Plated

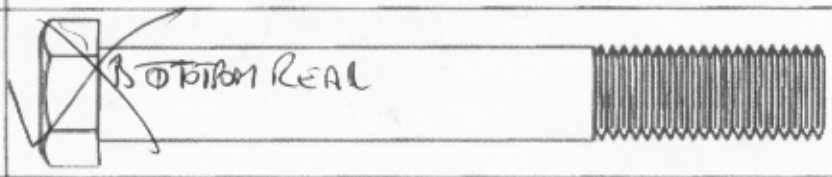
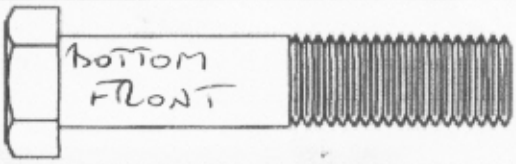
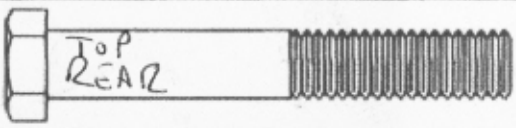
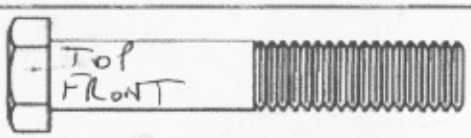
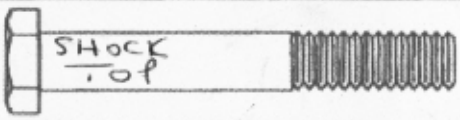
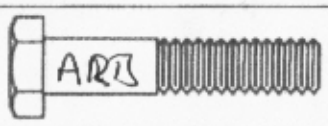
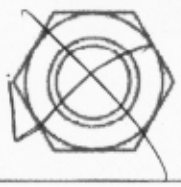
SERIAL NUMBER: **08A** V-Grade

300325

PACK NUMBER: **ZFS14**

FASTENER PACK - FRONT SUSPENSION (All DeDion Cars)

Please note: This pack may include extra fasteners to cover different options.

DESCRIPTION	PART NO.	QTY	ILLUSTRATION (Actual Size)
Bolt 1/2" x 4" with plain section & Imperial (fine) threaded section	BF 1/2 x 4 V-Grade 10.9 **1**	2	
Bolt 1/2" x 2 1/2" with plain section & Imperial (fine) threaded section	BF 1/2 x 2 1/2 V-Grade 10.9 **2**	2	
Bolt 3/8" x 2 1/2" with plain section & Imperial (fine) threaded section	BF 3/8 x 2 1/2 V-Grade 10.9 **3**	2	
Bolt 3/8" x 2 1/4" with plain section & Imperial (fine) threaded section	BF 3/8 x 2 1/4 V-Grade 10.9 **4**	2	
Bolt 5/16" x 2 1/4" with plain section & Imperial (fine) threaded section	BF 5/16 x 2 1/4 V-Grade 10.9 **5**	2	
Bolt 5/16" x 1 1/2" with plain section & Imperial (fine) threaded section	BF 5/16 x 1 1/2 V-Grade 10.9 **6**	4	
Nut 1/2" Half Nut with Imperial thread & nyloc locking mechanism	NFYH 1/2 for 1 & 2 **7**	4	
Nut 3/8" Nut with Imperial thread & nyloc locking mechanism	NFYF 3/8 TOP U/B FOR **9**	4	
Washer 5/16" Plain Washer Heavy Duty	WPH 5/16 TOP SHOCK **11**	2	
Washer 1/2" x 1.1/8" Plain Washer Chamfered	WPH 1/2 **8**	18	
Washer 1/2" Spring Washer Heavy Duty	WSH 1/2 BOTTOM FRONT **10**	2	
Washer 5/16" Spring Washer Heavy Duty	WSH 5/16 ARB **12** TOP SHOCK	6	

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FINAL TIGHTENING

20 Tighten the fixings detailed in Table 1 now.

TABLE 1 TORQUE FIGURES

Location	Washer	Torque
Stub axle		60 lbft (82 Nm)
Damper to lower wishbone (lower fixing)		15 lbft (20 Nm)
Damper to chassis (top fixing)		15 lbft (20 Nm)
Front anti-roll bar fixing		15 lbft (20 Nm)
Upright top ball joint	None	45 lbft (48 Nm)
Upright - bottom	Spacer - wide track only	45 lbft (61 Nm)

21 The remaining front suspension fixings should not be tightened until the suspension is loaded. This is achieved when the engine is in place and the car wheels are on the ground. This ensures that the rubber bushes are correctly preloaded. All bolts should then be tightened according to Table 2.

TABLE 2 TORQUE FIGURES

Location	Washer	Torque
Lower wishbone front	Spring under head then plain as shown in Fig 3 and Fig 4	60 lbft (82 Nm)
Lower wishbone rear	Plain spacers as shown in Fig 3 and Fig 4	60 lbft (82 Nm)
Upper wishbone front	None	25 lbft (34 Nm)
Upper wishbone rear	None	25 lbft (34 Nm)

CARS FITTED WITH ADJUSTABLE DAMPER PLATFORM

22 Cars fitted with adjustable damper platforms should be set to have a ride height of a minimum 75 mm under the sump with driver and passenger aboard. The rear of the car should then be adjusted to be approximately 15 mm higher than the front. This is achieved by lowering or raising the height of the platforms on the collar. Lower the collar to decrease ride height, raise the collars to increase ride height. At the end of adjustments ensure that the collars are locked together to avoid movement.

WARNING

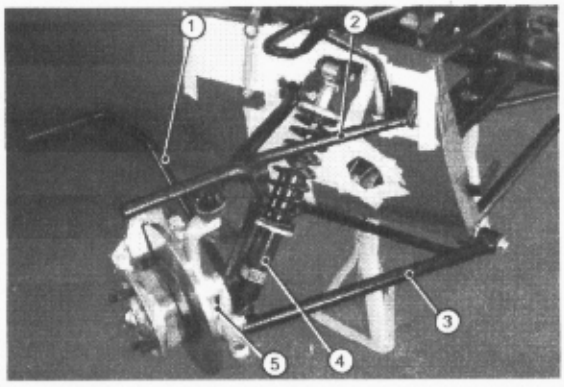
Correct use of fixings is required in order to ensure full engagement of the nyloc nut.

- **Wide track**. The upright is located into the spherical joint on the lower wishbone. Prior to locating the upright, a spacer (5/8" mm id x 3/4" od x 8mm) located in the polythene bag marked 'front suspension') must be inserted onto the bottom of the upright. The upright is secured using the special turned down nyloc nut supplied. Tighten the special nyloc nut to 40 lbft (54 Nm).

13 Pass the top wishbone ball joint down through the top of the upright and through the wingstay. Secure using the M14 nyloc nut. Tighten the nyloc nut to 45 lbft (61 Nm). To help the taper to grip in the vertical link smear a small amount of grease onto the tapered part of the ball joint and apply pressure to the top forcing it into the tapered part of the vertical link as tightly as possible. (Under no circumstances should this part be hit with a hammer).

14 Ensure the upright turns freely on the wishbones.

15 Your front suspension should now resemble that shown in Fig 4.



1 Cycle wing stay
2 Upper wishbone
3 Lower wishbone
4 Spring damper unit
5 Upright assembly

Fig 4 Front suspension (anti-roll bar not fitted)

FRONT ANTI-ROLL BAR

16 The anti-roll bar is attached to the front of the chassis using the special mounting brackets and cotton reel shaped bushes (supplied in the polythene bag marked 'front suspension'). Liberally coat the bushes with rubber lubricant and fit the bushes into the brackets. Slide the brackets over the ends of the anti-roll bar and around so they will align with the holes drilled in the front face of the chassis tube.

NOTE

Check that the colour of the bushes corresponds to the colour marked on the front anti-roll bar.

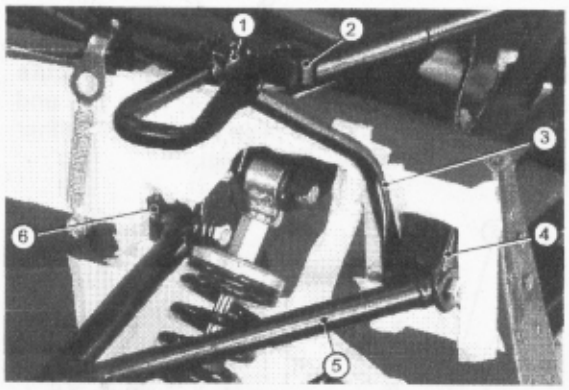
17 The rubber boots should be slid over the anti-roll bar, ensuring that the larger diameter of the rubber boot is outboard. Apply loctite to one end of the two threaded studs and screw into the threaded holes at each end of the anti-roll bar so that 15-18 mm of thread is left protruding. The plastic balls are fitted onto the threaded ends and tightened using protected grips. Ensure loctite is applied.

NOTE

With the smaller diameter front anti-roll bars the threaded stud is an integral part of the bar so only the rubber boots and the balls need to be fitted as described above.

18 Liberally coat the balls with bearing grease. Assemble the anti-roll bar onto the chassis by pushing the plastic balls, one at a time, into the mounting cups in the upper wishbones. Fit the spring washers (12) to the bolts (6) and pass forward through the vertical chassis tubes and into the captive nuts on the mounting brackets. Tighten to 15 lbft.

19 The rubber boots are slid over the plastic balls and secured to the top wishbone using cable ties which fit into the grooves provided. A further cable tie is used to hold the boot onto the anti-roll bar itself with the tails of the cable tie being cut off underneath for neatness.



1 Chassis mounting headlight bracket
2 Headlight bracket
3 Headlight bracket front arm
4 Upper wishbone front mount
5 Upper wishbone
6 Upper wishbone rear mount

Fig 3 Upper wishbone securing

8 The front leg of the upper wishbone is secured to the front mount using bolt (4). Prior to inserting the bolt the headlight bracket rear arm must be inserted into the chassis mount. The front arm is secured at the rear of the upper wishbone front mounting by nut (9). Do not tighten fixings.

SPRING DAMPER UNITS

9 An aluminium spacer bush 5/16" id x 1/2" od x 32 mm (polythene bag marked 'front suspension') must be coated in copper slip and inserted into the top mounting bush of the front spring damper unit. The spring damper is secured to the top mounting by bolt (5) with a plain washer (11) and a spring washer (12) under the bolt head.

NOTES

(1) It is necessary to gently press the body panel inwards to allow sufficient clearance for the bolt to be located.

(2) To prevent damage to the paintwork it is recommended that the plain washer and spring washer are placed closest to the spring damper mounting during bolt location.

10 An aluminium spacer 5/16" id x 1/2" od x 32 mm must be coated in copper slip and inserted into the lower mounting bush of the spring damper unit. The spring damper unit is secured using a 5/16" caphead bolt (supplied in wishbone) which passes through the rear leg of the lower wishbone through the aluminium spacer bush and into a captive thread on the front leg. This bolt should be torqued to 15 lbft (20 Nm).

NOTE

Do not tighten any other fixings at this stage.

UPRIGHT ATTACHMENT

WARNING

Correct use of fixtures is required to ensure full engagement of nyloc nut.

11 The cycle wing stay locates on the upright. Remove the 1/2" UNF nyloc nut and plain washer fitted to the stub axle and discard. Place cycle wing stay over the stub axle and secured using the thin 1/2" UNF nyloc provided.

12 Remove and retain the upper wishbone ball joint nyloc nut and the nyloc nut from the bottom of the upright assembly. The upright assembly must be mounted with the steering arm facing forward. Mount the upright assembly as follows:

NOTE

The upright assemblies are marked RHS or LHS on the inside of the assembly.

- **Standard**. The upright is located into the spherical joint on the lower wishbone and secured using the retained 1/2" nyloc nut. Tighten the nyloc nut to 40 lbft (54 Nm).

SECTION 3 - FRONT SUSPENSION

PREPARATION

1 It is recommended that the front wings are left unfitted until the front suspension is assembled and the engine installed. This will ensure that easy access to the engine bay etc is maintained.

2 When assembling the front suspension, there is a risk that the aluminium body skin can be damaged, especially when fitting the top mounting bolts and the spring damper units. It is therefore advisable, particularly with painted cars, to protect the bodywork with 2 or 3 layers of masking tape in key areas. It is recommended that the bodywork under the front bonnet catches is protected using card and masking tape. Fig 1 refers.

3 Apply a thin coat of copper slip to all fixings prior to fitment.

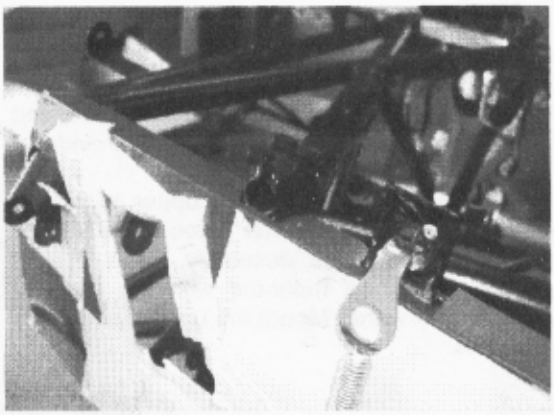


Fig 1 Bodywork protection

LOWER WISHBONES

WARNING

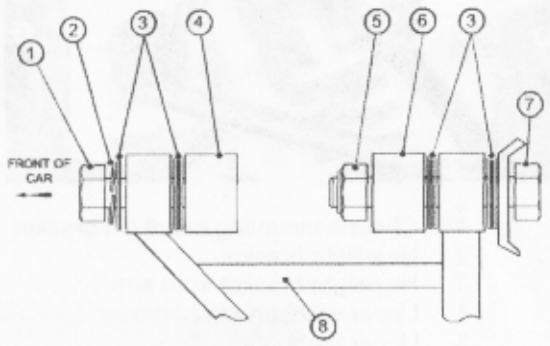
Never work underneath a car without supporting it on axle stands or equivalent. Do not rely on a jack alone.

4 The lower wishbones are assembled with the longer leg forward and the circlip facing downward.

NOTE

Ensure the circlip is correctly located in the retaining groove prior to assembling the lower wishbone.

5 Fit the rear leg of the lower wishbone through the slot in the bottom skin immediately behind the vertical chassis member. Secure using bolt (Fastener pack ZFS14, Item (1)) and nut (7) and inserting two plain washers (8) either side of the wishbone. Fig 2 refers.



1 Bolt
2 Spring washer
3 Plain washer
4 Front chassis mount
5 Nyloc nut
6 Rear chassis mount
7 Bolt
8 Lower wishbone

Fig 2 Washer usage - lower wishbone

6 The front leg of the lower wishbone is secured to the front of the chassis using bolt (2), with washer (8) and spring washer (10) next to the bolt head. Two washers (8) are inserted between the wishbone and the chassis, Fig 2 refers.

UPPER WISHBONES

7 The upper wishbones are handed and are assembled with the longer leg facing the front of the car. Prior to locating the upper wishbone a spacer bush 3/8" id x 1/2" od x 35 mm (polythene bag marked 'front suspension'), must be inserted into the rear bush. The rear leg of the upper wishbone (Fig 3 refers) is secured to the rear mount using bolts (3) inserted from the front of the mounting. The spacer bush must be coated with copper slip. The bolt is secured with a nut (9). Do not tighten fixings.

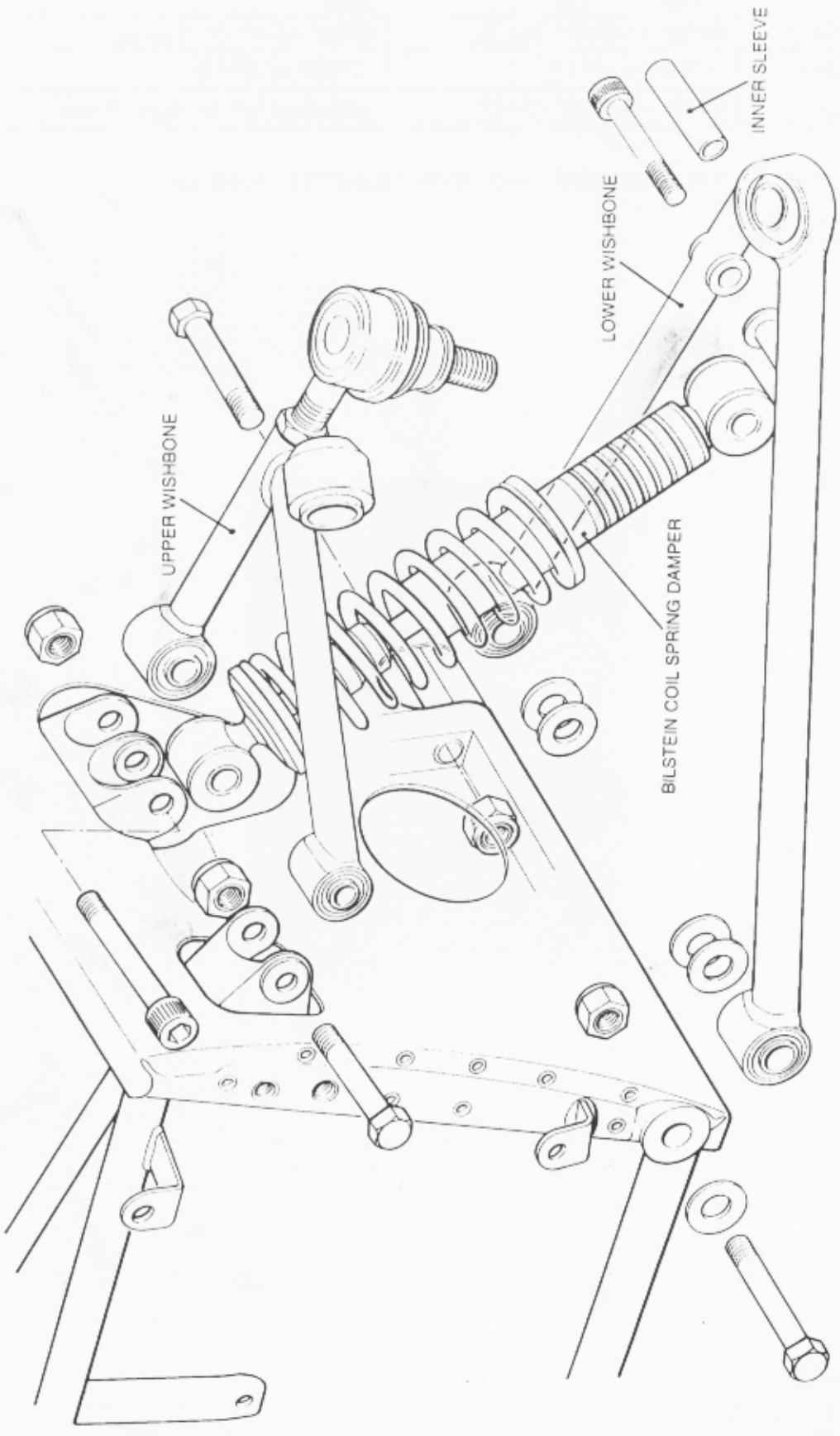


Figure 5A.1 Front Suspension Assembly - De Dion

	Front	Rear
Tracking	**0°20'** +/-0°10' Toe In	**0°30'** +/-0°15" Toe In
Camber	**-1°00'** +/-0°15'	**-1°00'** +/-0°15'
Castor	**3°30'** +/-1°00' (0°45'	variation left to right, Front)

Table 5A.7 Recommended Suspension Alignment - road use

5A.6 Final Tightening

6.1 The front suspension fixings should not be tightened until the engine is in place and the car's wheels are on the ground. This ensures that the rubber bushes are correctly preloaded and optimises handling. All bolts should be torqued according to table 5A.6

Bolt Size	Usage	Torque
1/2"UNF x 3 1/2"	Damper / upper wishbone mount	60 lbft
3/8"UNF x 2"	Upper wishbone - forward mount	20-25 lbft
1/2"UNF x 4"	Lower wishbone mounts	60 lbft
5/16"UNF x 2 3/4"	Lower wishbone to damper	12-15 lbft
M14 nyloc	upper balljoint	20-25 lbft
1/2" nyloc	lower wishbone to upright	40 lbft
5/16"UNF x 1 1/2"	Anti-roll bar brackets	12-15 lbft

Table 5A.6 Front Suspension Torques - De Dion

5A.7 Suspension Alignment

7.1 The front suspension is adjustable for both camber and castor angles and though the top wishbones normally come from the factory pre-adjusted you may wish to reset or change the basic settings. Factory recommended settings are therefore shown in the following table .

7.2 For your information, increased negative camber will tend to improve the car's turn in characteristics in fast corners but at the expense of possible tramlining on uneven surfaces and uneven tyre wear under normal conditions. The factory settings should therefore be adhered to except where the car is being prepared for motor sport.

7.3 The adjustment of castor is achieved by moving the lower front wishbone backwards or forwards in the chassis using spacing washers, therefore altering the effective kingpin angle in side elevation. Increasing the angle away from vertical will produce more pronounced self centring of the steering and hence a greater feeling of stability, but at the expense of heavier steering.

The Caterham factory has considerable experience with this suspension and would recommend distinctly different settings for race, hillclimb or sprint applications. For instance there is a range of different anti-roll bars available Contact Reg Price or Jez Coates at Dartford on 01322 559124 if you need advice.

5A.4 Front Upright Attachment

4.1 The ends of the top wishbones are threaded and the adjustable ball joints will have been fitted at the factory and set to the correct roadgoing camber settings. Do not therefore slacken the M16 fine thread lock nuts which prevent the joints from screwing in and out of the wishbones or the factory settings will be lost, leading to possible unbalanced handling and excessive tyre wear. However, for competition purposes, it does facilitate the re-setting of camber angles to fine tune the car's handling. Please check the locknuts for tightness.

4.2 The completed front upright assembly slots into the spherical joint in the lower wishbone, steering arm facing forward, and hangs from the ball joint secured with a M14 nyloc nut which must be tightened to 20-25 lbft. The bottom of the upright is secured using a 1/2" nyloc nut which is tightened to 40 lbft. Check that the upright swivels freely when tightened. Cycle wingstays should be fitted to the upright before the upright is assembled onto the car. (see section 4.3.3)

4.3 If the upper balljoint nyloc nut cannot be fully tightened because the balljoint is rotating, the taper of the balljoint has not fully engaged in the upright. To get around this, gently tap the balljoint into the upright with a soft faced hammer.

5A.5 Front Anti-roll Bar Attachment

5.1 The anti-roll bar is attached to the front of the chassis using special mounting brackets and cotton reel shaped rubber bushes. Fit the bushes into the brackets using plenty of rubber-lube and, again using lube, slide both brackets over the ends of the anti-roll bar and round until they align with the holes drilled in the front face of the chassis tubes.

5.2 When these mountings have been fitted onto the bar, the rubber boots and their securing bands should be slid over the anti-roll bar, ensuring that the larger diameter of the boot is outboard. Apply Loctite to the 10mm stud, then screw the plastic ball fully home. Now screw the plastic ball and stud into the threaded end of the anti-roll bar. Liberally coat the balls with grease. Do not fit the stud to the bar first, as this will leave insufficient thread to support the ball.

5.3 Assemble the anti-roll bar onto the chassis by pushing the plastic balls, one end at a time, into the mounting cups in the top wishbones and hold it in place using 5/16" x 1 1/2" bolts passed forward through the vertical chassis tubes and into the captive nuts on the mounting brackets, again using "Loctite". These bolts can be tightened immediately.

5.4 The rubber boots are slid over the plastic balls and secured to the top wishbone using the plastic bands which slip over the boot and hold it into the machined grooves provided. A smaller band is used to hold the boot onto the anti-roll bar itself.

2.3 DO NOT TIGHTEN any fixings at this stage and in particular be aware that cars fitted with clamshell wings, the wingstays are fitted using the same 1/2" caphead bolts as the dampers. Refer to Miscellaneous Section 9.16.1.

5A.3 Front Suspension - Lower

3.1 The front lower wishbones are handed, and are assembled with the longer arm forward and the circlip downward, as per Fig 5A.1. Each wishbone is fitted with a 1 3/16" OD, 5/8" ID spherical joint which is held in place with a circlip. Take care to ensure that this circlip is correctly located.

3.2 Fit the rear leg of the wishbone in place through the slot in the lower bodywork immediately behind the vertical chassis member and attach using a 1/2" x 4" bolt, plain 1 1/8" washers and nyloc, the bolt facing backward with two 3mm thick washers on either side of the wishbone as in figure 5A.3.2.

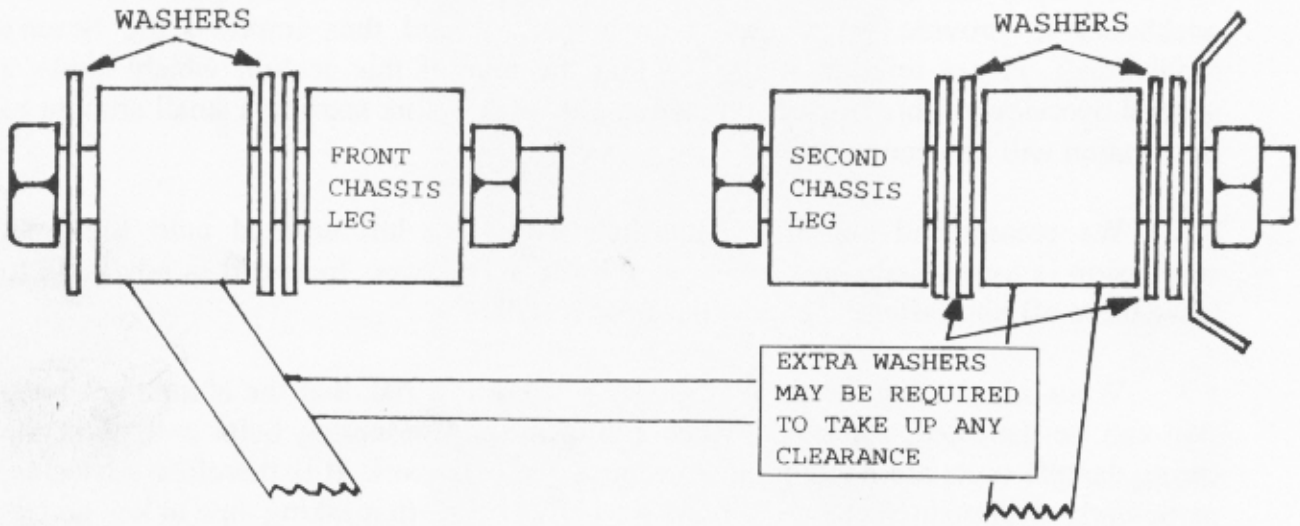


Figure 5A.3.2 Washer Usage - Left Hand Lower Wishbone

3.3 The front leg attaches similarly to the front of the chassis using a 1/2" x 4" bolt, plain 1 1/8" washers and nyloc facing rearwards with both a washer under its head and two 3mm washers between the wishbone and the front of the chassis.

3.4 You will note that the distribution of these washers may need to be altered to allow for any tolerances in the wishbone. Redistribution will also enable subsequent adjustment of castor angles.

3.5 The spring damper unit is attached to the lower wishbone using a 5/16" x 2 3/4" caphead bolt which passes through the rear leg of the wishbone, through a 1/2" OD aluminium bush which fits into the lower damper eye, and into a captive thread in the front leg. This bolt requires no washer, but should be "Loctited" in place.

DO NOT TIGHTEN any fixings at this stage.

SECTION 5A

FRONT SUSPENSION DE DION

Contents

5A.1 Preparation
5A.2 Front Suspension - Upper
5A.3 Front Suspension - Lower
5A.4 Front Upright Attachment
5A.5 Front Anti-Roll Bar Attachment
5A.6 Final Tightening
5A.7 Suspension Alignment

5A.1 Preparation

1.1 De Dion cars are fitted with a revised front suspension incorporating double wishbones to provide better Castor angle control and thus improve the Seven's roadholding. Please refer to figure 5A.1 at the rear of this section which shows a general overview of this suspension layout. However before starting a small amount of preparation will be necessary.

1.2 We recommend that front clamshell wings are left unfitted until the front suspension is assembled since access is considerably easier. Indeed it is advisable to leave these off until after the engine has been installed.

1.3 When assembling the front suspension, there is a risk that the aluminium body skin can be damaged, especially when fitting the top mounting bolts and when the spring damper units are hanging down against the bodywork. It is therefore advisable, particularly with painted cars, to protect the bodywork with masking tape in key areas.

5A.2 Front Suspension - Upper

2.1 Using a 1/2" x 3 1/2" caphead bolt, washer and half nyloc, assemble the Bilstein coil spring damper unit and the rear leg of the upper wishbone onto the upper mounting bracket on the chassis, the wishbone slotting into the mounting located behind the damper. Feed the bolt in from the front, taking great care not to damage the body skin. At the same time, the forward end of the upper wishbone should be slotted into place in the mounting bracket on the chassis and attached using a 3/8" x 2" bolt and nyloc.

2.2 If racing specification Bilstein dampers have been chosen these should be fitted with their threaded ends downwards so that coil springs can be changed without removing the dampers from the chassis.