



FRONT SUSPENSION

FRONT SHOCK DAMPERS





SECTION K.

FRONT SUSPENSION.

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SECTION K.

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THE FRONT HYDRAULIC SHOCK DAMPERS.

DESCRIPTION.

The front hydraulic shock dampers are of Bentley design and manufacture. They are double-acting and effectively damp excessive spring action. The shock damper consists of two pistons operating in cylinders which are maintained full of oil, the latter being displaced from one cylinder to the other through drilled passages, the degree of damping being controlled by spring-loaded valves.

SERVICE.

The level of the oil in the shock dampers should be inspected every 10,000 miles (16,000 Kms.) running, and more oil added if necessary.

For recommended oils, see Sub-Section ED.2.

It is most important that only perfectly clean oil of the correct viscosity should be used, and the following precautions must be observed:-

- (a) Before attempting to remove the filling plug, (6, Fig.2) both the plug and the shock damper casing adjacent to it must be cleaned very carefully with a brush dipped in paraffin, in order to avoid the possibility of dirt entering the hole when the plug is removed.
- (b) Before topping-up the dampers, the oil should be strained through a fine gauze. Straining is greatly facilitated if the oil is first warmed from 50°C to 75°C. especially during cold weather.

The importance of such cleanliness cannot be over-emphasised. A very small particle of foreign matter in the oil may lodge under a valve and impair the effectiveness of the shock damper.

Remove the plug, and top up if necessary, until the oil level reaches the bottom of the filler plug orifice. The oil should be poured in very slowly to avoid entrapping bubbles of air. It will be found most convenient to add oil by means of the small syringe provided in the tool kit. When replacing the plug care must be taken that the joint washer is in position.

POSSIBLE TROUBLES WITH REMEDIES.

Oil Leaks from the Rubber Glands.

Oil leaks have been known to occur from the front shock damper glands (29 and 33, Fig.2) after long periods of service, inspection of the leaking glands will probably reveal that the canvas lining has worn through. The remedy is to fit new rubber glands.



Oil leaks from under the Valve Caps.

An oil leak from under a valve cap (24 and 39, Fig.2) will probably be due to insufficient tightening of the cap. When tightening, a box-spanner should always be used. A damaged aluminium washer under a valve cap will also cause an oil leak.

Squawk-Noises from the Bump and Rebound Valves.

On early chassis, dampers were fitted in which the valve springs (26 and 35, Fig.2) were ground square at each end. With this type of damper, valve noise troubles have been experienced, the noise being a squawking sound, and is due to the rapid vibration of a bump or rebound valve.

Later dampers are fitted with springs having plain ends, that is the wire is cut off abruptly and the end coils are not ground square with the axis of the spring. This has the effect of imposing a small side load on the valve which damps out any tendency to rapid vibration and thereby prevents squawking.

To remedy a squawking valve, either fit the latest type of valve spring, or, cut off half of each end coil, both ends of the existing springs with ground ends, and fit packing washers inside each valve cap to compensate for the reduced free length of the springs. Do not mix the springs and do not damage the smooth surface of the adjacent coils when removing the end half coils.

Knocks from Front Dampers transmitted up the Steering Column.

This is a very unlikely source of trouble, and is caused by mechanical lost-motion due to wear of the piston links and pins (11, 19 and 20, Fig.2) after considerable mileage has been covered. The remedy is to fit new links and pins as necessary.

Loose Bump and Rebound Valve Seats.

On early type front dampers the two valve seats, (44, Fig.3 shows the "bump" valve seat, the "rebound" valve seat on opposite side of damper being identical) were a press-fit in the casing, and in certain circumstances a valve seat has been known to work loose. This is unlikely to happen on later dampers, as the seats are screwed in position.

When a damper is dismantled because of ineffective operation, note whether the seats are of the pressed-in type, the screwed-in type have a hexagon for spannering purposes, if they are of the pressed-in type, check for tightness with a pair of long nosed pliers. Unless the seats are perfectly tight, the screwed-in type should be fitted. Should one seat be found to be loose and the other tight then do not attempt to remove the latter, otherwise damage to the casing would result.

To fit a screwed-in type valve seat it will be necessary to modify the casing by drilling, tapping, counterboring and chamfering as shown in Fig.1. The machining for each valve chamber is the same. No attempt must be made to lap a valve to its seating, therefore, care must be taken not to damage the mating surfaces of the valve and its seat.

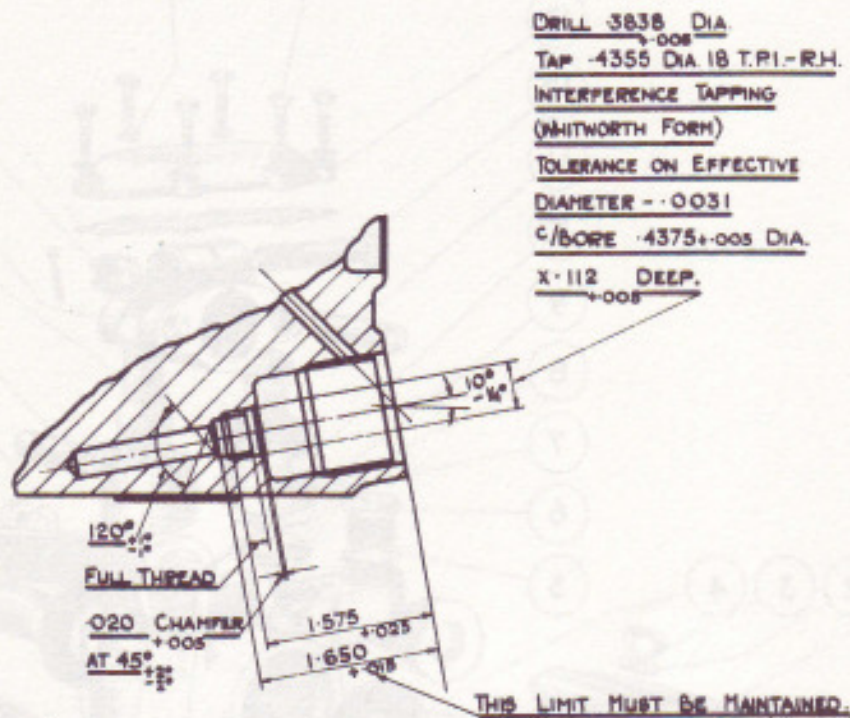


FIG. 1. MODIFICATION TO MAIN CASING WHEN FITTING THE SCREWED-IN TYPE VALVE SEATS.

Excessive Front End "Lightness" (insufficient damping.)

If complaints are received of excessive front end "lightness" or of the front bump buffer hitting the bump stops, increase the bump loading as described in Service Bulletin BB-27 Section K.

TO REMOVE A FRONT SHOCK DAMPER.

- (i) Jack up the front of the car - jack under, and in the centre of the front 'pan'. Place a wood block of suitable height under the outer end of the lower triangle lever, taking care not to damage the aluminium cover protecting the coiled oil feed pipe to the lower bearing of the yoke. Lower the weight of the car on to the wood block. The weight of the car must not be taken off the wood block until the shock damper has been refitted to the car, otherwise the road spring may become displaced.
- (ii) Remove the front wheel. Remove the split pin, nut and bolt from the Silentbloc bearing where the upper triangle levers form the joint at the top of the yoke. On removal of bolt, the hub assembly will pivot on the lower joint of the yoke and fall outwards unless it is supported. A wood block of suitable height should be positioned on which the hub may rest, otherwise the weight will be taken by the flexible pipe of the hydraulic brake system.

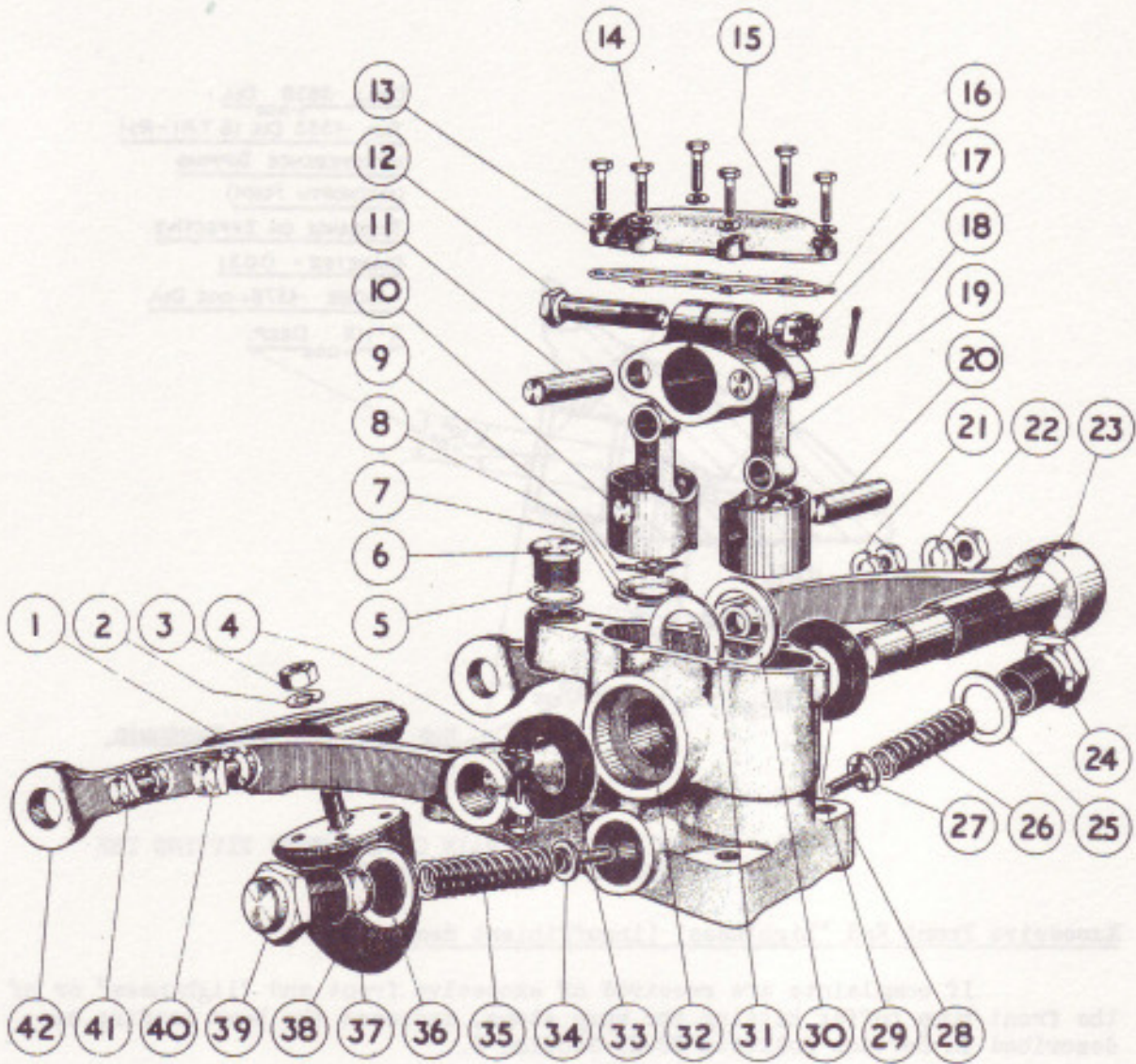


FIG. 2. "EXPLODED" VIEW OF FRONT SHOCK DAMPER.

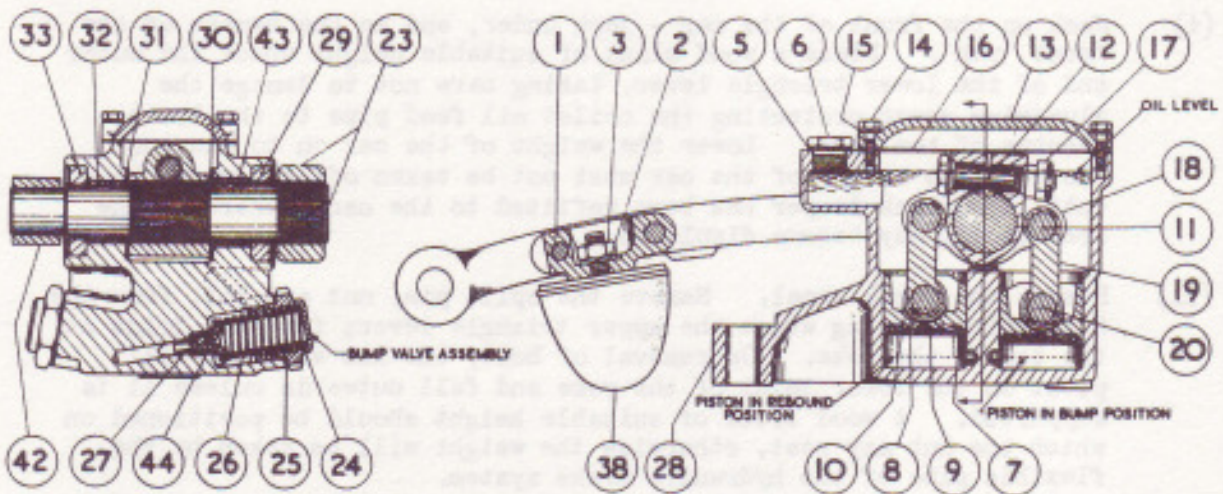


FIG. 3. SECTION THROUGH FRONT SHOCK DAMPER.



NOMENCLATURE (Items 1 to 44).

- | | |
|--|---|
| 1. Buffer Support. | 2. Spring Washer. |
| 3. Nut. | 4. Bolt. |
| 5. Plain Washer (Alum.) | 6. Filler Plug. |
| 7. Spring Ring - Replenishing Valve. | 8. Dished Plate, - Replenishing Valve. |
| 9. Replenishing Valve Assembly. | 10. Piston. |
| 11. Pin - Rocker & Connecting Link. | 12. Bolt (Spherical head) - Rocker. |
| 13. Top Cover - Main Casing. | 14. Setscrew - Top Cover. |
| 15. Spring Washer. | 16. Joint Washer. |
| 17. Nut (Spherical Seat). | 18. Rocker. |
| 19. Connecting Link. | 20. Pin - Piston & Conn: Link. |
| 21. Spring Washer & Nut - Upper Triangle Lever. | 22. Spring Washer & Nut - Upper Triangle Lever. |
| 23. Triangle Lever (Upper) & Main Shaft Assembly. | 24. Valve Cap. |
| 25. Plain Washer. (Alum.). | 26. Spring - Bump Valve. |
| 27. Valve, (Bump). | 28. Main Casing. |
| 29. Gland Rubber - large - Main Shaft. | 30. Bearing Washer - large - Main Shaft. |
| 31. Bearing Washer - small - Main Shaft. | 32. Bearing Bush - small - Main Shaft. |
| 33. Gland rubber - small - Main Shaft. | 34. Valve, (Rebound). |
| 35. Spring - Rebound Valve. | 36. Plain Washer, Alum. |
| 37. Adjusting Washer. | 38. Buffer - Upper Triangle Lever. |
| 39. Valve Cap. | 40. Bolt - Upper Triangle Lever. |
| 41. Bolt - Upper Triangle Lever. | 42. Triangle Lever (Upper). |
| 43. Bearing Bush - large - Main Shaft. }
(See Fig.3.) | 44. Valve Seating (Bush). }
(See Fig.3.) |

Removal of the afore-mentioned bolt will be difficult if the rubber buffer is resting on its stop, this can be overcome by applying weight to front of the car, thus removing the load from the bolt.

- (iii) Push the upper triangle lever upwards clear of the yoke. Remove the three nuts and bolts securing the damper to the frame. On later cars the outer fixing bolt is fitted with its head uppermost, but provision is made on the bump stop bracket for a ring spanner to be used for the removal of the nut. Remove the damper taking care not to lose the two distance washers fitted between the damper and the upper side of the frame and through which the two inner bolts pass..
- (iv) Before cleaning the damper, inspect for any oil leaks from the valve caps and gland rubbers, then clean the damper externally.

TO DISMANTLE A FRONT SPOCK DAMPER.

When removing the rebound and bump valve assemblies as explained below, the parts should be placed in separate containers and suitably labelled "rebound" and "bump". This precaution is necessary as the parts must be replaced in their original positions when re-assembling.



(i) The shock damper should not be held directly in a vice. A convenient method of holding it is to bolt it to a flat plate measuring approximately 7" x 7" x $\frac{3}{8}$ " thick to the back of which a piece of angle iron has been attached, the angle iron being clamped between the vice jaws. This plate when suitably drilled can also be used for holding a rear shock damper.

(ii) Remove the top cover (13, Fig.2) and the joint washer.

(iii) With a box spanner unscrew the valve caps (24 and 39) about half way and then turn the damper upside down and drain the oil from the casing.

(iv) Remove the rebound valve assembly situated underneath the triangle lever (42, i.e. the detachable lever secured by a pinch bolt), as follows:-

Remove the valve cap and plain washer (39 and 36), the adjusting washer or washers (37) which will probably have remained in the valve cap. In isolated cases it may be found that no adjusting washer or washers have been fitted.

Remove the spring (35) and the valve (34). Place the removed parts in a clean and separate container. Repeat for the bump valve assembly on the opposite side of the damper.

(v) Remove the bolts (40 and 41) from the triangle levers, slacken the nut on the pinch bolt (4) and then remove triangle lever (42).

(vi) Remove pinch bolt (12) from the rocker (18). In order to enable the rocker to be fitted the correct way round and the pistons to their original bores when re-assembling, mark the rocker and an adjacent point on the casing by centre punching.

(vii) The next operation is to remove the triangle lever and main shaft assembly (23) from the rocker, but before doing so and in order that the splines on the shaft can be re-engaged in the same relative position with the splines in the rocker when re-assembling, mark the parts as follows:-

While the lever (23) is being held about midway between its fully "up and down" movement so that the gap in the top of the rocker is in the T.D.C. position, scribe a line across the boss of the lever and the adjacent boss on the main casing (28) and in line with the centre of the gap in the rocker.

Push the lever up as far as it will go and then scribe a second line on the boss of the lever and in line with the line already scribed on the casing. Similarly scribe a third line on the boss of the lever, with the lever fully pressed down.

(viii) Using an aluminium drift, remove the lever (23) and then remove the rocker and piston assembly and the two bearing washers (30 and 31).

(ix) Should it be found necessary to remove the replenishing valves (9) from the pistons, then remove the spring rings (7) and the dished plates (8) and then remove the valves.



- (x) In the event of it being necessary to remove the pistons (10) from the connecting links (19) and the connecting links from the rocker, then press out the appropriate pins (11 and 20) as the case may be.
- (xi) Remove the filler plug (6) and its washer.
- (xii) Carefully remove the gland rubbers (29 and 33) from the casing.
- (xiii) All dismantled parts should now be thoroughly cleaned.

TO RE-ASSEMBLE A FRONT SHOCK DAMPER.

It is very important that all parts are assembled in a thoroughly clean condition, as even a very small particle of foreign matter lodging under one of the valves would impair the effectiveness of the shock dampers, therefore the parts should be laid on a piece of clean paper prior to re-assembling, taking care not to mix up the bump and rebound valve parts so as not to upset the loading.

- (i) Mount the damper on the holding plate and fix it in a vice.
- (ii) If the pistons, or, the connecting links have been removed from the rocker for any reason, they should be re-assembled so that the cut-away sides of the pistons are facing each other as shown in Fig.2.
- (iii) If the replenishing valve (9) has been removed from the pistons then replace the valve, the dished plate (8) and the spring ring (7) to retain.
- (iv) Place the rocker assembly the correct way round in the casing as indicated by the centre punch marks, fit the bearing washers (30 and 31) each side of the rocker, the washer with the larger hole in it should be fitted near the lever (23).
- (v) Place the large gland rubber (29) over the shaft and against the lever (new gland rubbers should be fitted if the existing ones are not in good condition), and then fit the lever and shaft assembly to the casing as follows:-
 - (a) Centralise the bearing washers and the rocker and then line up the centre of the slot in the rocker with the scribed line on the boss of the casing.
 - (b) Enter the shaft part way into the casing. Line up the centre scribed line on the lever with the one on the casing and also with the centre of the gap in the rocker and then tap the shaft about half way into the casing until the splines of the shaft have engaged with those of the rocker for about half their length. Press the gland rubber (29) into position in the casing and then tap the shaft fully home.
 - (c) Now check that the shaft is in the original position in relation to the rocker by moving the lever to its extreme positions and noting whether the outer scribed lines on the lever line up with the scribed line on the casing. Fit the pinch-bolt (12) to the



rocker, (with bolt head facing outer end of damper as shown in Fig.2) tighten up the nut and secure with a new split pin.

- (d) Fit the gland rubber (33) to the casing and then refit the triangle lever (42) but do not tighten up the pinch-bolt (4) at this stage.
- (vi) Replace the buffer support (1) and secure with the bolts, spring washers and nuts, lightly tap the lever (42) at the shaft end to line up and then tighten up the pinch-bolt to lock.
- (vii) Refit the bump and rebound valve assemblies to their appropriate positions (i.e. the rebound valve assembly should be fitted under the lever clamped to the shaft by the pinch-bolt (4) and screw in the valve caps three or four turns at this stage.
- (viii) It will now be necessary to fill the damper with the correct oil, and expel all traces of air from the damper as follows:-

While pouring in the oil, work the triangle lever up and down and at the same time progressively screw in the valve caps, until the caps are about three turns from the fully screwed-in position, then, half fill the casing with oil, again work the lever up and down to expel the remainder of the air and securely tighten up the valve caps with a box spanner. The dampers are correctly bled when all traces of lost motion have disappeared from the triangle lever with the valve caps tightened. If there is still air in the system, screw back the valve caps about half-way and repeat the "pumping" operation, progressively screwing in the valve caps at the same time.

- (ix) Fill the damper with oil until level with the bottom of the filler orifice. Fit the top cover using a new joint washer, and finally replace the filler plug.

TO REFIT A FRONT SHOCK DAMPER.

- (i) Place the two distance washers on the upper side of the frame, i.e. the washers which are fitted between the damper and the frame through which the two inner bolts pass.
- (ii) Should the two inner bolts (which are identical) have fallen out of position during the removal of the damper, then ascertain before refitting them, that the two bevelled washers are in position on the bolts. It will be observed that one of these washers has a flat on it for frame clearance, the bolt containing this washer should be fitted to the inner rear hole. Position the two inner bolts (making sure that they have passed through the tubular part of the distance piece as fitted to the inside of the frame) until the ends of them have engaged with the two distance washers on the upper side of the frame. Place the damper in position, push up the two bolts and secure with the spring washers and nuts but do not fully tighten the nuts at this stage.
- (iii) With the metal rebound stop in position, fit the outer bolt. If, when dismantling, it was found that the bolt was inserted from below, then fit the bevelled washer adjacent to the bolt head and the spring washer under the nut.



- (iv) With the three nuts securing the damper, lightly tightened up, adjust the metal rebound stop so that the stops on it are in line with those on the underside of the upper triangle lever and then fully tighten up the three nuts.
- (v) Refit the bolt to the yoke and the upper triangle lever, tighten up the nuts and secure with a new split pin.
- (vi) Replace the front wheel, jack up car, remove the wooden block and then remove the jack.

NOTES ON FIT OF PISTONS IN BORES OF MAIN CASING.

On later front shock dampers selective fitting of the pistons and casing has been employed in order to reduce working clearances to a minimum. Both piston diameter and casing bores have been divided into four ranges of size. The ranges are denoted by a colour on the pin boss in the piston and a colour just above the bores in the main casing. The colours of both piston and bore must be the same for satisfactory operation, i.e. colour to colour.

The main casing is painted as follows to denote the bore diameter:-

Bore dia:	Colour
1.500 - 1.5005	Red
1.5005 - 1.501	Green
1.501 - 1.5015	Blue
1.5015 - 1.502	Yellow

The piston is painted as follows to denote the diameter of the piston:-

Size.	Colour
1.449 - 1.4495	Red
1.4495 - 1.500	Green
1.500 - 1.5005	Blue
1.5005 - 1.501	Yellow



FRONT SUSPENSION

STUB AXLES, PIVOT PINS, YOKES, LOWER TRIANGLE LEVERS & TORQUE ARMS.

1. METHOD OF LUBRICATION OF THE PIVOT PIN BEARINGS, THE BEARINGS AT THE LOWER END OF THE YOKE, AND THE OUTER BALL JOINTS OF THE TWO CROSS STEERING TUBES:

Oil under pressure from the centralised chassis lubrication system is delivered by an external brass coiled pipe, connected at one end to a 3-way junction, situated on the torque arm and at the other end to a non-restricted elbow fitted to the front of the yoke from where the oil passes through an oil passage in the yoke ('A' Fig.4), which registers with an oil hole in the pivot pin (17), and fills the "reservoir" ('B') in the pin. A dowel screw (5 Figs.4 & 5) is provided for correctly positioning the pivot pin in relation to the oil passage in the yoke. Oil from the "reservoir" is supplied to the upper roller bearing (13) through the clearance between a loose restricting pin (4) and the internal bore in the upper end of the pivot pin, the clearance being so arranged to meter the correct amount of oil. Oil from the same source is supplied to the lower needle roller bearing (16) and the thrust washer (7) via a non-removable press fit brass sleeve ('C' Fig.4) fitted near the lower end of the pin. The inner bore of this sleeve provides metering clearance between itself and the outer diameter of the oil feed tube (10).

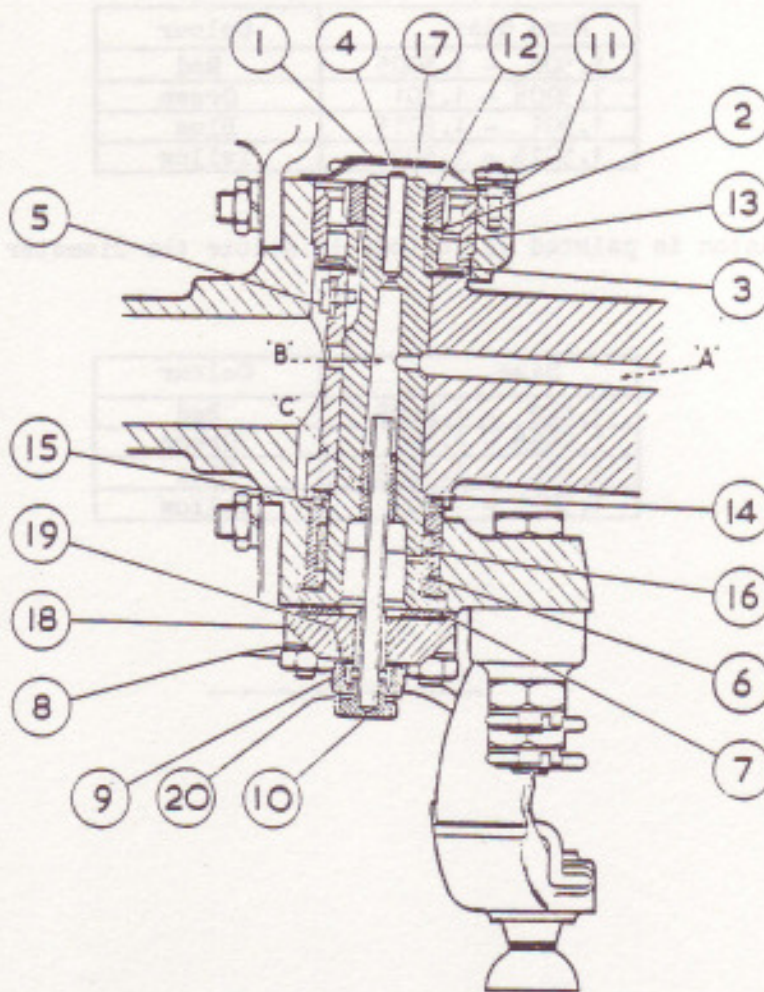


FIG.4 SECTION - PIVOT AXLE.(PIVOT PIN & BEARINGS).



It will be seen upon reference to Fig.4, that the oil feed tube (10) projects upwards into the hollow pivot pin. Oil from the "reservoir" passes through the tube to a banjo connection (9) and then via an external brass pipe to the outer ball joint of the cross steering tube.

From the above, it will be observed that the oil supply to the upper and lower bearings of the pivot is controlled, whereas the oil supply to the outer ball joint of the cross steering tube is not controlled other than by the fit of the lower ball pad against the ball pin.

Oil to the needle roller bearings at the lower end of the yoke is also delivered by an external brass pipe, connected at one end to the 3-way junction on the torque arm and at the other end to an elbow type meter valve, situated on the lower triangle lever from where the correct amount of oil is supplied to the bearing via drilled passages.

The above method of lubrication is the same for both the right-hand and left-hand side stub axles, the bearings at the lower end of the yokes and the outer ball joints of the two cross steering tubes.

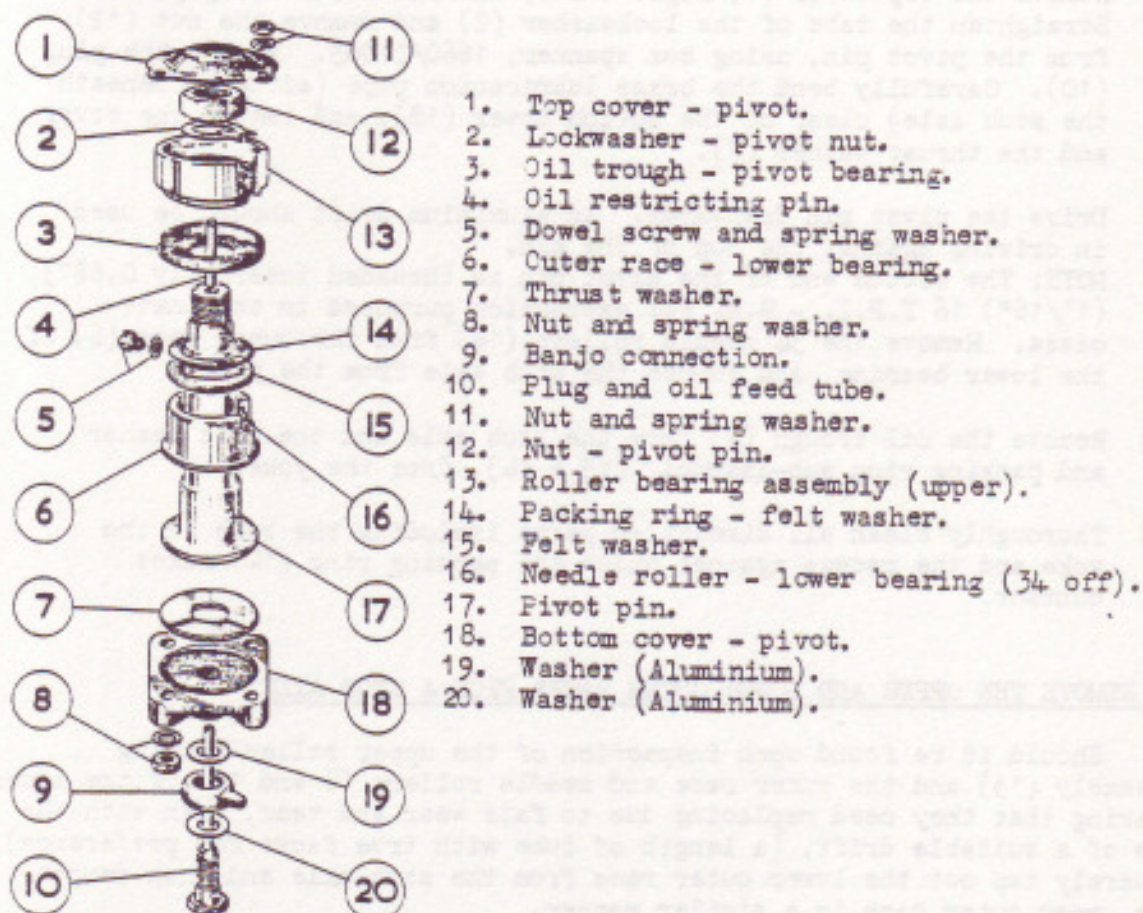


FIG. 5. EXPLODED VIEW - PIVOT AXLE (PIVOT PIN & BEARINGS).



2. TO REMOVE A STUB AXLE FROM A YOKE.

- (i) Disconnect the front brake hydraulic pipe (flexible hose) from the bracket situated on the frame. (See Sub-Section BJ-5 "To remove the hydraulic expanders"). It should not be necessary to unscrew the hose connection from the expander. Cover up the end of the pipe to prevent the ingress of foreign matter.
- (ii) Remove the front hub complete with the brake drum from the stub axle. (See Sub-Section BT-1, "To remove a front hub"). DO NOT touch the brake shoe linings with greasy hands or allow any oil or grease to contact them.
- (iii) Remove the eight nuts and spring washers, situated inside the grease catcher, from the bolts and studs securing the brake carrier plate to the stub axle and tap back the four bolts. Remove the brake carrier plate complete with the brake shoes, taking care not to damage the Klingerite joint fitted between the carrier plate and the stub axle.
- (iv) Remove the ball joint (ball pin) of the cross steering tube from the cross steering lever attached to the stub axle (See "NOTE" under "General-Side Steering Tube" in Sub-Section BQ-3).
- (v) Remove the top cover (1, Figs. 4 & 5) and the restricting pin (4). Straighten the tabs of the lockwasher (2) and remove the nut (12) from the pivot pin, using box spanner, 1660/T1005. Remove the plug (10). Carefully bend the brass lubrication pipe (situated beneath the stub axle) clear of the bottom cover (18), and remove the cover and the thrust washer (7).
- (vi) Drive the pivot pin downwards. An aluminium drift should be used in driving against the top of the pin.
NOTE: The bottom end of the pivot pin is threaded internally 0.6875, (11/16") 16 T.P.I. - R.H. for extraction purposes in obstinate cases. Remove the 3/4 needle rollers (16) from the outer race (6) of the lower bearing, and remove the stub axle from the yoke.
- (vii) Remove the oil trough (3) from the stub axle and the felt washer and packing ring sub-assembly (15 & 14), from the yoke.
- (viii) Thoroughly clean all dismantled parts including the bore in the yoke and the recess against which the packing ring (14) makes contact.

3. TO REMOVE THE UPPER AND LOWER OUTER RACES FROM A STUB AXLE.

Should it be found upon inspection of the upper roller bearing assembly (13) and the outer race and needle rollers (6 and 16) of the lower bearing that they need replacing due to fair wear and tear, then with the use of a suitable drift, (a length of tube with true faces for preference), squarely tap out the lower outer race from the stub axle and then remove the upper outer race in a similar manner.



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4. TO FIT A NEW LOWER OUTER RACE TO A STUB AXLE:

With the bores in the stub axle, thoroughly cleaned and free from scores or burrs, remove the tubular nut and sleeve from the tool 1660/T1007 and 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. Lightly lubricate the new outer race (6) and place it in position on the draw bar followed by the sleeve of the tool and with the tubular nut and a suitable tommy bar, screw up the tubular nut until the outer race is pressed fully home against the shoulder in the stub axle.

NOTE: The tool (1660/T1007) cannot be used when the outer race of the upper roller bearing is in position in the stub axle, therefore the outer race of the lower needle roller bearing is pressed in first. If the tool is not available, then the outer race should be pressed into position.

5. TO FIT A NEW UPPER OUTER RACE TO A STUB AXLE:

NOTE: To fit the above, it will be necessary to temporarily fit the pivot pin to the stub axle on the bench. Proceed as follows:-

- (i) Lightly smear the roller path of the outer race (6) of the lower bearing with a soft type of grease, just sufficiently to hold the rollers in position. Place the $\frac{3}{4}$ new needle rollers in the bearing and then fit the pivot pin in position. Place the thrust washer (7) into the recess in the bottom cover (18) and temporarily fit the bottom cover securing it with the four spring washers and nuts to keep the pivot pin in position.
- (ii) Screw the adaptor of tool No: STD-529 on to the pivot pin. Lightly lubricate the new outer race of the upper bearing, and with the race track of it at the bottom, place it on to the adaptor. Using the special punch (STD-529), press or tap in the race as far as it will go and until it contacts the shoulder in the stub axle.
- (iii) Remove the tool, the bottom cover and the pivot pin.
NOTE: If the tool is not available, then the outer race should be pressed into position, in which case, it would not be necessary to temporarily fit the pivot pin to the stub axle.

6. TO REFIT A STUB AXLE TO A YOKE:

NOTE: If the lower portion of the pivot pin which forms the inner race for the lower needle roller bearing is found to be worn or shows evidence of load markings from the needle rollers, then a new pin should be fitted.

- (i) As a precautionary measure, ascertain that the dowel screw (5) fitted to the yoke is tight.
- (ii) With the lip of the oil trough (3) uppermost, place it into position against the upper outer race as shown in Fig.4. Place the metal packing ring and felt washer sub-assembly (14 & 15) in the recess provided in the yoke as shown in Fig.4, i.e. with the packing ring against the yoke. Renew the felt washer if necessary and soak in oil before fitting.



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- (iii) With the $\frac{3}{4}$ needle rollers in position in the lower bearing, place the stub axle on to the yoke, taking care not to displace or ruffle the felt washer. Enter the pivot pin, (the pin has a taper of 1 in 200 on dia.) as far as it will go by hand, which will require careful sighting upon entering, in order to make sure that the narrow slot in the top of the pivot pin is lying in a radial line with the dowel screw (5). Precaution must be taken not to damage the dowel screw when entering the pin in the yoke, especially when tapping it fully into position, i.e. the narrow slot in the pin must correctly engage with the dowel screw. The pin must be driven in until the shoulder on the pin makes contact with the corresponding shoulder in the yoke.
- (iv) Tap the new roller and cage assembly squarely into position on the pivot pin, taking care not to allow the rollers to score the roller path of the outer race, fit a new lockwasher (2), tighten up the nut (12), using the box spanner 1660/T1005, but do not bend up the tabs of the lockwasher at this stage. (See Sub-paragraph vii).
- (v) Lubricate and place the thrust washer (7) into the recess in the bottom cover.
NOTE: The thickness of a new thrust washer is 0.098" - 0.001 (2.48 mm) and the depth of the recess in the bottom cover is 0.100" + 0.004 (2.54 mm). Should the washer found to be worn appreciably in excess of this figure, or if the friction faces are scored, then a new thrust washer should be fitted in order to eliminate end-lift of the stub axle. Fit the bottom cover after having smeared the joint face with a jointing compound and fully tighten up the nuts (8).
- (vi) Ascertain that the stub axle can be freely moved from one full lock to another, apart from normal drag caused by the felt washer. If found to be stiff, then with the aid of a soft aluminium drift, give the lower cover a few sharp taps upwards and check the pivot pin nut (12) for tightness. Stiffness in the stub axle may be caused by the following :-
- Presence of foreign matter between the shoulder on the pivot pin and the corresponding shoulder in the yoke preventing the pin from being driven fully into position.
 - Damaged felt washer or its packing ring.
 - Thrust washer too thick. This only applies if a new thrust washer has been fitted.
 - Roller path of upper outer race of stub axle scored.
- if it is found that a new thrust washer is the cause of the trouble, then it should be evenly reduced in thickness until the stub axle can be freely moved from lock to lock with only a slight amount of end lift.
- (vii) Bend up the tabs of the lockwasher (2) to secure the pivot pin nut. Place the restricting pin (4) into the pivot pin, lubricate the upper bearing with oil. Smear the joint face of the top cover (1) with a jointing compound and fit the cover.



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- (viii) Place a new aluminium washer on each side of the banjo connection (9), and then fit the plug and oil feed tube (10) to the bottom cover.
- (ix) Refit the ball joint (ball pin) of the cross steering tube to the cross steering lever (See "Note" under "General - Side Steering Tube" and paragraph "To refit a cross steering tube" in Sub-Section EQ-3.), and secure the nut with a new split pin of the correct size.
- (x) With the Klingerite joint in position on the stub axle, refit the brake carrier plate complete with the brake shoes to the stub axle, and secure with the eight spring washers and nuts.
- (xi) Refit the front hub complete with the brake drum and re-adjust the front brake (See Sub-Section BT-1, "To refit a front hub").
- (xii) Reconnect the front brake hydraulic pipe.
- (xiii) Bleed the front hydraulic brake system (See Sub-Section BJ-2, "Bleeding the Hydraulic System").

7. TO REMOVE A YOKE FROM THE LOWER & UPPER TRIANGLE LEVERS.

- (i) Remove the nut and spring washer (6 Fig.6), the cover (5) and the plain washer from the bolt (18).
- (ii) Disconnect the coiled oil pipe (4) from the three-way junction situated on the torque arm and from the elbow connector fitted to the front of the yoke. Remove the clip from the yoke and then remove the pipe and the distance piece (8). Cover up the Bijur connections to prevent ingress of foreign matter.
- (iii) Remove the split pin and castellated nut (9) and the aluminium washer (10). Remove the two clamping bolts from the lower end of the yoke.
- (iv) Tap out the bolt (18). Remove the roller housing (3), together with the adjusting washer (2). Remove the bearing pin and the distance piece (21 & 13) which will remove with it the rear roller housing and adjusting washer (17 & 20) from the lower triangle lever. Attach each adjusting washer to its respective housing.
- (v) Collect the needle rollers, remove the roller retaining washers (12 & 15) and felt washers (1 & 14) from the lever.
- (vi) Remove the split pin, nut and bolt from the Silentbloc bearing at the upper end of the yoke and remove the yoke.
- (vii) All dismantled parts should now be thoroughly cleaned.

8. INSPECTION OF THE SILENTBLOC BEARING & THE NEEDLE ROLLER BEARINGS OF THE YOKE.

SILENTBLOC BEARING.

If upon inspection it is found that the rubber of the Silentbloc bearing at the upper end of the yoke has collapsed, then a new bearing

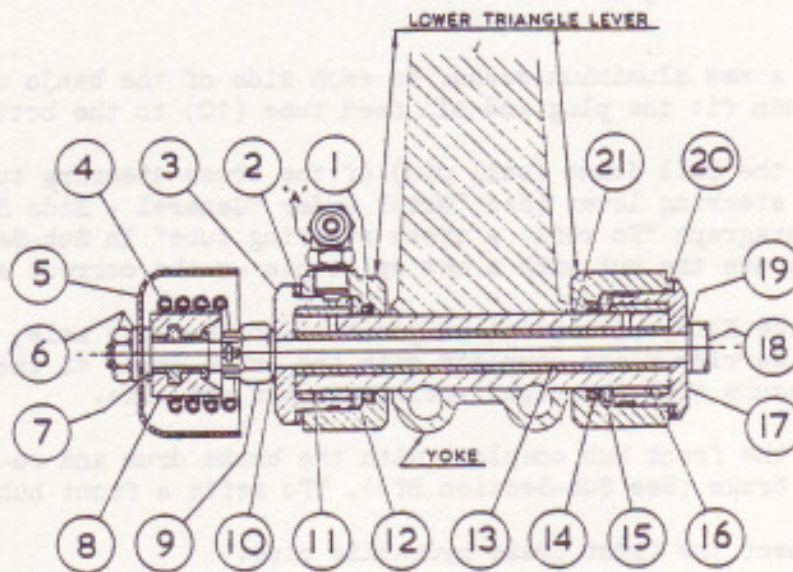


FIG. 6. SECTION - YOKE LOWER BEARING.

- | | |
|--------------------------------|---|
| 1. Felt washer. | 11. Needle roller (27 off) 2.5 x 15.8 m/m |
| 2. Adjusting washer (range of) | 12. Washer, roller retaining. |
| 3. Roller housing. | 13. Distance piece. |
| 4. Coiled oil pipe. | 14. Felt washer. |
| 5. Cover - coiled oil pipe. | 15. Washer, roller retaining. |
| 6. Nut & spring washer. | 16. Needle roller (27 off) 2.5 x 15.8m/m |
| 7. Plain Washer. | 17. Roller housing. |
| 8. Distance piece (Assy.) | 18. Bolt. |
| 9. Nut, castellated. | 19. Washer, aluminium. |
| 10. Washer, aluminium. | 20. Adjusting washer (range of). |
| | 21. Bearing pin. |

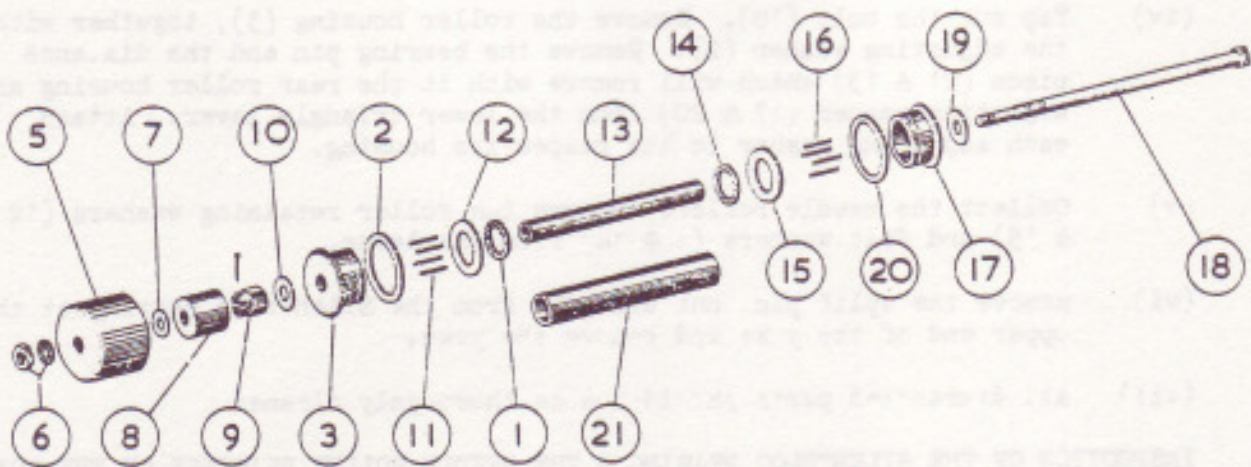


FIG. 7. EXPLODED VIEW - YOKE LOWER BEARING.



should be fitted. The bearing can be removed and a new one fitted with the aid of a press and two pieces of drawn steel tube of the following dimensions:-

a) TUBE FOR SUPPORTING THE YOKE:

Outside diameter 1.875" Sectional thickness 7 SWG (.176") Length 2.500"

b) TUBE FOR REMOVING & REFITTING A SILENTBLOC BEARING:

Outside diameter 1.500" (Turn this diameter to 1.475" dia.) Sectional thickness 7 SWG (.176") Length 2.500"

Lightly smear the outer casing of the bearing with grease before pressing it into position. If desired, a tool can be made for the above mentioned operations as shown in Figs. 8 & 9 of which the two principal dimensions are given. Fig.8 shows the tool in position on the yoke prior to removing the bearing, and Fig.9 shows the tool in position prior to pulling into position a new bearing. When fitting a new bearing the "end piece" (3 Fig.8) should be removed from the tool and the "refitting cap" (7 Fig.9) used in place of it. The advantages of the tool are:-

- c) The Silentbloc bearing can be removed and a new one fitted with the yoke in position on the car.
- d) The tool can be used for removing the Silentbloc bearing fitted to the inner end of each of the lower triangle levers and for pulling a new bush into position should this operation at any time be necessary. (See paragraph 10, Sub-paragraph vii).

NEEDLE ROLLER BEARINGS:

The following parts may require replacement due to fair wear and tear:-

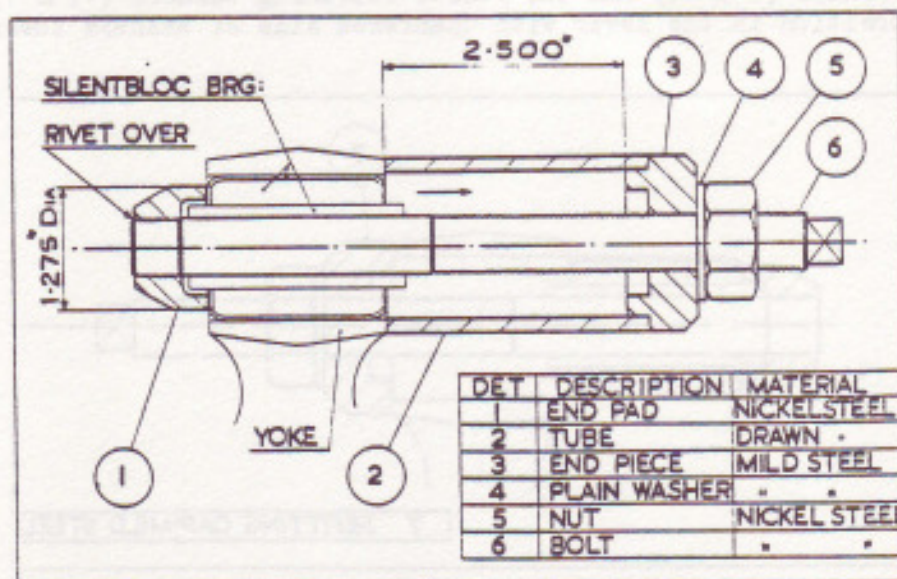


FIG. 8.



- a) Needle Rollers (11 & 16 Figs. 6 & 7.)
- b) Felt Washers. (1 & 14 Figs. 6 & 7.)

If the needle roller path of the roller housings (3 & 17) and the ends of the bearing pin (21) which forms the inner race for the two needle roller bearings, show evidence of load markings from the needle rollers, then new parts should be fitted as found necessary. It should be noted that the following parts are identical with one another:-

Felt Washers.	(1 & 14 Figs. 6 & 7.)
Washers, roller retaining.	(12 & 15 " " ")
Needle rollers.	(11 & 16 " " ")
Adjusting Washers(except for thickness)	(2 & 20 " " ")
Roller housings.	(3 & 17 " " ")

9. TO ASSEMBLE THE LOWER BEARING OF THE YOKE & ADJUST END FLOAT OF ROLLER HOUSINGS:

- (i) Remove the existing adjusting washers (2 & 20, Fig.6) from the roller housings.
- (ii) Fit the roller housing (17), the bolt (18), the distance piece(13), and the roller housing (3), to the lower triangle lever and tighten up the nut (9). Do not, at this stage, connect the yoke to the lower bearing (triangle lever).
- (iii) Next determine the thickest adjusting washers (2 & 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" (0.13 m/m). This should give .000" to .005" end float of the roller housings and distance piece in the triangle lever.
- (iv) Remove the bolt, the roller housings and the distance piece.
- (v) Fit the bearing pin (21) to the lever and yoke. Place the felt washers (1 & 14) and the roller retaining washers (12 & 15) in position in the lever with chamfered side of washers towards the

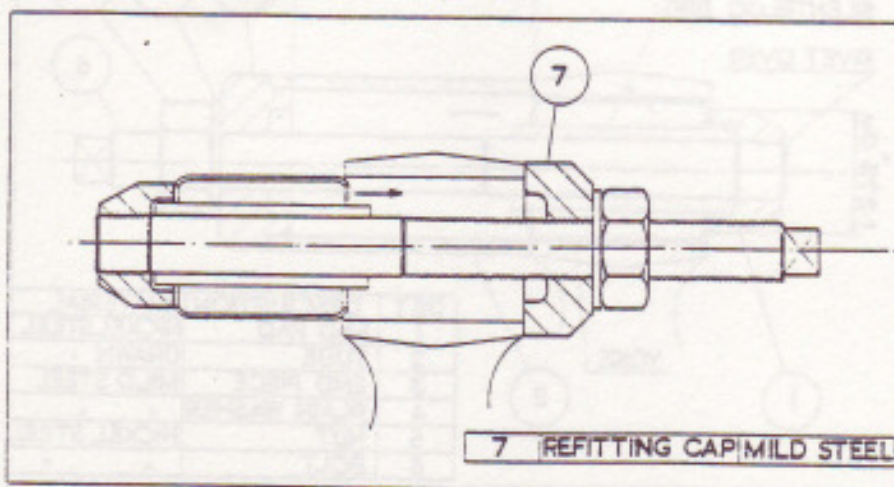


FIG 9.



felt washers as shown in Fig. 6.

- (vi) Fit the distance piece. Place the adjusting washers selected on the roller housings with chamfered side against flange. Lightly smear the inside of the roller housings with a soft type of grease (only use absolute minimum amount to hold needle rollers in position.)

Fit twenty-seven needle rollers in each housing, making sure that in fitting them, the oil holes in the housings have not been blocked up with grease. Lightly oil the rollers and fit these assemblies into the lever.

- (vii) Fit the bolt (18), using two new aluminium washers (10 & 19) and tighten up the nut (9) and lock.
- (viii) 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 two bolts removed from the yoke and secure with the spring washers and nuts.
- (ix) Refit the bolt to the upper triangle lever and yoke, with the head of the bolt to the front of the chassis. Lightly screw up the castellated nut at this stage, and temporarily secure with a split pin. This nut must be tightened up and locked when the front suspension is in the normal ride position, i.e. with passengers in front seats and road wheels on the ground.
- (x) Place the distance piece (8 Fig.6) on to the bolt. Fit the coiled oil pipe (4) over the distance piece, attach the pipe to the yoke by the clip provided and reconnect the pipe to the elbow connection on the yoke and to the three-way junction on the torque arm.
- (xi) Fit the plain washer (7), the cover (5), and secure with the spring washer and nut (6). Check that oil pipe does not foul the cover.
- (xii) Repeat for the opposite side.

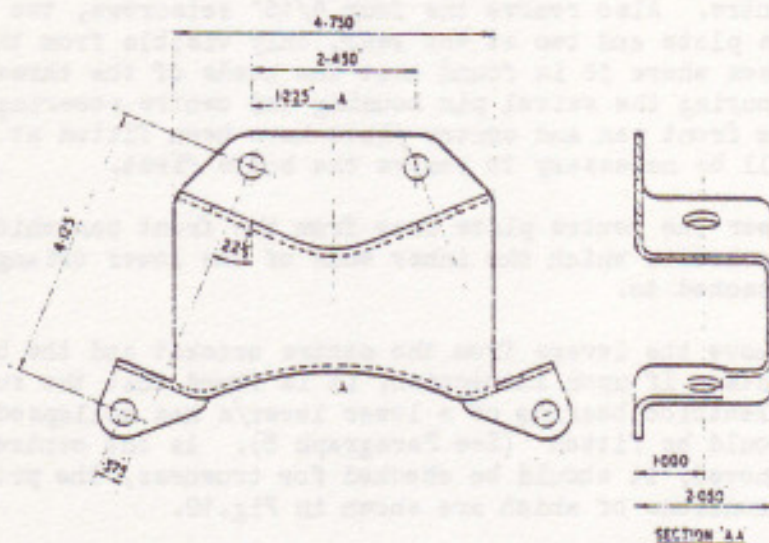


FIG. 10. CENTRE BRACKET - LOWER TRIANGLE LEVERS.



- (xiii) After completion of the work, remove jacks, and with passengers in front seats, tighten up the castellated nut at the upper end of the yokes and secure with a new split pin of correct size.

10. TO REMOVE & REFIT LOWER TRIANGLE LEVERS:

Should it be found necessary for any reason to remove the above, then proceed as follows:-

- (i) Remove the front road springs as described in Service Bulletin Nos:BB-39 and BB-39a (Section K).
- (ii) 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.
- (iii) Disconnect the oil feed pipe from the elbow connection on each of the lower levers and cover up the connections to prevent ingress of foreign matter.

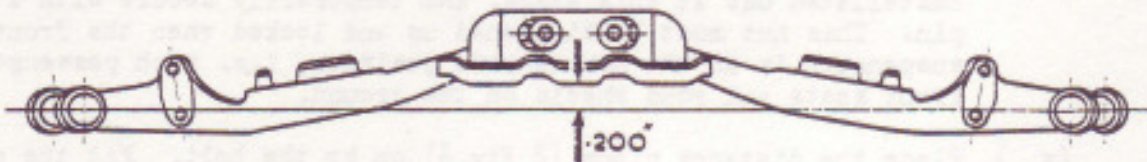


FIG. 11.

- (iv) Disconnect the yokes from the lower levers as described in paragraph 7 - Sub-paragraphs (i) to (v).
- (v) Remove all visible 5/16" (B.S.F.) nuts and setscrews from the underside of the centre (jacking) plate securing the centre plate to the front pan, but do not remove the two 3/8" (B.S.F.) nuts near the centre. Also remove the four 5/16" setscrews, two at the front of the plate and two at the rear, only visible from the upper side. In cases where it is found that the heads of the three 5/16" bolts, securing the swivel pin housing and centre steering lever unit to the front pan and centre plate have been fitted at the bottom, it will be necessary to remove the bolts first.
- (vi) Lower the centre plate away from the front pan which will expose the bracket to which the inner ends of the lower triangle levers are attached to.
- (vii) Remove the levers from the centre bracket and the bracket from the plate. If upon inspection, it is found that the rubber of a Silentbloc bearing of a lower lever/s has collapsed, a new bearing should be fitted (See Paragraph 8). As the centre bracket has been removed, it should be checked for trueness, the principal dimensions of which are shown in Fig.10.
- (viii) Refit the lower triangle levers and check outer ends for correct height as follows:-



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- a) Refit the bracket to the centre plate. The setscrews and bolts should be inserted from the top.
 - b) Assemble the triangle levers to the bracket, fitting the two bolts so that the castellated nuts face to front of car and lightly tighten up the nuts.
 - c) 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" (5 m/m) below the underside of the centre plate as shown in Fig. 11. Tighten up the castellated nut and secure with a new split pin. While the nut is being tightened, check that the lever has not moved from the .200" position.
 - d) Repeat for the other lever.
- (ix) Refit the remaining parts as previously described. The refitting of front springs is described in Service Bulletins Nos: BB-39 and BB-39a (Section K).

11. TO FIT A NEW CENTRE (JACKING) PLATE TO THE FRONT PAN:

- (i) It will be assumed that in the event of the front pan (frame) having been damaged that the necessary repairs will have been carried out. The new centre plate as supplied will have certain holes left undrilled.
- (ii) On the underside of the centre plate, there are two .421" diameter clearance holes masked by the welded-on rectangular tapping strip. Drill a .328" (8.3 m/m) diameter hole in each tapping strip concentrically with the corresponding .421" diameter holes in the plate. From the upper side of the plate, tap the two holes in the strip to .375" diameter (B.S.F.) 20-T.P.I. - R.H. and attach the centre bracket to the plate with the two setscrews.
- (iii) Find the centre of the bracket at front end and check that the centre is equidistant from each side of the plate. Square up if necessary. Drill two .375" diameter holes in the plate concentrically with the two corresponding holes at the front end of the bracket. Remove the bracket.
- (iv) On the rear flange of the front pan, three holes .343" + 5 (11/32nds) on a 2.125" P.C. diameter, exist through which pass the three bolts securing the swivel pin housing and centre steering lever unit to the front pan and centre plate. Another hole 1.1875" + 1 (1-3/16") is also drilled in which the 1.1865"-1 dia. at the lower end of the housing of the above mentioned unit spigots. It will be necessary to mark off and drill holes of the same size in the centre plate using the holes in the pan (not the original holes in the old centre plate) as a template. Chalk the centre plate as necessary and temporarily fit it to the pan and carefully mark off (scribe) the centre plate and drill the holes. Check that the end of the housing fully spigots in the hole and that the three bolts pass freely. Remove the centre plate.



- (v) Fit the bracket and remaining parts as previously described.

12. TO FIT A NEW RUBBER SPHERICAL BEARING BUSH TO THE REAR END OF A TORQUE ARM:

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

- (i) Place the car over a pit or on a ramp and jack up the front sufficiently to take the weight off the tyres.
- (ii) Remove the three nuts and spring washers retaining the cap to the bracket and pull the rear of the torque arm downwards.
- (iii) Remove the rubber bearing bush. Clean the inside of the bracket.
- (iv) If the spherical end of the torque arm shows signs of rust, it should be cleaned up and polished with medium and fine emery cloth.
- (v) 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.
- (vi) Push the end of the torque arm into position against the bracket ascertaining that the two "pips" of the bush have entered the corresponding holes in the bracket.
- (vii) Fit the cap, ascertaining that the lower "pip" of the bush has engaged with the corresponding hole in the cap, and tighten up the nuts. Slacken off the nuts about $1\frac{1}{2}$ turns, bounce the car at the front and finally tighten up the nuts.