SECTION
H
FRONT SUSPENSION - STEERING

SECTION H

FRONT SUSPENSION AND STEERING

STEERING GEOMETRY - STEERING COLUMN AND BOX - SIDE AND CROSS STEERING TUBES - CENTRE STEERING LEVER AND SWIVEL PIN HOUSING ASSEMBLY - STUB AXLES - PIVOT PINS - YOKES - FRONT SPRINGS - LOWER TRIANGLE LEVERS - TORQUE ARMS - FRONT SHOCK DAMPERS

SECTION H

FRONT SUSPENSION AND STEERING

List of Illustrations:

STEERING AND FRONT SUSPENSION

GENERAL:

The steering is of the cam and roller type. A double toothed follower roller mounted in the jaws of the rocking shaft, engages with the cam, this being a modified form of worm gear.

The independent front wheel suspension system consists of the two upper and two lower radius arms, of different lengths, set at a leading angle, with open type coil springs mounted between the forward lower radius arms and the chassis frame. Each lower radius arm consists of a front lever operating in a Silentbloc rubber bearing at its inner end and a torque arm operating in a spherical rubber bearing at the rear end.

The upper radius arms also constitute the arms for the double acting hydraulic shock dampers.

Mounted between the radius arms are the vertical yokes on which the stub axles are pivoted.

A steel torsion-rod stabiliser, anti-roll bar, is provided, mounted in rubber bearings and coupled to the wheel mountings by links and rubber pads.

The front wheels and hubs being rubber insulated in relation to the rest of the chassis, it is important that the rubber bushes should be in 'a normal state of compression' when checking the geometry.

STEERING GEOMETRY:

Commencing Bentley chassis B-1-GT, Silver Wraith chassis WME-1, and Silver Dawn chassis SCA-1, the steering geometry was modified to provide greater steering accuracy. It is not possible to apply the revised design to earlier chassis.

The changes in the revised design are:-

1. The lower yoke bearings at the outer ends of the lower triangle levers have been raised 1.500", thus reducing the angularity of the lower triangle levers by 1.100" and increasing the ground clearance. The angularity of the upper triangle levers has been similarly reduced.

   Thus, the upper triangle lever assembly of the front shock dampers is not interchangeable with the assembly fitted to earlier series chassis owing to the different angular setting of the lever in relation to the main shaft of the lever.

2. The effective radius of the track rods and their angularity has been increased by interposing a third section between the two swinging track rods, involving the use of an extra steering lever on the front pan.

3. The free and loaded length of the front suspension springs is reduced by .600", but the number of coils and the rating remain the same.

4. The off-set of the point of contact of the tyres from the projected centre line of the pivots is reduced, to reduce any disturbance of the steering should one brake to more effective than the other.

5. The steering drop arm has been shortened to lighten the steering.

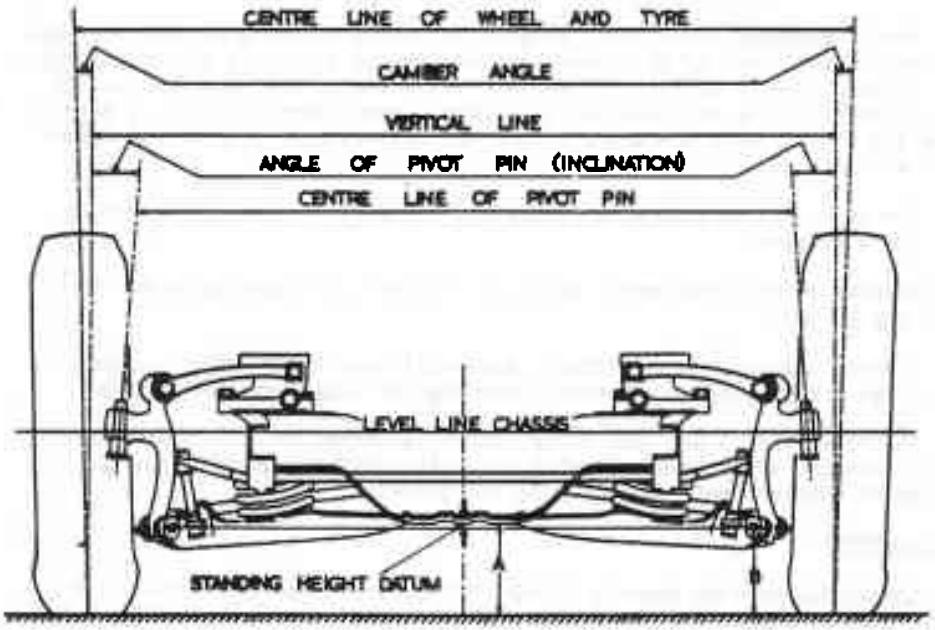


FIG.H1. STEERING GEOMETRY.

STANDING HEIGHT:

As shown in Fig. H1, the standing height is the difference between the dimensions "A" and "B".

To check the measurement:-

1. The car should be unladen, i.e. less driver and passengers, but with five gallons of petrol in the tank, and standing on level ground.

2. Check front and rear tyre pressures and correct.

3. Measure distance from ground to the underside (centre rib) of the centre plate of the front pan - Dimension "A".

4. Measure the distance from the ground to the centre of the lower bearing of the yoke, i.e. the centre of the bolt which passes through the bearing - Dimension "B".

5. Subtract "B" from "A" and record the reading obtained.

A negative reading is when dimension "B" is greater than "A". A positive reading is when dimension "A" is greater than dimension "B".

The limits for standing height are:-

Bentley and Silver Dawn:

Standard Springs	.700" to 1.350" positive	- early chassis
Standard Springs	.400" negative to .200" positive	- later chassis
Colonial Spring	1.350" to 2.050" positive	- early chassis
Colonial Springs	.600" positive to 1.200" positive	- later chassis

Silver Wraith:

1.150" to 2.150" positive	- early chassis
.300" to .900" positive	- later chassis

Phantom IV:

1.150" to 2.100" positive

Adjustment:-

No precise instructions can be laid down, each car must be individually considered in relation to the weight on the front wheels and the poundage of the springs fitted. Certain packing washers may be fitted but extra packing washers should not be added before consulting the Main Service Station. It is however, permissible to remove any packing washers to lower the car. The standing height will be reduced by twice the thickness of any washer removed.

Under-steer can be improved slightly at the expense of joggles, by raising the front of the car to the top limits of standing height.

TOE-IN OF FRONT WHEELS:

The Factory setting for toe-in on new cars is $5/32" \begin{smallmatrix} +\ 1/32 \\ -\ 1/16 \end{smallmatrix}$. This allows for the setting down of the various Silentbloc bushes, and this setting should be used if these bushes are renewed. Under normal running conditions, the toe-in must be set within the limits of 1/16" to 1/8".

To Measure:-

Use a standard optical alignment gauge, as per the makers instructions.

Adjustment:-

The cross steering tubes are adjustable for length. One complete turn of tube and socket will alter the toe-in by .090". Disconnect outer end of cross steering tube from cross steering lever, using steel drift and steady block to release tapered shank of ball pin. Slack off the pinch bolt at inner end and unscrew to increase, divide more than one turn between both cross steering tubes.

WHEEL CAMBER:

With two passengers in the front seats of the car, the camber angle should be 1° to $1\frac{1}{4}^{\circ}$ outwards on the earlier models and 0° (vertical) to 1° outwards on later models. Phantom IV, 0° to $1\frac{1}{4}^{\circ}$ outwards. There is no provision for adjustment.

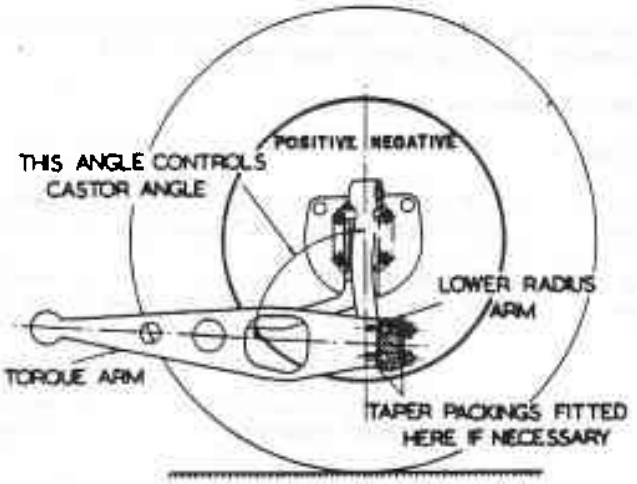


FIG. H2. CASTOR ANGLE.

CASTOR ANGLE:

The castor angle, see Fig. H2, should be $\frac{3}{4}^{\circ}$ positive to $1\frac{1}{2}^{\circ}$ negative for the earlier models, and $\frac{1}{2}^{\circ}$ positive to $1\frac{1}{2}^{\circ}$ negative for the later models. Phantom IV, vertical to 1° negative.

Adjustment:-

The castor angle can be made positive by fitting taper wedges between the torque arm and the lower radius arm, see Fig. H2, 1° taper wedges will probably be adequate in most cases. $1\frac{1}{2}^{\circ}$ wedges can be fitted if desired, but they tend to increase road shocks.

PIVOT PIN INCLINATION:

The pivot pin (king pin) inclination (angle) is approximately $3\frac{1}{4}^{\circ}$ on the earlier models and $4\frac{1}{4}^{\circ}$ on the later series. Phantom IV, is approximately $3\frac{1}{4}^{\circ}$. No adjustment is provided.

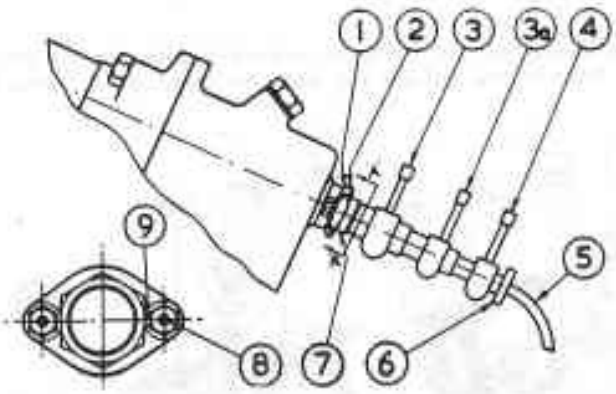
THE STEERING COLUMN AND BOX

TO REMOVE STEERING COLUMN AND BOX:

(i) Disconnect the controls at the bottom of the column, see Fig. H3. Remove the horn wire from the horn relay. Remove anti-chafing bush (6), at bottom of steering column and the pinch bolts from levers.

(ii) Unlock and remove nut (2) from threaded taper piece (7) and remove nearside nut (8). Replace nut (2) on taper piece, tap towards the steering box to loosen tube, then slip nut over tubes and remove control tube assembly.

(iii) Remove steering wheel using Extractor No. 3243/T1006. Mark hub of steering wheel and steering cam for re-assembly.



SECTION 'AA'

FIG. H3. STEERING COLUMN (BOX) - Lower End.

1. Locking Washer.
2. Nut.
3. Throttle Control Lever.
3a. Riding Control Lever.
4. Mixture Control Lever, on Bentley cars (prior to Series "R").
5. Horn Wire.
6. Anti-chafing Bush.
7. Taper Piece (Threaded).
8. Nut.
9. Locking Tab.

(iv) Remove rubber gas seal (around steering column), detach seal from dashboard.

(v) Remove front R.H. undershield, and, jack up and remove the side steering tube (17, Fig. H4) from the pendulum lever (21) (see page H12).

If steering is turned on full R.H. lock, ball pin will come clear of the pendulum lever. If not, it will free when the steering box and bracket are disconnected from the frame.

15. Pressure Spring.
16. Sealing Disc.
17. Side Steering Tube.
18. Mud Excluder.
19. Ball Pin (Tapered).
20. Locating Washer.
21. Pendulum Lever.

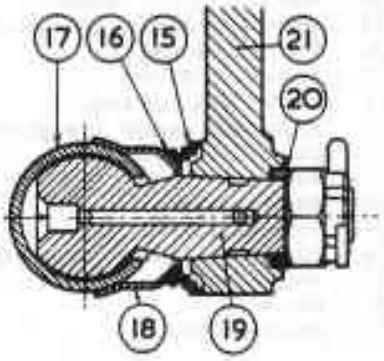


FIG. H4. SECTION THROUGH PENDULUM LEVER BALL PIN.

(vi) Disconnect steering box complete with its bracket (42, Fig. H5).

(vii) Disconnect oil feed pipe to the ball pin, from 4 way connection.

(viii) While steering column is held, remove bracket under the instrument panel. Remove the column and box, by passing it forwards.

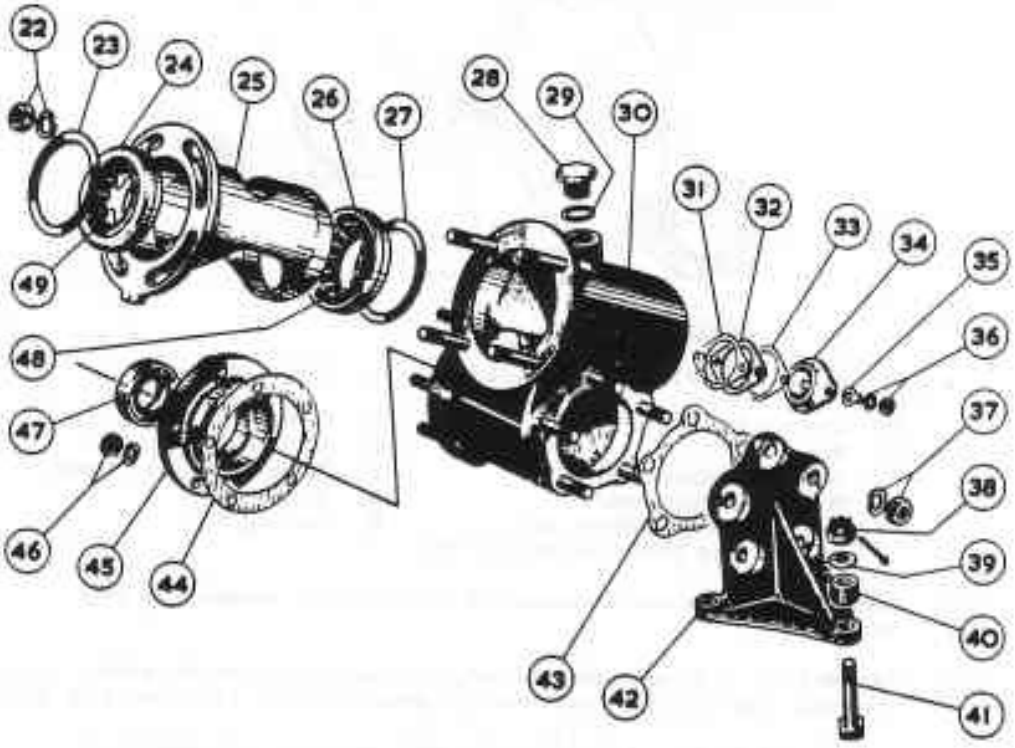


FIG. H5. STEERING BOX, "EXPLODED VIEW".

22. Nut and Spring Washer.
23. Adjusting Washer (Range of).
24. Roller Bearing Cup.
25. Adjusting Sleeve.
26. Roller Bearing Cup.
27. Adjusting Washer (Range of).
28. Oil Filler Plug.
29. Washer.
30. Steering Box.
31. Joint Washer.
32. Adjusting Washer (Range of).
33. Joint Washer.
34. Guide.
35. Locking Tab.
36. Nut and Spring Washer.
37. Nut and Spring Washer.
38. Nut.
39. Plain Washer.
40. Distance Piece.
41. Bolt.
42. Bracket.
43. Joint Washer.
44. Joint Washer.
45. Cover.
46. Nut and Spring Washer.
47. Oil Seal.
48. Roller and Cage Assembly.
49. Roller and Cage Assembly.

To Dismantle Steering Column and Box:

Drain oil from steering box. Hold column in a vice at lower end near the box, using wood vice clamps. The box itself MUST NOT be held in vice, mark pendulum lever and rocker shaft for re-assembly.

Remove pendulum lever and coiled pipe from rocking shaft using Extractor No. 3243/T1001.

Leakage or wear of the oil seal (47, Fig. H5) will be indicated by oil inside the cover and on the pendulum lever.

Removing Rocker Shaft from Steering Box:

(i) Mark cover (45, Fig. H5) and steering box for re-assembly. Remove cover and oil seal (47) and roller bearing (59, Fig. H6). Rocking Shaft can be removed with roller and cage assembly (55).

(ii) Remove nuts retaining steering column (67, Fig. H7) to box, and remove steering column.

(iii) Remove the nut securing stationary tube guide (34, Fig. H5) to the box, remove the guide with an aluminium drift or screwdriver. A joint washer is fitted between guide and box. An adjusting washer/s (32) and an extra joint washer is fitted between the guide and the box (as shown in Fig. H5) to control the end play of the stationary tube (64, Fig. H7).

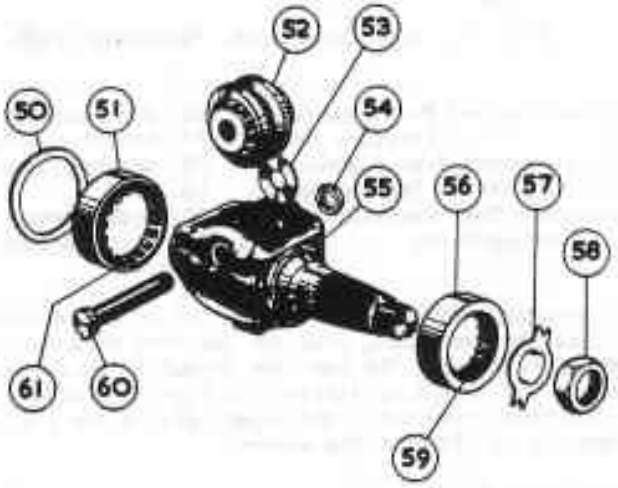


FIG. H6. ROCKING SHAFT ASSEMBLY, "EXPLODED" VIEW.

50. Adjusting Washer (Range of).
51. Roller Bearing Cup.
52. Cam Roller Assembly.
53. Adjusting Washer (Range of).
54. Nut.
55. Rocking Shaft.
56. Roller Bearing Cup.
57. Lock Washer.
58. Nut.
59. Roller and Cage (Assembly).
60. Bolt.
61. Roller and Cage (Assembly).

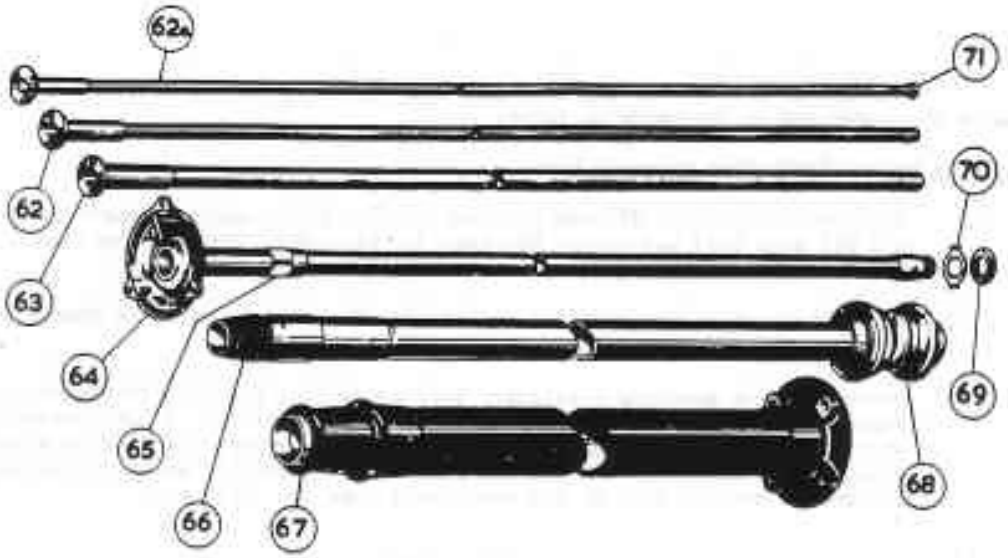


FIG. H7. STEERING COLUMN, "EXPLODED" VIEW.

62a. Mixture Control Tube (Assembly) (Bentley cars).
62. Riding Control Tube Assembly.
63. Throttle Control Tube Assembly.
64. Stationary Tube Assembly.
65. Felt Packing Strip.
66. Steering Cam Tube Assembly.
67. Steering Column Assembly.
68. Steering Cam.
69. Nut.
70. Lock Washer.
71. Anti-chafing Bush.

(iv) Using an aluminium drift on the bottom end of the steering cam tube assembly, at the same time, pull the cam tube by hand to withdraw it from the steering box. The cam tube assembly, on removal from the box, may withdraw the adjusting sleeve (25, Fig. H5), if so, remove it by tapping its upper face until the upper bearing cup (24) of the taper roller bearing is clear of the sleeve.

(v) Thoroughly clean all parts.

To Remove Cam Roller Assembly from the Rocking Shaft:

It should only be necessary to remove the cam roller assembly (52, Fig. H6) from the rocking shaft in the event of wear, end float of the assembly in the rocker shaft, or a flat on the cam track due to shock.

(i) Remove bolt (60), cam roller assembly (52) and adjusting washer/s (53) from rocking shaft.

(ii) Thoroughly clean all parts.

To Fit a New Cam Roller Assembly to the Rocking Shaft:

(i) Determine the thickness of the adjusting washer (53, Fig. H6) to ensure contact of the inner end faces of the two inner races of the cam roller assembly, to give the necessary pre-loading on the roller.

The inner race of the cam roller is in two halves, (52, Fig. H6) held together by a retaining ring. When the inner faces of the two halves of the inner race are brought into contact, this will give a pre-load on the roller of 2 to 8 ounces at a radius of 3" the roller will be a little stiff to turn by hand. This pre-load is determined by the makers and cannot be altered.

(ii) Before fitting cam roller assembly to rocking shaft, place on bolt (60, Fig. H6), a temporary distance piece 7/16" thick by about 11/16" outside diameter by 7/16" inside diameter, or failing this, suitable washers, to compensate for the thickness of the walls of the rocking shaft. Pass the bolt through the inner races and then tighten up to bring into contact the inner faces of the two halves of the inner race.

With nut and bolt,tightened, measure the width across the outer faces of the inner races, which should be 1.257" plus or minus 0.003", then measure the width across the inner machined faces of the rocking shaft gap which will be 1.262" plus 0.005". The difference between the measurements will determine the thickness of the adjusting washer required.

(iii) Fit the roller assembly into the rocking shaft ensuring that the adjusting washer makes the roller assembly a good push fit in the rocker shaft gap. Insert the bolt. Check roller for freedom. It should be a little tight. If free, the adjusting washer/s are not thick enough to ensure contact of the inner races.

To Fit Rocking Shaft to Steering Box, Temporarily in Order to Check Pre-Load of Rocking Shaft:

(i) Place one of the two roller and cage assemblies (59 or 61, Fig. H6) on to the bearing cup (51), with the bearing cup in the steering box and drop the rocking shaft into position in the box, Place the other roller and cage assembly on the rocking shaft. Place the cover with bearing cup (56) and oil seal over the splined end of the rocking shaft, with markings in line. Fit spring washers to the three short studs and temporary additional washers to the two long studs, and tighten up.

(ii) Slip the pendulum lever on to the splines of the rocking shaft with the marking on lever and shaft in line. Hold steering box (bracket 42), in a vice, with rocking shaft and pendulum lever horizontal, check the pre-load at the end of the pendulum lever which should be 3 to 12 ounces.

To carry out this check:- Six 2 ounce weights are required, with a small hole in the centre and a piece of hooked wire for attachment. Find the weight required to move the pendulum lever, by adding weights to the end of the lever. If less than 3 ounces, fit a thicker adjusting washer as follows:-

(iii) Remove bracket (42), joint washer (43) Fig. H5, and adjusting washer/s (50, Fig. H6).

Measure the thickness of the adjusting washer/s removed, and select a washer/s 0.001" thicker from the range available. Such a change, i.e. 0.001" will alter the pre-load by approximately 8 ounces.

Place adjusting washer/s against the outer face of the bearing cup (51, Fig. H6). Fit a new joint washer (43) and refit the bracket (42) to the steering box with markings in line and re-check the pre-load.

To Centralise the Steering Cam with Rocking Shaft:

(i) Should the cam tube assembly have withdrawn with it the adjusting sleeve (25, Fig. H5), proceed as follows:-

(a) Grease the two outer diameters of the adjusting sleeve (25) and enter it into position in the steering box, so that the two faces make contact. Grease the original lower adjusting washer (27) and with the steering box in a vertical position, place in position in the bottom of the box. If two adjusting washers were fitted, the thinner of the two washers must be fitted adjacent to the lower face of the lower bearing cup (26), if the thinner washer was fitted behind the thicker washer, there would be a risk of it being trapped behind the gap which exists between the inner end of the adjusting sleeve and the lower inner end of the steering box.

(b) Fit the lower bearing cup (26) in position against the adjusting washer/s.

(ii) Place one of the two roller and cage assemblies (48 or 49) on the lower bearing cup, place cam tube assembly on the roller bearing. Place the other roller and cage assembly on to the cam, and push or tap the other bearing cup (24) squarely into position in the adjusting sleeve and on to the roller bearing. Select an adjusting washer/s (23), too thick to enable the flange of the steering column to be pulled right down on to the adjusting sleeve. Place the adjusting washer/s against the outer face of the upper bearing cup (24) and then place steering column in position, nip up the steering column retaining nuts sufficiently to make the cam tube moderately stiff to turn by hand before the steering wheel is slipped on.

There should now be a gap between the face of the flange of the steering column and the adjusting sleeve. It is possible for the adjusting sleeve to "lift", creating the gap between the flange and sleeve - avoid this, otherwise the lower adjusting washer/s (27) could slip out of position and become trapped. If there is no gap then a thicker adjusting washer/s (27) must be fitted until a gap is obtained.

(iii) The eccentric adjusting sleeve is for adjusting the mesh between the cam and roller. Looking from the steering column end, rotate the sleeve clockwise to "free" the cam from the roller, i,e., there will be slackness between the cam and roller. The sleeve has elongated stud holes which limit its rotation in the box. Rotate the sleeve by the lug provided - clockwise, "free" the cam from the roller and nip up the steering column nuts again.

Slacken steering column nuts just sufficiently to allow the adjusting sleeve to be rotated by the lug.

(iv) Temporarily refit rocking shaft to steering box and secure in position by refitting the cover (45, Fig. H5).

Mount steering box in a vice and slip on the steering wheel. From one full lock position, rotate slowly towards the other lock, hold the end of the pendulum lever with the other hand, shaking it to and fro until the position of minimum slack between the cam and roller has been found. With the cam in this position and without moving it, again slacken the four steering column nuts slightly, i.e. only just sufficiently to allow the adjusting sleeve to be rotated. Rotate sleeve anti-clockwise until all slack between the cam and roller is <u>just</u> eliminated, then retighten.

(v) Set cam in the straight ahead position, by rotating the steering wheel about one-and-seven-eighth's of a turn from either lock, bringing the keyway in the cam tube to its lowest position, i.e. nearest to the rocking shaft.

The tightest meshed position extends over possibly half a turn of the steering wheel. By rotating the steering wheel, determine how much it has to be turned to move it from the straight ahead position to the centre of the tightest meshed position. If the tightest meshed position is to the right of the straight ahead position, a thinner adjusting washer/s (27, Fig. H5) should be fitted to the lower roller bearing; if to the left, then a thicker washer is required. If two washers are fitted, the thinner must be fitted against the lower face of the bearing cup. The washer/s should be greased to keep them in position against the cup during erection. To estimate the thickness of the washer required, a change of 0.007" moves the tight place along half a turn of the steering wheel. When the centre of the tightest meshed place is at the straight ahead position, i.e. cam tube assembly keyway at its lowest point, and rocking shaft in central position, adjust the pre-load on the cam bearings.

<u>To Adjust Pre-Load on Cam Roller Bearings</u>:

(i) The pre-load should be from 12 to 20 ounces, measured at the rim of the steering wheel, and this should be done with the column in a horizontal position. The pre-load is obtained by selecting a washer/s to fit behind the lowest face of the steering column flange and the outer face of the upper bearing cup (24).

(a) Measure the gap at two opposite points between the flange faces of the adjusting sleeve and the steering column flange and note the average gap. Loosen the nuts retaining the column to the box and rotate the adjusting sleeve (25), clockwise producing slack between the cam and roller.

(b) Remove column and adjusting washer/s (23). To determine the thickness of the adjusting washer/s required, measure the thickness of the washer/s removed, and subtract from this figure, the average gap.

(ii) Fit the new washer/s as determined, replace the steering column on the box. Slip on the steering wheel and attach a piece of string to the steering wheel rim, to this, tie on 2 ounce weights as required to determine the pre-load. If the weight required to move the steering wheel exceeds 20 ounces, decrease the thickness of the upper adjusting washer/s by 0.001", but if below 12 ounces, increase the thickness of the washer/s by 0.001".

TO REFIT STEERING COLUMN AND BOX:

(i) If an adjusting washer/s (32) was fitted between the guide (34) and the box (as shown in Fig. H5), fit a new joint washer (31 and 33) either side of the adjusting washer/s. Secure the guide to the box by placing one of the two spring washers and nuts on the off-side stud and tighten up. Do not fit the other nut (8, Fig. H3).

(ii) With the coiled lubricating pipe cover on the pendulum lever, fit the lever to the rocking shaft in its original position with markings in line, i.e. pendulum lever $\frac{3}{4}$" backwards. Ensure alignment of the oil holes in the ball of the pin with the axis of the side steering tube.

To Check and Adjust Controls:

The throttle control lever (3, Fig. H3), the ride control lever (3a) and the mixture control lever (4) (on Bentleys prior to series "R"), may not have been refitted in the same angular position relative to the tube, the following adjustments should be made if necessary:-

Hand Controls::

The hand throttle lever on steering column should move from fully closed position, approximately $\frac{3}{4}$" before starting to open the throttle. If free travel is more or less than $\frac{3}{4}$", set lever in the fully closed position, slacken pinch-bolt and ease the lever as required. The other controls can be adjusted in a similar manner.

THE SIDE AND CROSS STEERING TUBES

SIDE STEERING TUBE:

The ball joints are lubricated from the centralised chassis lubrication system. No adjustment is provided for the poundage on the ball joint at the front end of the tube, as a coil spring exerts a constant pressure on the joint (see Fig. H9), it can be adjusted for length. The length is fixed by the makers during the building of the chassis; it is screwed into a socket and attached to the centre steering lever. If replaced, the new tube must be adjusted for length.

To Remove a Side Steering Tube:

Front End:

(i) Remove nut (12, Fig. H8) from the ball pin at the front end of tube. Remove ball pin (8), pressure spring (13) and sealing disc (11).

Rear End:

(ii) Remove the side steering tube (ball pin) from the pendulum lever.

(iii) If there is insufficient clearance to allow the ball pin to come clear of the pendulum lever, disconnect coil pipe and remove the pendulum lever from the rocking shaft using Extractor No. 324J/T1001.

Mark the pendulum lever and rocking shaft for re-assembly.

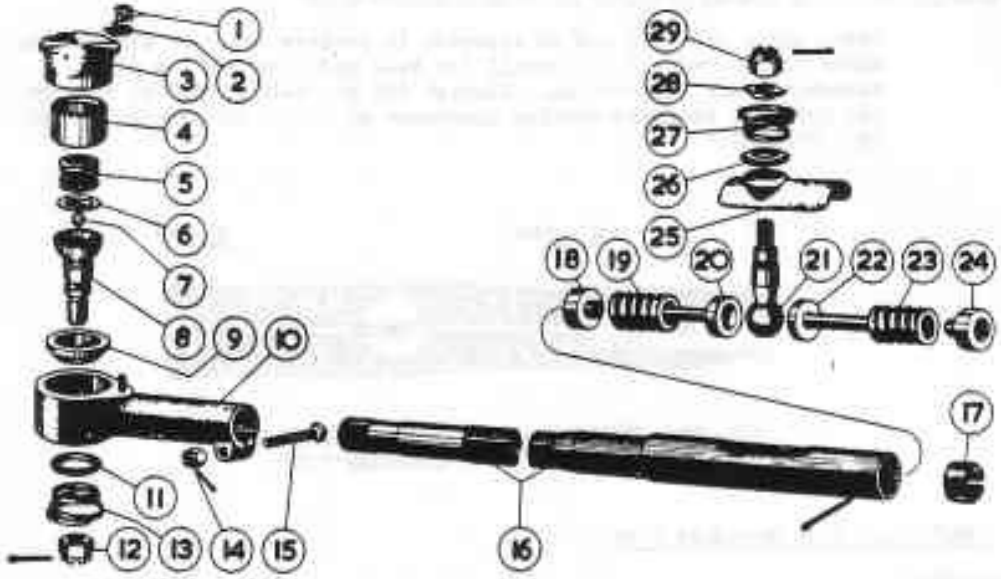


FIG. H8. SIDE STEERING TUBE, "EXPLODED" VIEW.

1. Nut and Spring Washer.
2. Locking Plate.
3. Cap Nut.
4. Sleeve.
5. Spring.
6. Spring Pad.
7. Ball, hardened 0.3125" dia.
8. Ball End Pin.
9. Ball Pad.
10. End Socket.
11. Sealing Disc.
12. Nut.
13. Pressure Spring.
14. Nut.
15. Pinch Bolt.
16. Side Steering Tube.
17. End Nut (Internal).
18. Guide.
19. Spring.
20. Ball Pad.
21. Ball Pin (Tapered).
22. Ball Pad.
23. Spring.
24. Guide.
25. Mud Excluder.
26. Sealing Disc.
27. Pressure Spring.
28. Locating Washer.
29. Nut.

To Remove Ball End Pin from Front End of Side Steering Tube:

(i) Remove nut, spring washer (1), Fig. H8, and locking plate (2); Cap nut (3) and sleeve (4); spring (5), spring pad (6), ball (7) and ball pin (8). (The ball pad (9) can be removed if necessary).

(ii) When re-assembling, pack cap with Duckham's HBB. Grease.

To Remove Ball End Pin from Rear End of Side Steering Tube:

(i) Remove split pin and internal end nut (17), guide (24), spring (23) ball pad (22), ball pin (21); then ball pad, spring and guide.

(ii) Clean all parts thoroughly.

To Refit Ball End Pin to Rear End of Side Steering Tube:

Smear parts with oil and re-assemble in reverse order of dismantling. Screw in the end nut (17) until the ball pads, spring and guide assemblies are choc-a-bloc. Slacken the nut back 0.180" to restore the original standard working clearance of 0.090" at points 'A' and 'B', Fig. H9.

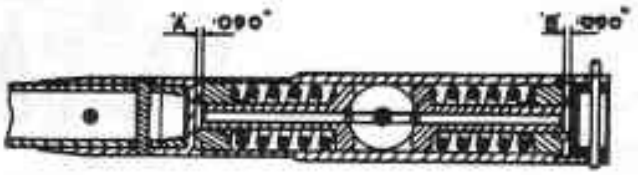


FIG. H9. SECTION - BALL JOINT AT REAR END OF SIDE STEERING TUBE.

To Refit the Side Steering Tube:

Rear End:

Ensure that the mud excluder (25, Fig. H8) is fitted correctly. Enter the pin (21) into the pendulum lever. Place the locating washer (28) on to the ball pin to ensure alignment of the oil holes in the ball of the pin with the axis of the side steering tube. If the pendulum lever has been removed from the rocking shaft, refit the ball pin of the side steering tube to the pendulum lever on the bench. With the coiled lubrication pipe and cover in position on the pendulum lever, fit lever to rocking shaft in original marked position.

Front End:

Place the spherical face of the sealing disc (11) against the ball pad (9, Fig. H8), place the small diameter end of the pressure spring (13) on to the spigotted sealing disc. Enter the ball pin into the centre steering lever.

To Adjust a New Side Steering Tube for Correct Length:

(a) Rotate steering wheel about one and seven eighths of a turn from either lock so as to place the cam tube in the straight-ahead position (i.e. the cam roller of the steering, central with the cam). The spoke nearest to the oil hole in the hub of the steering wheel should now be at the top. Place the spoke at the top as necessary, so as to get the cam tube in the exact straight-ahead position.

(b) With the road wheels in the straight-ahead position and, without moving either steering wheel or front wheels, remove pinch bolt (14) from side steering tube and adjust for length by screwing end socket (12) in or out as required. Refit pinch bolt.

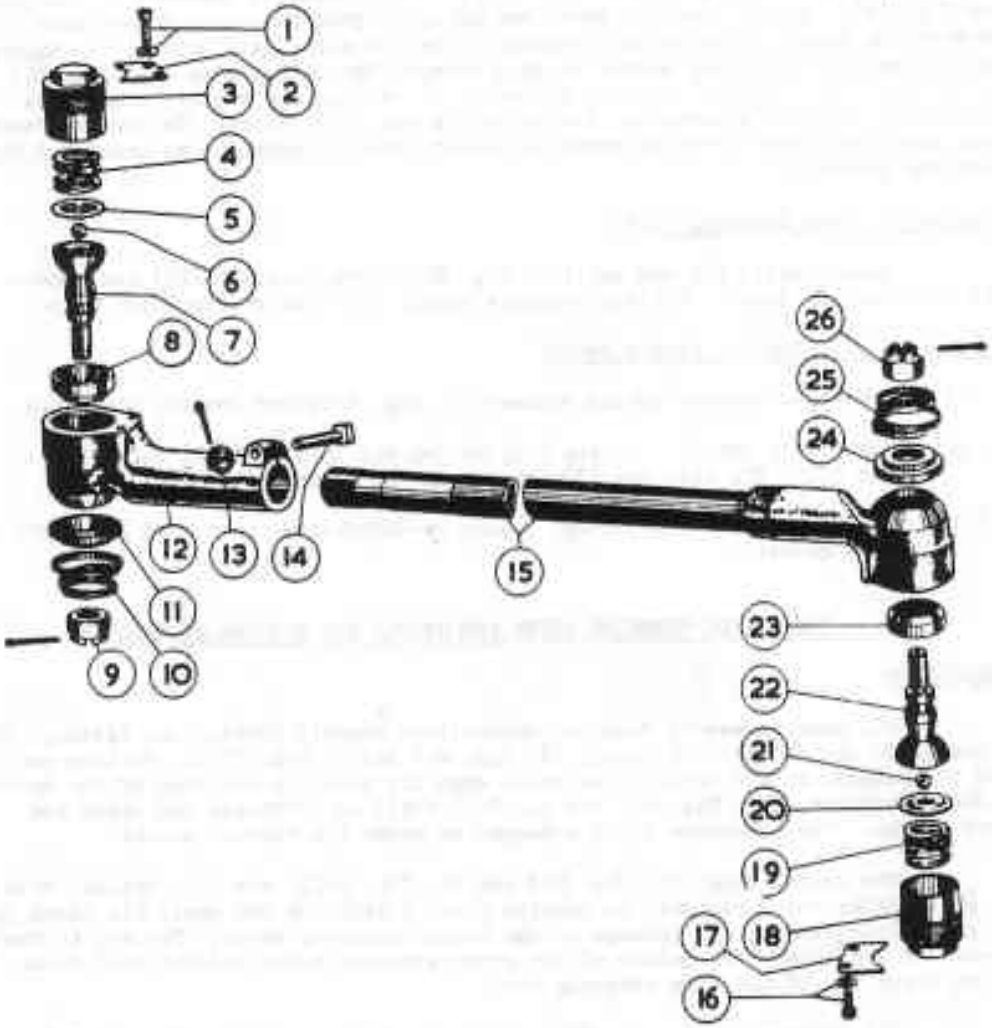


FIG. H10. CROSS STEERING TUBE, "EXPLODED" VIEW.

1 & 16.	Setscrew and Spring Washer.	9 & 26.	Nut.
2 & 17.	Locking Plate.	10 & 25.	Pressure Spring.
3 & 18.	Cap Nut.	11 & 24.	Sealing Disc.
4 & 19.	Spring.	12.	Socket (Inner).
5 & 20.	Spring Pad.	13.	Nut.
6 & 21.	Ball, Hardened, 0.3125" dia.	14.	Pinch Bolt.
7 & 22.	Ball End Pin.	15.	Cross Steering Tube and Outer Socket.
8 & 23.	Ball Pad.		

CROSS STEERING TUBES:

The four ball joints are identical and lubricated from the centralised chassis lubrication system. A coil spring exerts a constant pressure on the joints. (See Fig. H9). In the event of wheel wobble or of road re-action transmitted to the steering wheel, increase the loading of the two outer ball joints. To increase the loading, fit a packing washer or shim between the coil spring (19, Fig. H8) and the cap nut (18). Ensure that the thickness of the packing washer is such that when the cap nut is fully screwed up, the spring is not choc-a-bloc. The cross steering tubes are adjustable for front wheel alignment (toe-in) purposes as described in "Steering Geometry".

To Remove a Cross Steering Tube:

Remove split pin and nut (26, Fig. H10) from ball pin (22) and remove ball pin from the lever. Collect pressure spring (25) and sealing disc (24).

To Remove a Ball End Pin from a Joint:

(i) Remove setscrews, spring washers (1, Fig. H10) and locking plate (2).

(ii) Remove cap nut (3), spring (4), spring pad (5), ball (6) and ball pin (7). The ball pad (8) can be removed if necessary.

(iii) Clean all parts thoroughly. (When re-assembling, pack with Duckham's HBB. grease).

THE CENTRE STEERING LEVER AND SWIVEL PIN HOUSING ASSEMBLY

LUBRICATION:

Oil under pressure from the centralised chassis lubrication system, is delivered to the drilled top cover, (6, Fig. H11 and 1, Fig. H12). It then passes down the passage in and through two small diameter holes in the stem of the spring loaded restrictor, (35, Fig. H11 and 34, Fig. H12), to lubricate the upper and lower bushes. The clearance being arranged to meter the correct amount.

The swivel pins (25, Fig. H11 and 24, Fig. H12), are also drilled with two small holes which register on annular grooves with the two small oil holes in the restrictor, and an oil passage in the centre steering lever. The oil is then carried to the inner ball joints of the cross steering tubes and the ball joint at the front end of the side steering tube.

Oil leakage from the centre steering lever joints is probably due to expansion of air in the joints after operation of the chassis oil pump. The cure is to dismantle the ball joints and to pack them with Duckham's HBB. grease. The chassis oil pump develops sufficient pressure to clear the oil feed pipe.

Nomenclature for Fig. H11:

1. Bolt (Special).
2 & 3. Bushes.
4. Junction (Straight).
6. Top Cover.
10. Housing (Lower).
11. Housing (Upper).
14. Centre Steering Lever.
17. Cross Tube Centre Link.
19. Union Nut.
22 & 23. Ball Pins.
25. Swivel Pin.
28. Spring Seat.
30. Compression Sleeve.
32. Spring Valve Restrictor.
33. Spring.
35. Restrictor Valve.
40. Felt.Washer.
41. Adjusting Shim (Range).
X.24. Nut,Spring & Plain Washer.
X.50. Screw.
X.57. Bolt.
X.84. Plain Washer.
X.87. Spring Washer.

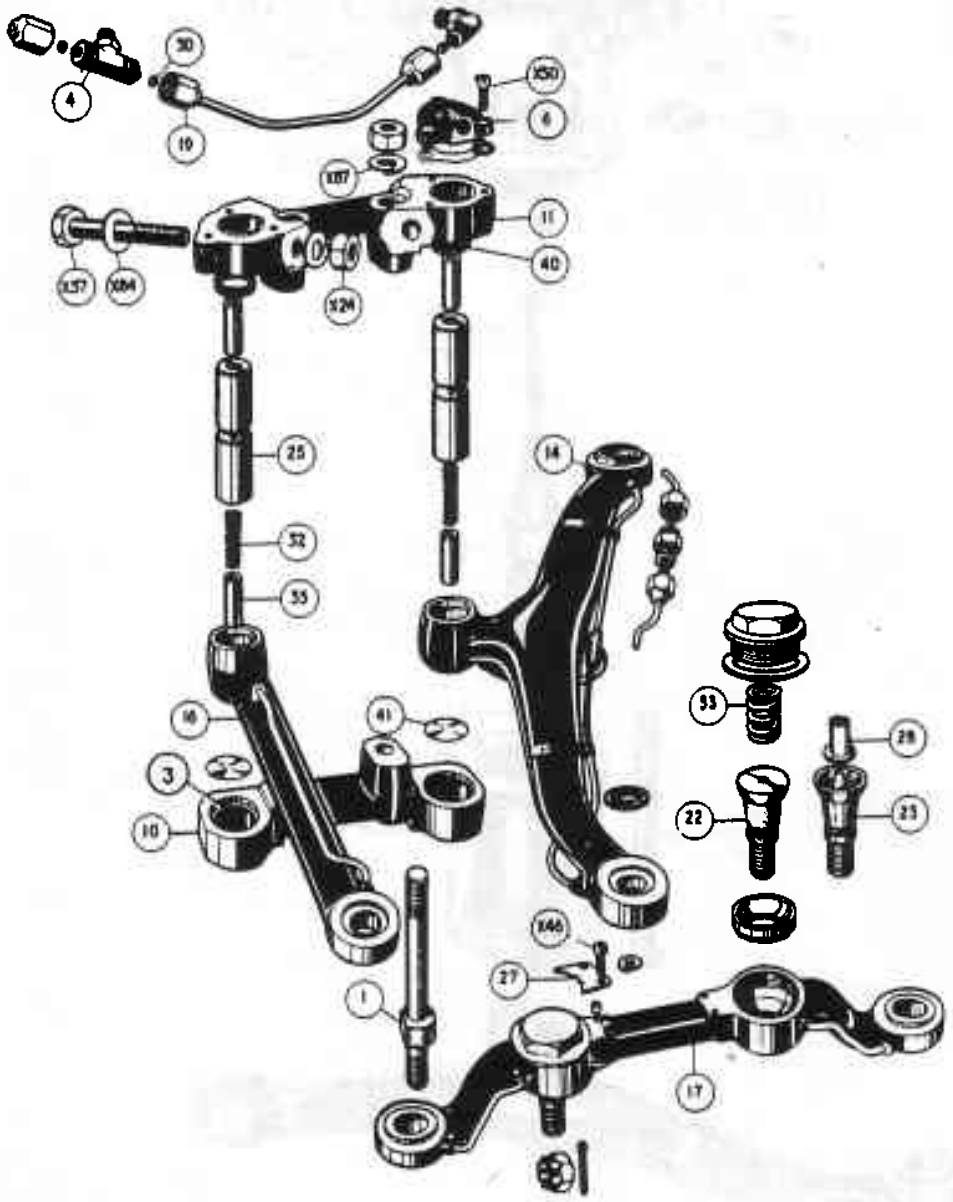


FIG. H11. "EXPLODED" VIEW OF SWIVEL PIN HOUSING AND CENTRE STEERING LEVER NEW GEOMETRY FROM BENTLEY CHASSIS NO. B-1-GT, SILVER WRAITH WME-1, AND SILVER DAWN SCA-1.

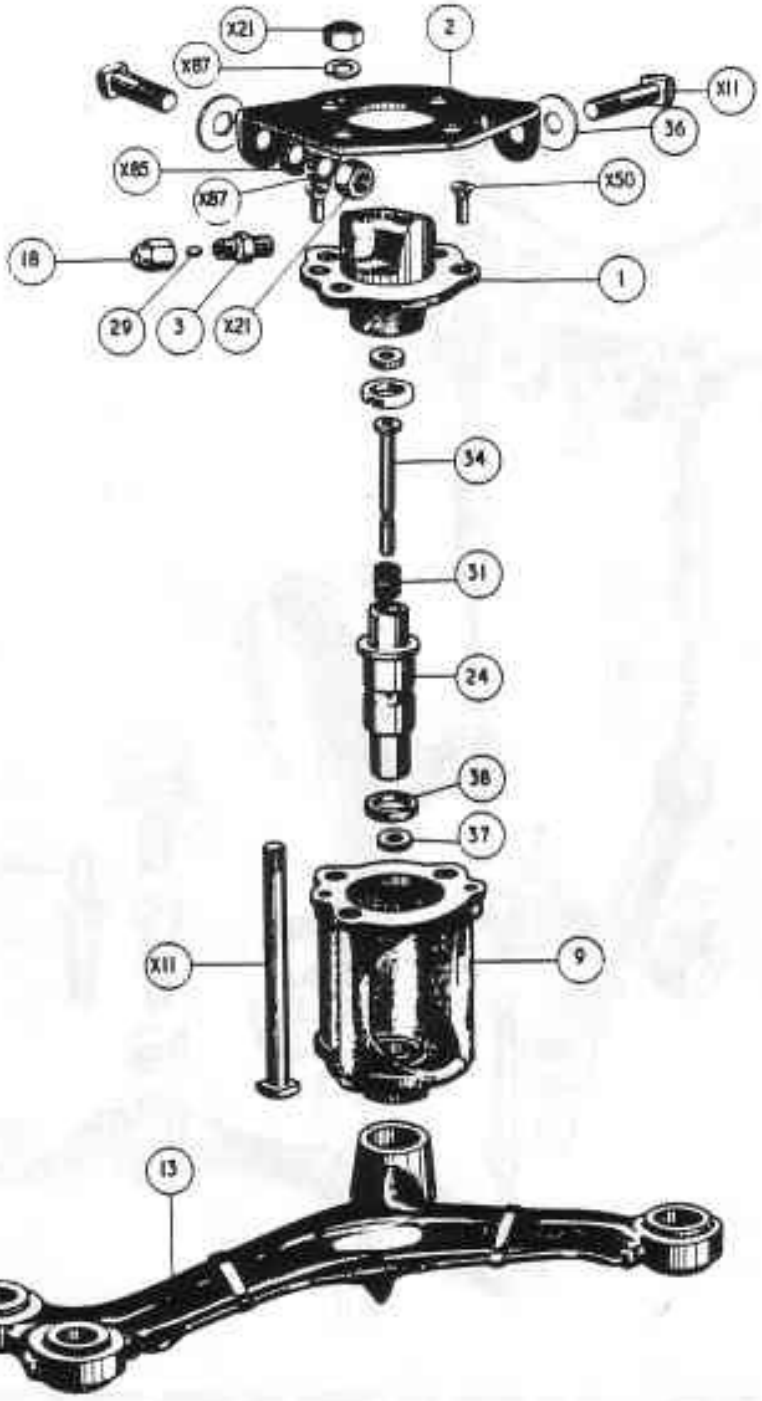


FIG. H12. STEERING LEVER FITTED PRIOR TO BENTLEY CHASSIS NO. B-1-GT, SILVER WRAITH WME-1, and SILVER DAWN SCA-1.

Nomenclature for Fig. H12:

1. Upper Cover and Bush.	34. Lubrication Valve.
2. Bracket Housing to Frame.	36. Bracket Adjusting Washer.
3. Oil Pipe Junction.	37. Felt Washer.
9. Housing and Bush.	38. Swivel Pin Adjusting Washer.
13. Steering Lever.	X.11. Bracket Bolts.
18. Oil Pipe Junction Nut.	X.21. Bracket Nuts.
24. Swivel Pin.	X.50. Screw, Housing Cover.
29. Compression Sleeve.	X.85. Washer, Frame Bolt.
31. Lubrication Valve Spring.	X.87. S. Washer, Frame Bolt.

To Remove a Swivel Pin Housing and Centre Steering Lever Assembly:

(i) Remove the ball joint of side steering tube from centre steering lever, and the two inner ball joints of cross steering tubes from the cross tube centre link.

(ii) Disconnect the oil feed pipe from top cover, remove nuts and spring washers from lower end of retention bolts (1) Fig. H11, remove the two horizontal bolts (X.57) in upper housing and withdraw assembly.

(iii) Remove inner ball pins of cross tube centre link (17) Fig. H11, and the three countersunk screws (X.50) from top cover, lift off cover, then remove nuts from upper end of the two retaining bolts (1) and lift off upper bearing housing.

(iv) Remove centre steering lever (14) and idler lever (16) from the lower bearing housing (10), then remove the oil restrictor valves and springs from the two levers (14 and 16).

(v) Remove the shims (41) from inside of lower bearing housing bushes (10) and thoroughly clean all parts.

To Re-Assemble the Swivel Pin Housing and Centre Steering Lever:

(i) Ensure that the swivel pins are a tight fit in the steering levers. The diameter of the bore of the lever should be 0.750" + 0.0005" and the corresponding diameter of the swivel pin should be 0.751" + 0.0005". Temporarily re-assemble the unit minus the felt washers, restrictor and spring, check the amount of swivel pin end float. Fit adjusting shims as necessary to allow from 0.001" to 0.002" end float.

(ii) Renew felt washers if necessary. Lubricate parts with engine oil. Place lower adjusting shim in position in casing. Fit felt washers in casing. Enter swivel pin into casing. Place spring and restrictor valve in swivel pin. Lightly smear (with a soft type of grease), upper adjusting shim and place it in top cover. Fit felt washer in top cover. Enter top cover on two swivel pins. Secure top cover to casing by means of countersunk screws.

FRONT SUSPENSION

STUB AXLES, PIVOT PINS, YOKES, LOWER TRIANGLE LEVERS AND TORQUE ARMS

LUBRICATION:

Oil under pressure from the centralised chassis lubrication system fills a "reservoir" in the pin. A dowel screw positions the pivot pin in relation to the oil passage in the yoke. Oil from the "reservoir" is supplied to the upper roller or needle bearing through the clearance between a loose restricting pin and the internal bore in the upper end of the pivot pin.

To Remove Stub Axle from Yoke:

(i) Disconnect front brake hydraulic pipe from bracket end, NOT from expander end. Remove front hub complete with brake drum from stub axle. Remove the brake carrier plate complete with brake shoes.

(ii) Remove the ball joint (ball pin) of the cross steering tube from cross steering lever attached to stub axle.

(iii) Remove top cover (8 and 9, Fig. H13 and H14) and restricting pin. Remove the nut (X.24) from pivot pin, using box spanner, 1660/T1005. Remove the oil union from flange (10 and 11). Remove lower cover and thrust washer (25).

(iv) Drive pivot pin downwards with an aluminium drift. The bottom end of pivot pin is threaded internally (R.H.) 11/16" 16 T.P.I. for extraction purposes. Remove 34 needle rollers from outer race (4) of the lower bearing, and remove stub axle from yoke. Remove oil trough (17) from stub axle (old type), felt washer and packing ring sub-assembly (21 and 16), from the yoke. Thoroughly clean all parts.

To Remove Upper and Lower Outer Races from Stub Axle:

Using a length of tube with faces as a drift, tap out lower outer race from stub axle, then remove the upper outer race in a similar manner.

To Fit New Lower Outer Race to Stub Axle:

With the bores in the stub axle, clean and free from scores or burrs, remove the tubular nut and sleeve from tool 1660/T1007, place the head (attached to the draw bar) of the tool on to the three studs at the top of the stub axle, and push it fully home. Lubricate the new outer race and place it in position on the draw bar followed by the sleeve of the tool and with the tubular nut and a tommy bar, screw up the tubular nut until the outer race is pressed fully home against the shoulder in the stub axle.

To Fit New Upper Outer Race to Stub Axle:

Temporarily fit the pivot pin to the stub axle on the bench.

(i) Grease the roller path of the outer race (4) of the lower bearing sufficiently to hold the rollers in position. Place the 34 new needle rollers in the bearing and fit the pivot pin in position. Place the thrust washer (25) in recess in the bottom cover (10) and temporarily fit the bottom cover to keep the pivot pin in position.

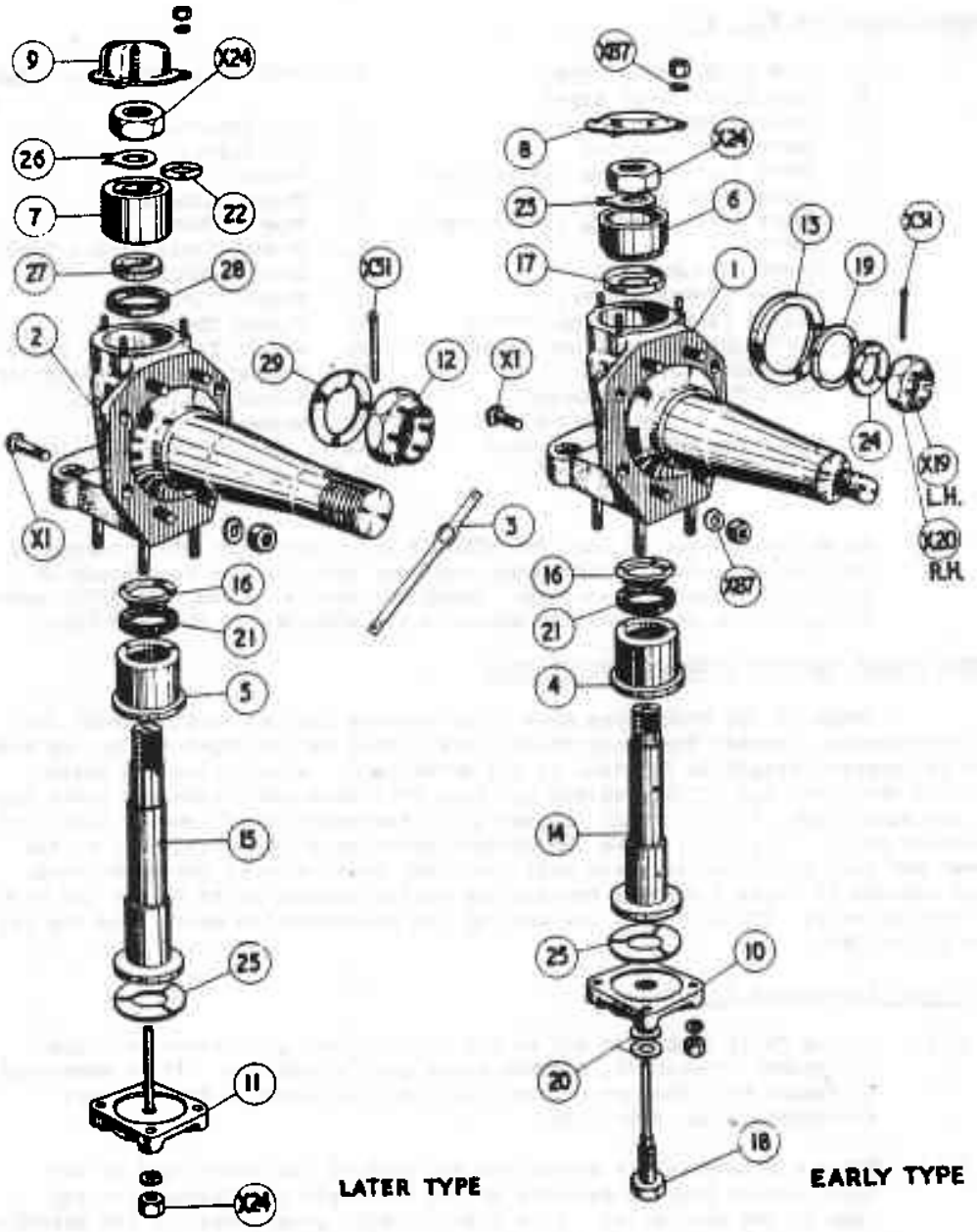


FIG. H13. PIVOT PIN AND BEARINGS

Nomenclature for Fig. H13:

1. Stub Axle (early type).
2. Stub Axle (later type).
3. Sealing Band.
4. Lower Pivot Bearing.
5. Lower Pivot Bearing (later type).
6. Upper Pivot Bearing.
7. Upper Pivot Bearing (later type).
8. Cover.
9. Cover (later type).
10. Flange (Bottom Cover).
11. Flange (later, Bottom Cover).
12. Castellated Nut (later type).
13. Distance Piece.
14. Pivot Pin (With internal restrictor).
15. Pivot Pin (later type, with internal restrictor).
16. Felt Washer Retainer (Packing Ring).
17. Oil Trough.
18. Oil Union.
19. Washer.
20. Washer Aluminium.
21. Washer Felt.
22. Washer Plain (later type).
23. Lock Washer.
24. Washer Plain.
25. Washer Thrust.
26. Washer Tab. (later type).
27. Washer Distance (later type).
28. Washer Sealing Felt.
29. Washer Special.

X.19. Castellated Nut (later type).
X.24 Pivot Nut.

(ii) Screw the adaptor of tool No. STD.529 on to the pivot pin. Lubricate the new outer race of the upper bearing, and with the race track at the bottom, place on adaptor. Using the special punch (STD.529), press or tap in the race until it contacts the shoulder in the stub axle.

UPPER ROLLER BEARING ASSEMBLY (PIVOT PIN):

Whenever the stub axles have to be removed from an earlier model for reconditioning, inspect the inner roller race fitted to the upper end of the pivot pin for correct height in relation to its outer race. A condition can arise whereby the lower end of the rollers (A, Fig. H14) protrudes below the lower edge of the outer race, i.e. at point 'B' due to an accumulation of adverse limits of machined parts. Fig. H15, shows the correct position of the rollers, i.e. the lower end face of the rollers are well above the lower edge of the outer race. This applies to chassis numbers bearing the suffix letters AK to FU, in the case of Bentley cars; WTA to WLE in the case of the Silver Wraith cars; and SBA for the Silver Dawn.

To Check, Proceed as follows:-

(i) Having fully tightened nut at the top of pivot pin, remove nut and lockwasher beneath it, leaving pivot pin in position. It is essential to ensure that the upper outer race is fully home in its downward direction in the stub axle.

(ii) Place a straight-edge across the top face of the outer race of the upper roller bearing assembly of the pivot pin (not across the top face of the stub axle). With a small depth gauge, measure the distance downwards from the top face of the outer race to the top face of one of the rollers (not the brass roller cage), i.e. dimension 'D' Fig. H15 and note.

(a) If dimension 'D' is within the limits of .430" - .480" (10.9 - 12.2 m/m) this is correct.

(b) If dimension 'D' is between the limits of .480" - .515" (12.2 - 13 m/m), then it will be necessary to remove the pivot pin and fit a .040" (1 m/m) thick packing washer ('C' Fig. H15), Part Number R.4468, between the oil trough 'E' and the inner roller race.

(c) If dimension 'D' is over .515" (13 m/m), fit two packing washers.

(iii) Having refitted the pivot pin and fully tightened nut, check that the stub axle can be moved freely from one full lock to another.

(iv) Continue the re-assembling operatings.

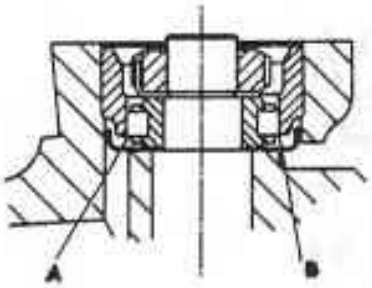


FIG. H14.

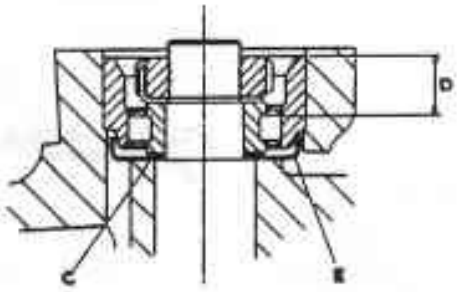


FIG. H15.

To Refit Stub Axle to Yoke:

(i) Ascertain that the dowel screw fitted to the yoke is tight.

(ii) Early type assembly, replace oil trough (17), with lip uppermost. Later type assembly, replace felt washer (28) distance piece (27). Place the metal packing ring and felt washer sub-assembly (16 and 21) in the recess provided, i.e. with the packing ring against the yoke. Renew the felt washer if necessary and soak in oil before fitting.

(iii) With the 34 needle rollers in position in the lower bearing, place the stub axle on to the yoke. Enter the pivot pin as far as it will go by hand, sighting upon entering to make sure that the narrow slot in the top of the pivot pin is lying in a radial line with the dowel screw (3, Fig. H16). The pin must be driven in until the shoulder on the pin makes contact with the corresponding shoulder in the yoke.

(iv) Fit new rollers and cage assembly into position on the pivot pin. Tighten up the nut (X.24), using a box spanner, but do not bend up the tabs of the lockwasher at this stage.

(v) Lubricate and place the thrust washer (25) into the recess in the bottom cover. The thickness of a new thrust washer is .098" - .001" and the depth of the recess in the bottom cover is .100" + .004". The fitting allowance (end lift) of a stub axle is from .007" to .017".

(vi) Smear the joint face of the bottom cover with a jointing compound and fit it to the stub axle fully tightening the nuts. Ensure that the stub axle can be freely moved from one full lock to another. If found to be stiff, then with a soft aluminium drift, give the lower cover a few sharp taps upwards and CHECK THE PIVOT PIN NUT (X.24) FOR TIGHTNESS.

(vii) Place the restricting pin into the pivot pin, lubricate the upper bearing with oil. Smear the joint face of the top cover (8) or (9) with a jointing compound and fit the cover. Fit oil feed (tube 18) early type, to the bottom cover.

(viii) On completion of assembly, and having reconnected the brake pipe, bleed the front braking system.

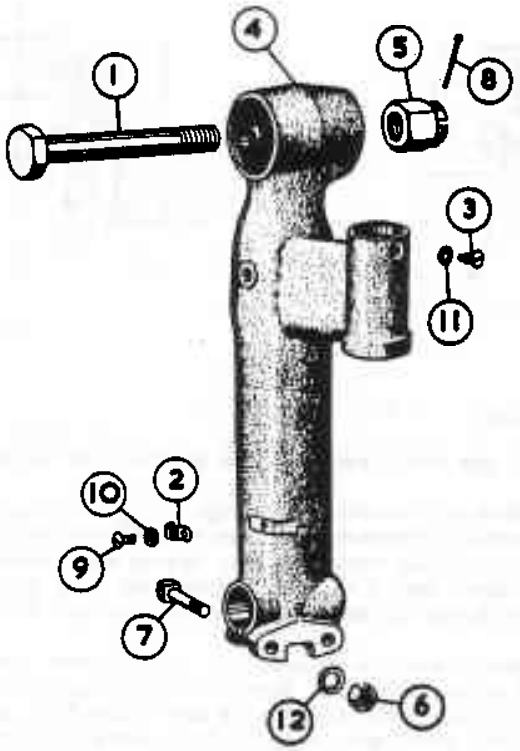


FIG. H16. THE YOKE TO LOWER TRIANGLE LEVER.

1. Bolt (Upper Bearing).
2. Clip (Oil Pipe).
3. Grub Screw (Locating).
4. Yoke.
5. Nut (Upper Bearing).
6. Nut (Split Boss).
7. Bolt (Split Boss).
8. Split Pin (Upper Bearing).
9. Screw (Oil Pipe Clip).
10. Washer, spring (Oil Pipe Clip).
11. Washer, Spring (Grub Screw).
12. Washer, Spring (Split Boss).

TO REMOVE YOKE FROM LOWER AND UPPER TRIANGLE LEVERS:

(i) Remove the nut and spring washer (6, Fig. H17), the cover (5) and the plain washer (7) from the bolt (18). Disconnect the coiled oil pipe (4) (inside cover) from the three-way junction on the torque arm and elbow connection fitted to the front of the yoke. Remove the clip from the yoke, then pipe and distance piece (8).

(ii) Remove the split pin, castellated nut (9), and aluminium washer (10). Remove the two clamping bolts from the lower end of yoke. Tap out bolt (18). Remove roller housing (3), together with the adjusting washer (2). Remove bearing pin and distance piece (21 and 13) which will remove with it the rear roller housing and adjusting washer (17 and 20) from the lower triangle lever. Collect the needle rollers, remove roller retaining washer (15 and 16) and felt washer (1 and 14) from the lever.

(iii) Remove the split pin, nut and bolt from the Silentbloc bearing at the upper end of the yoke and remove the yoke.

Silentbloc Bearing:

If the rubber of the Silentbloc bearing at the upper end of the yoke has collapsed, a new bearing must be fitted with the aid of a press. If the needle roller path of the roller housings (3 and 17) and the ends of the bearing pin (21) show load markings from the needle rollers, new parts should be fitted.

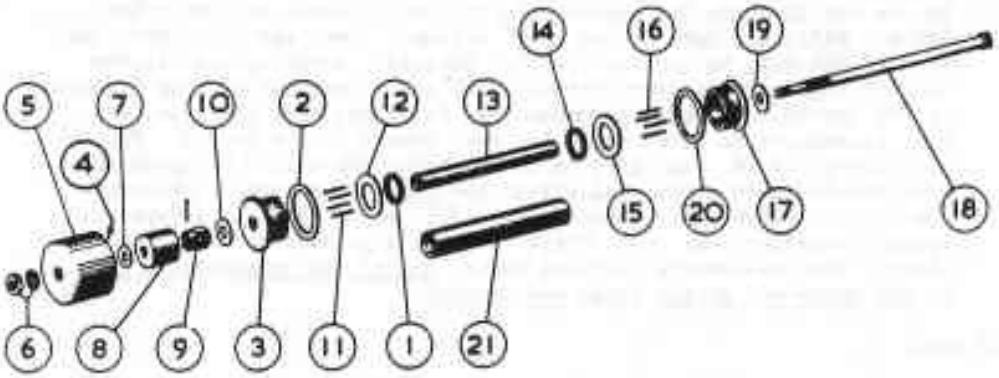


FIG. H17. YOKE LOWER BEARING.

1. Felt Washer.
2. Adjusting Washer (Range of).
3. Roller Housing.
4. Coiled Oil Pipe (Inside Cover).
5. Cover - Coiled Oil Pipe.
6. Nut and Spring Washer.
7. Plain Washer.
8. Distance Piece (Assembly).
9. Nut, Castellated.
10. Washer, aluminium.
11. Needle Roller (27 off) 2.5 x 15.8 mm).
12. Washer, Roller retaining.
13. Distance Piece.
14. Felt Washer.
15. Washer, Roller Retaining.
16. Needle Roller (27 off) 2.5 x 15.8 mm).
17. Roller Housing.
18. Bolt.
19. Washer, aluminium.
20. Adjusting Washer (Range of).
21. Bearing pin.

TO ASSEMBLE LOWER BEARING OF YOKE AND ADJUST END FLOAT OF ROLLER HOUSINGS:

(i) Remove the existing adjusting washers (2 and 20, Fig. H17). Fit the roller housing (3), the bolt (18), the distance piece (8), and the roller housing (3), to the lower triangle lever and tighten up the nut (9). Do not connect the yoke to the lower bearing (triangle lever).

(ii) Determine the thickest adjusting washers (2 and 20) which can be pushed in between the lower triangle lever and the roller housings. These should be of equal or adjacent thickness, i.e. the difference in thickness between the two washers should not exceed .005". This should give .000" to .005" end float of the roller housings and distance piece in the triangle lever. Remove the bolt, the roller housings and the distance piece.

(iii) Fit the bearing pin (21) to the lever and yoke. Place the felt washers (1 and 14) and the roller retaining washers (12 and 15) in position in the lever with chamfered side of washers towards the felt washers. Fit the distance piece. Place the adjusting washers selected on the roller housings with chamfered side against flange. Smear the inside of the roller housings with grease, using the minimum amount to hold needle rollers in position. Fit the needle rollers in each housing. Ensure that the oil holes in the housings are not blocked with grease. Oil the rollers and fit the assemblies into the lever. Fit the bolt (18), using new aluminium washers (10 and 19), tighten up nut (9) and lock.

(iv) Centralise the yoke in the fork of the lower triangle lever as far as the two slots in the bearing pin (21) will allow, and refit the bolts. Refit the bolt to the upper triangle lever and yoke, with the head of the bolt to the front of the chassis. Screw up castellated nut and temporarily secure with a split pin. This nut must be tightened up and locked when front suspension is in normal ride position, i.e. with passengers in front seats and road wheels on the ground. Fit the distance piece (8, Fig. H17) on to the bolt, the coiled oil pipe (4) over the distance piece, and attach the pipe to the yoke. Reconnect the pipe to elbow. Fit plain washer (10), cover (5), and secure with spring washer and nut (6). Check that oil pipe does not foul the cover. With passengers in front seats, tighten the castellated nut at the upper end of the yokes and secure.

FRONT SPRINGS:

On early series chassis, the springs were .600" shorter than current productions, the rating is the same. Bentley export models may be fitted with "Colonial" type or a heavier rated type, of springs to customers requirements.

Packing washers .062" thick, up to ten in number may be used to raise the "standing height". The fitting of one washer raises the standing height by $\frac{1}{8}$". If a number of packing washers are fitted, these should be divided and fitted at the top and bottom of spring.

REMOVAL AND REPLACEMENT OF FRONT SUSPENSION SPRINGS:

To Remove:

(i) Remove the castle nut securing the ball end pin to the side steering lever. Disconnect the outer end of the cross steering tube from the cross steering lever.

With a steady block against the lever at the ball and pin end, tap the eye of the lever out with a drift. Remove nuts and spring washers from the bracket of the front stabiliser and lift from studs. Place the spring retaining bolt tool No. 3752/T1002 downwards through the hole (A, Fig. H18) provided in the top of the front pan and leave in this position.

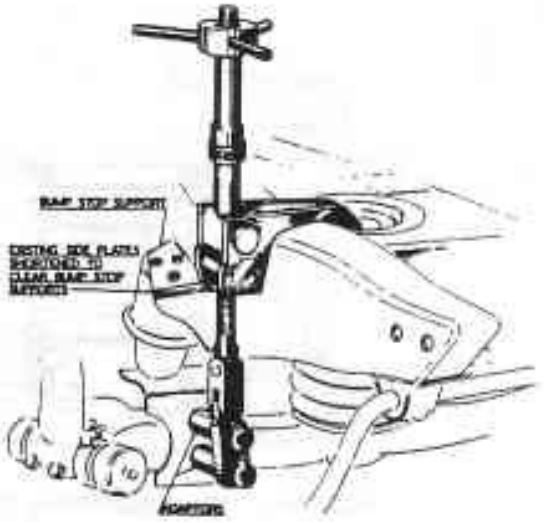


FIG. H18. SPRING COMPRESSION TOOL IN POSITION.

(ii) Place the lower end of the special tool No. 3752/T1008 on the studs of the front stabiliser bracket, with claws fitting under the lip (edge) of the hole in the top of the front pan. Tighten knurled nuts to secure. Compress the spring then fully tighten spring retaining bolt. While compressing spring, guide threaded end of retaining bolt through the hole in the lower buffer stop leaving the spring in position (Fig.H19).

(iii) With the hub held, remove the bolt from the Silentbloc bearing at the upper end of the yoke, and allow the hub to rest on a wooden block. Release the compression tool, and allow the triangle lever to move downwards until the rubber buffer attached to the upper triangle lever rests on its stop. Remove the spring complete with bolt and temporarily reconnect the yoke to the upper triangle lever by means of a tommy bar.

To Replace:

(i) To fit a spring, a "Pot" Special Tool STD-416 will be required to compress and decompress the road spring. Place the spring in the "Pot" and clamp it down fully by tighteneng the two outer nuts of the "Pot". Remove the retaining bolt from the spring.

(ii) With one of the special washers on the bolt, pass the "Pot" centre bolt through the bottom of the "Pot", place the other washer on the cover, and fully tighten the bolt. Remove the outer "Pot" nuts, then gently unscrew the nut on the centre bolt and allow the spring to expand to its full free length.

(iii) With the fabric seatings (1 and 5, Fig. H19), bump stop and adjusting washers (if required), in position, fully compress the spring. Remove the centre bolt from the "Pot", and in its place fit the retaining bolt, and fully tighten the nut.

(iv) Fit the spring to the vehicle. With the spring in position and fully compressed by the compression tool, the yoke should be reconnected to the upper triangle. This must be done before removing the spring retaining bolt. The castellated nut of the yoke bolt may only be fully tightened and split pinned when the car has been lowered to the ground

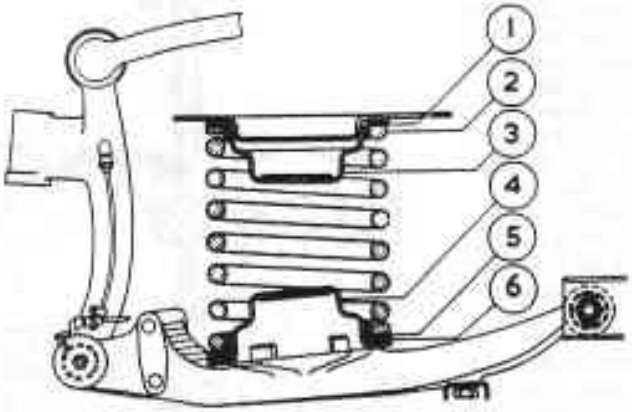


FIG. H19. FRONT SUSPENSION SPRING IN POSITION.

1. Spring Seating (Rubberised fabric).
2. Road Spring.
3. Buffer Stop (Upper).
4. Buffer Stop (Lower).
5. Spring Seating (Rubberised fabric).
6. Adjusting Washer, if required.

and bumped a few times, to settle to its normal loaded state. Should the spring touch the frame, it should be compressed and rotated to a suitable position.

TO REMOVE AND REFIT LOWER TRIANGLE LEVERS:

(i) Remove the front springs and with the yokes temporarily reconnected to the upper triangle levers of the front shock dampers, remove the two stays connected to the lower triangle levers and torque arms.

(ii) Remove the oil feed pipe from the elbow connection on each of the lower levers and disconnect the yokes from the lower levers.

(iii) Remove nuts and setscrews from centre (jacking) plate, do NOT remove the two $\frac{3}{8}$" B.S.F. nuts near the centre. Remove the four 5/16" set-screws, two at the front of the plate and two at the rear, only visible from the upper side. Lower the centre plate from the front pan, exposing the bracket to which the inner ends of the lower triangle levers are attached. Remove the levers from the centre bracket and the bracket from the plate. Check centre bracket for trueness, the principal dimensions are shown in Fig. H20. Replace Silentbloc bearings if necessary.

(iv) Refit the lower triangle levers and check outer ends for correct height as follows:-

(a) Refit bracket to centre plate, inserting setscrews and bolts from the top. Assemble the triangle levers to the bracket, fitting the two bolts so that the castellated nuts face to front of car and lightly tighten the nuts.

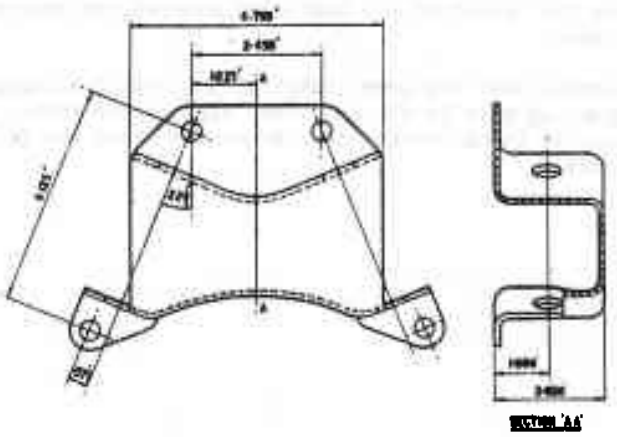


FIG. H20. CENTRE BRACKET - LOWER TRIANGLE LEVERS.

(b) Place a long straight edge against the underside of the centre plate and move one of the triangle levers until the centre of the bore in the outer end of the lever is .200" below the underside of the centre plate as shown in Fig. H21. Tighten up the castellated nut and secure. While tightening the nut, check that the lever has not moved from the .200" position.

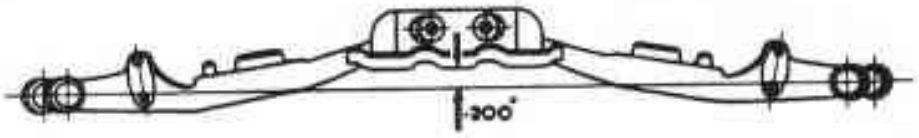


FIG. H21.

TO FIT NEW CENTRE (JACKING) PLATE TO FRONT PAN:

The centre plate or jacking bracket is drilled to register with the holes in the centre pan, above it. The two tapping strips, however, must be marked off, drilled, and tapped as required, using the pan as a template.

TO FIT NEW RUBBER SPHERICAL BEARING BUSH TO REAR END OF TORQUE ARM:

If the rear end of a torque arm can be moved sideways by hand, the rubber bearing has collapsed.

(i) Remove the nuts and spring washers retaining the cap to the bracket and pull the rear of the torque arm downwards. Remove the rubber bearing bush. The spherical end of the torque arm should be cleaned up and polished with medium and fine emery cloth.

(ii) Press the new bush on to the torque arm with the two locating "pips" uppermost. Prior to fitting the bush, squeeze out as much air as possible from it, as soon as the mouth of the bush touches the ball end of the torque arm and rotate while pressing it on.

(iii) Push the end of the torque arm into position against the bracket ensuring that the two "pips" of the bush have entered the corresponding holes in the bracket.

(iv) Fit the cap, ensuring that the lower "pip" of the bush has engaged with the corresponding hole in the cap, then tighten the nuts. Slacken off the nuts about 1½ turns, bounce the car at the front and finally tighten up the nuts.

FRONT SHOCK DAMPERS.

Loading

Up (Bump) - 65 - 75 lbs.
Down (Rebound) - 125 -135 lbs.

Oil - SAE.20.

GENERAL.

The shock dampers are of the double acting type and consist of two pistons operating in oil filled cylinders, the oil being displaced from one cylinder to the other through drilled passages. The degree of damping being controlled by spring loaded valves. Recuperating valves are fitted in bottom of each piston.

REMOVAL.

(i) Jack up car and place blocks under the outer ends of lower triangle levers.

NOTE:- Weight of car must not be taken off blocks until damper is refitted or front spring will be displaced.

(ii) Remove wheel, and disconnect upper triangle lever from stub axle yoke, support hub on wooden block. Remove damper from frame, collect distance washers.

DISMANTLING.

(i) Remove top cover. Unscrew valve caps (13 and 27, Fig.H.22), about half way and drain oil. Remove rebound valve assembly, situated under detachable lever. Remove bump valve assembly from other side. Keep parts separate.

(ii) Remove distance piece carrying rubber rebound stop (1). Slacken pinch bolt and remove lever (2).

(iii) Slacken off pinch bolt on rocker (8). Mark rocker and casing to ensure that pistons are refitted in original bores.

To ensure that splines of main shaft are engaged with same splines on rocker on re-assembly:-

(a) Hold lever in midway position so that gap in top of rocker is in T.D.C. position, scribe a line across the boss of lever and adjacent boss of main casing in line with gap of rocker.

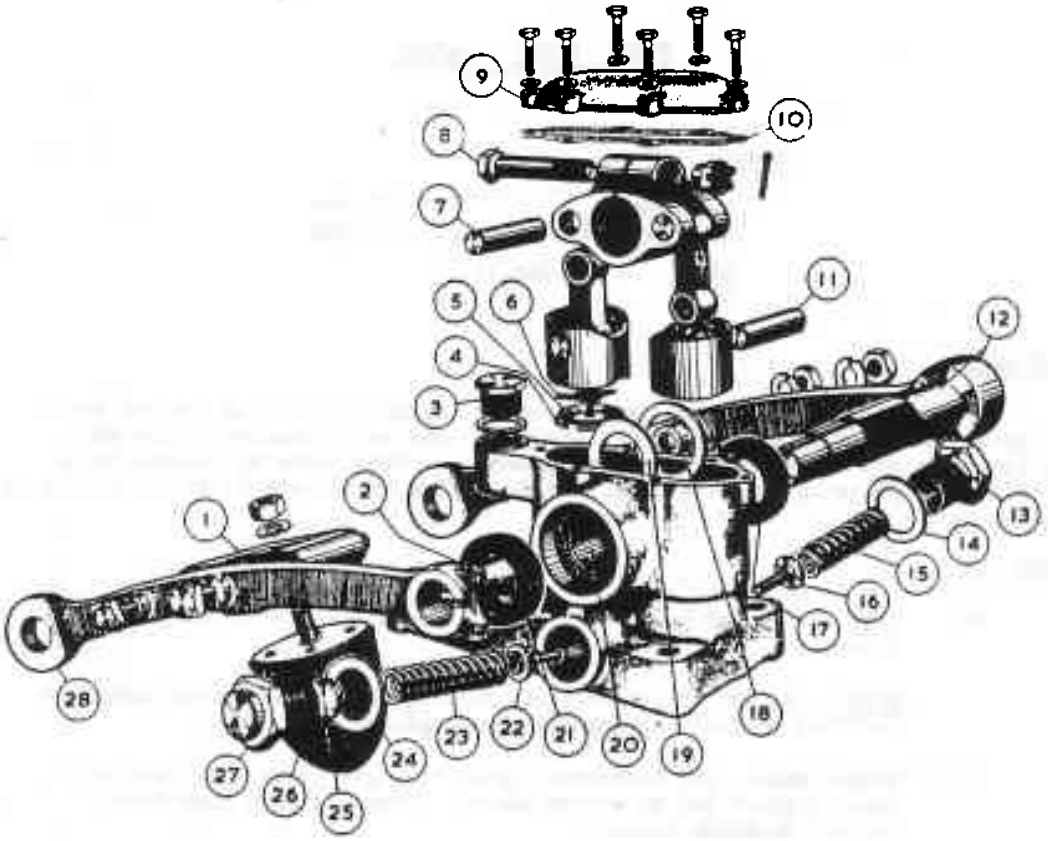


FIG. H.22. FRONT SHOCK DAMPER.

1. Buffer support.
2. Pinch bolt.
3. Filler plug.
4. Spring ring.
5. Dished plate.
6. Replenishing valve assembly.
7. Pin.
8. Rocker bolt.
9. Cover.
10. Joint washer.
11. Pin.
12. Upper triangle lever and mainshaft assembly.
13. Valve cap.
14. Aluminium washer.
15. Bump valve spring.
16. Bump valve.
17. Large gland rubber.
18. Large bearing washer.
19. Small bearing washer.
20. Small bearing bush.
21. Small gland rubber.
22. Rebound valve.
23. Rebound valve spring.
24. Aluminium washer.
25. Adjusting washer (When fitted).
26. Buffer.
27. Valve cap.
28. Upper triangle lever.

(b) Hold lever hard up and scribe a second line on boss of lever in line with previous line.

(c) Hold lever hard down and scribe a third line on boss. Tap out main shaft and lever.

(iv) Remove rocker and piston, bronze thrust washers (18 & 19) and rubber gland (17 & 21). Remove filler cap (3). Remove spring rings (4), dished plates (5) and replenishing valves (6).

RE-ASSEMBLING.

Re-assemble damper in reverse order of dismantling. The bronze thrust washers should be renewed if they are scored. If the pins (7 & 11) are worn, replace.

Fill damper with oil and bleed by pumping levers until all free movement is lost.

PISTON FIT IN BORES OF MAIN CASING.

Selective fitting of pistons is carried out to reduce working clearances to a minimum. Both piston and bores are colour coded and fitted colour to colour. The piston is coloured on its pin boss and the bore at its base:-

PISTON DIAMETER.	BORE DIAMETER.	COLOUR.
1.449 - 1.4495	1.500 - 1.5005	Red
1.4459 - 1.500	1.5005 - 1.501	Green
1.500 - 1.5005	1.501 - 1.5015	Blue
1.5005 - 1.501	1.5015 - 1.502	Yellow

POUNDAGE ADJUSTMENT.

If shock damper test rig is available, adjustment to poundage can be made by varying size of adjusting washers in valve caps.

In certain countries where additional damping may be required, it is permissible to plug one of the two oil leak holes provided in each valve by removing either the bump or rebound valve and soldering up the leak hole in the head of the valve which communicates with the leak hole in the stem of the valve near the head. These two holes should not be confused with the three larger diameter equally spaced holes drilled near the centre of the valve stem.