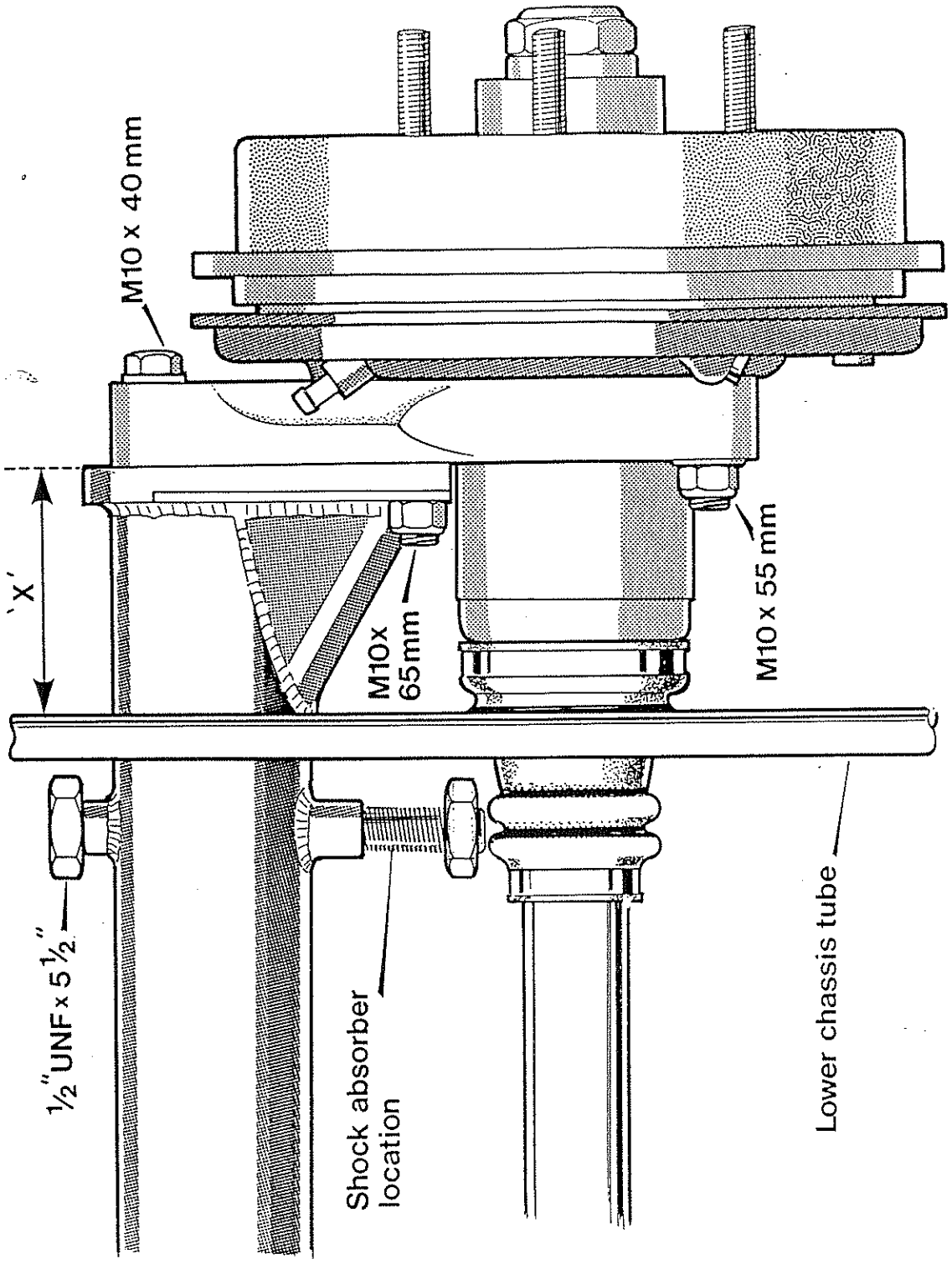


Fig. 7.3.4 - 5