

FRONT SUSPENSION
(INDEPENDENT)





SERVICE INSTRUCTION LEAFLET

ISSUED BY
ROLLS-ROYCE LIMITED

RR/M 1

SB/VA.1/DB

Subject : FRONT SUSPENSION - Fitting a larger diameter bolt to the lower bearing of the steering yokes. ALL PHANTOM III CARS.

Date
of November 14th., 194
Issue

MODIFICATION

FOR CATEGORY 1 ACTION.

It has been decided to fit a larger diameter bolt to the lower bearing of the two steering yokes in place of the existing bolt, 1 fig.1, on all Phantom III cars. The modification consists of increasing the diameter of the bolt holes at the outer end of the bottom triangle levers and fitting new parts to the lower end of the yokes which form the bearing and fully described in this Service Instruction leaflet.

NOTE: It can be ascertained whether the larger diameter bolt has already been fitted to the lower bearing of the steering yokes in place of the original smaller diameter bolt, by reference to the width across the flats of the head of the bolt, after removing the leather gaiter, if fitted.

The width across the flats of the head of the original and smaller diameter bolt is .625" (15.9 mm.), whereas the width across the flats of the head of the new larger diameter bolt is .875" (22.2 mm.).

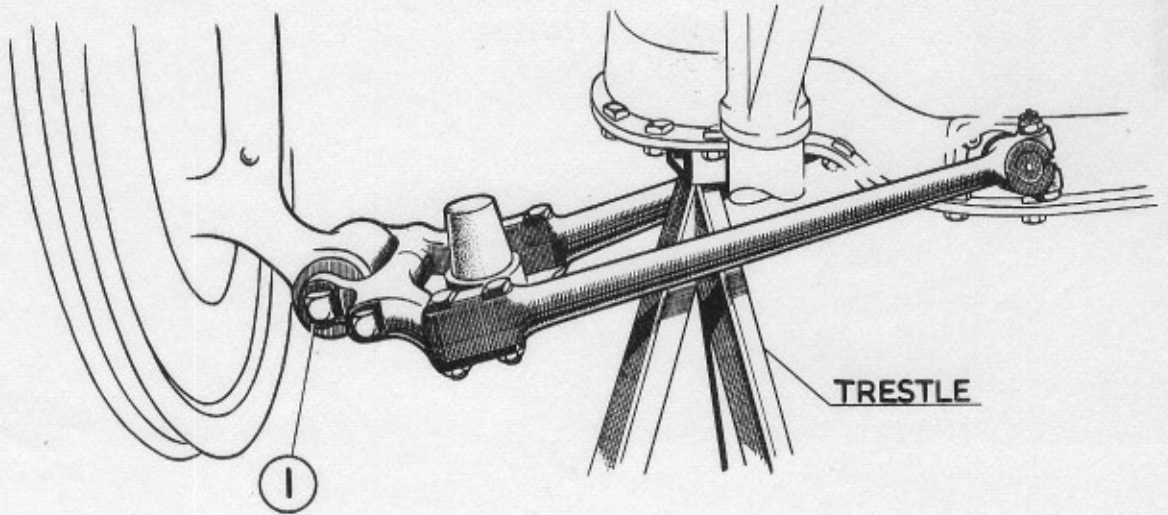


Fig.1.

1. PARTS REQUIRED:

<u>Part No:</u>	<u>Description:</u>	<u>No.Off:</u>	
RG-6409	Bolt - triangle levers - yoke lower bearing	2	
RG-6410	Fulcrum pin - yoke lower bearing	2	
G-81604	Needle rollers - yoke lower bearing	70	
G-84773	Housing - rollers - yoke lower bearing	2	
K-461 3/2	Split pin	2	
K-4614/2	Split pin	4	
KB-3597/2	Nut (castellated)	2	
330/4501	Oil seal - yoke lower bearing	4	
G-84775	Adjusting washer (.060" thick) yoke lower bearing	1	} 2 per car as necessary
G-84776	Adjusting washer (.065" thick) yoke lower bearing	2	
G-84777	Adjusting washer (.070" thick) yoke lower bearing	1	
G-84778	Adjusting washer (.075" thick) yoke lower bearing	1	
G-84564	Thrust washer - yoke lower bearing	4	

ALL COMMUNICATIONS SHOULD BE ADDRESSED TO

ROLLS-ROYCE LIMITED, SERVICE STATION, HYTHE ROAD, WILLESDEN, LONDON, N.W.10

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continued:

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2. SPECIAL TOOLS REQUIRED

- 1 EXP 331 Piloted 3-flute drill, .500" dia.
- 1 EXP 334 Piloted 3-flute drill, .548" dia.
- 1 EXP 332 Piloted reamer, .5625" dia.

3. TO REMOVE THE BOLT FROM THE LOWER YOKE BEARING

- (i) Jack up the front of the car - jack under and in the centre of the front "pan". A piece of board should be placed between the jack and the "pan" to spread the load and protect the nuts.

Place a suitable trestle under and near each end of the front "pan" as shown in Fig.1, and lower the car on to the trestles in order to allow the buffers of the right and left-hand upper triangle levers to rest on their stops, which will relieve the load from the bolt, 1 Fig.1. Remove the front wheels.

- (ii) Disconnect the pull rod from the brake operating lever situated on the yoke at each side of the car by removing the pin.
- (iii) To obtain sufficient working space during the drilling and reaming operations, it will be necessary to remove the outer ball joint (ball end pin) of the cross steering tubes from the cross steering levers, in order that the hub and brake drum assembly can be swung upwards clear of the lower triangle lever.

To remove, proceed as follows:-

- a). Remove the split pin, nut and locating washer from the ball end pin.
- b). Place a substantial steady block in contact with the lever near the ball pin in order to provide a solid reaction point, and with the aid of a hammer and drift, give the eye of the lever (adjacent to the ball pin) one or more sharp blows which will release the tapered shank of the pin from its location in the lever.
- c). Collect the mud excluder, the retaining piece and the pressure spring (fitted between the joint and the lever).
- (iv) Remove (if fitted) the leather gaiter from the joint at the lower end of the yoke.
- (v) Remove the bolt, 1 Fig.1, from the yoke lower bearing. Swing the hub upwards and allow it to rest on a block of wood, taking care not to damage the oil pipe at the top of the yoke.

4. TO INCREASE THE DIAMETER OF THE BOLT HOLES AT THE OUTER END OF THE BOTTOM TRIANGLE LEVERS.

NOTE, IMPORTANT. The levers must not be removed from the car for drilling and reaming.

(i) Before attempting to drill and ream the bolt holes at the outer end of the bottom triangle levers it will be necessary to rigidly locate the levers to prevent chatter during the reaming operation. The best method is to place a suitable piece of metal or hard wood about 10 or 12 inches long vertically between the underside of the frame and the buffer plate of the levers (see Fig.2) and position a small jack beneath the levers and then jack up the levers sufficiently to locate them.

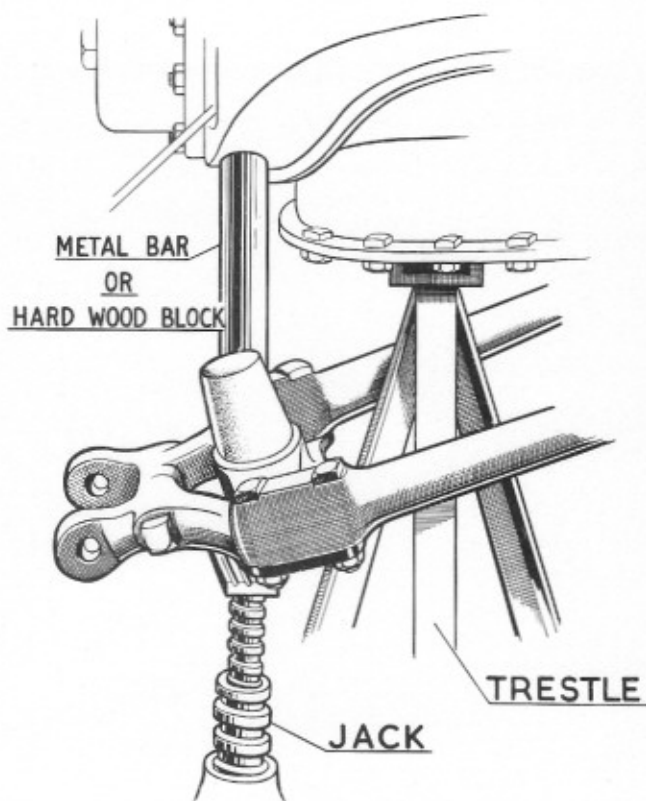


Fig.2

(ii) Drill the existing .4375" dia. holes ('M', Fig.3) of the triangle levers to .548" dia. with the piloted three flute drills, EXP 331/4. Finally ream the holes to .5625" dia. with the piloted reamer, EXP 332. A suitable off-set or 'T'-handled wrench will be required for both the drilling and reaming operations. To preserve the life of the drill and reamer, oil them liberally with soluble or cutting oil. After reaming lightly radius the holes to remove burrs.

(iii) It will be necessary to extend the flat machined portion, 'N' Fig.3, on the front triangle lever by filing sufficiently to accommodate the larger head of the new bolt. A sharp corner must be avoided, i.e. leave a radius of approximately .125" (3 mm.) as shown in Fig.3. It will also be found necessary on certain cars to carry out the same operation to the rear triangle lever to accommodate the larger nut of the new bolt. Again a sharp corner must be avoided. The bolt head and nut must lie flat against the levers.

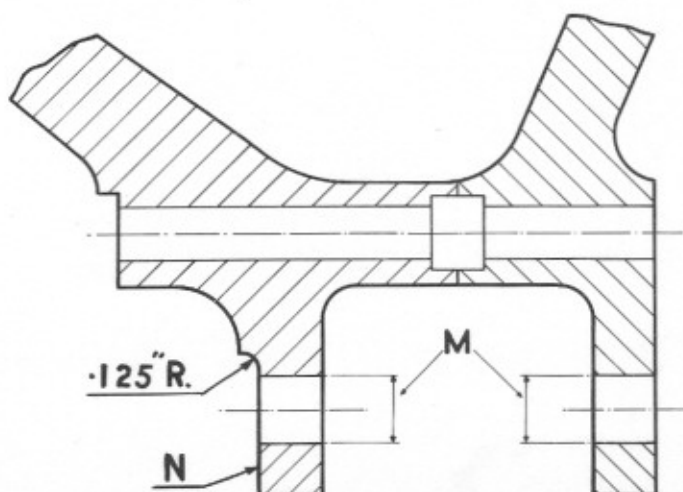


Fig.3

5. TO REMOVE THE PARTS FROM THE LOWER END OF THE YOKE WHICH FORM THE BEARING ASSEMBLY.

NOTE: Fig.4 is a section through the yoke lower bearing assembly as fitted to all cars in 'A' series, i.e. those cars having the series letters AZ & AX.

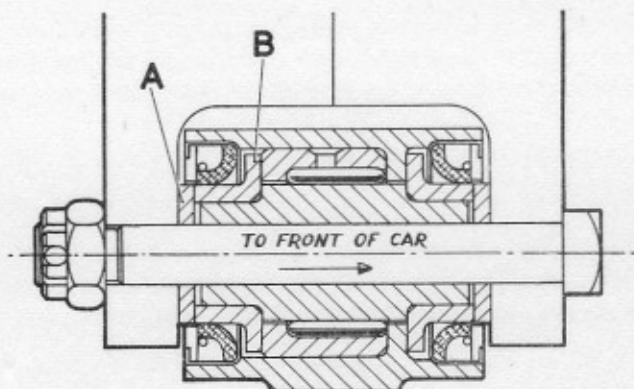


Fig.4.

On a considerable number of cars having the series letters AZ and AX, the lower yoke bearing on each side of the car has, during the course of repairs, been converted to the arrangement shown in Fig.5.

Fig.6 is the latest arrangement and shows the new bolt (12) of increased diameter in position. This arrangement is the same as that shown in Fig.5 except for the difference in size of the bolt (12), the nut (13) and the bore of the fulcrum pin (16).

For ease of description in the following context, reference will be made to Fig.5 for the dismantling procedure of the bearing assembly.

(i) With a suitable drift, tap out, towards the rear of the car, the fulcrum pin 'L' from the yoke which will remove with it the thrust washer 'D' and the oil seal 'C'. Tap on the end of the fulcrum pin and NOT on the end of the thrust washer 'K'. Collect the adjusting washer 'E' and the needle rollers 'G'.

(ii) Tap out the front thrust washer 'K' which will remove with it the oil seal 'J'. Do NOT tap on the shoulder 'H' which is an integral part of the yoke.

(iii) Remove the needle roller housing 'F'. Tap it out squarely and towards the rear.

(iv) Clean parts as necessary including the bore in the yoke.

6. OIL FLOW FEED TEST TO THE YOKE LOWER BEARING.

To carry out the above, proceed as follows:

Disconnect the oil feed pipe from the plug at the top of the yoke and with an oil syringe inject an S.A.E. 20 oil under as much pressure as possible into the yoke through the oil feed plug and observe if it finds its way into the bore at the lower end. If an air pressure system is available, a suitable pipe could be connected to the oil feed plug and air pressure applied in addition to the test with the oil syringe. Should the above prove ineffective then it will be necessary to connect a high pressure oil gun to the plug to clear the oil passage. It is essential that oil should find its way to the lower bearing of the yoke.

Fig.5 is a section through the yoke lower bearing assembly as fitted to 'B', 'C' and 'D' series cars, i.e. those cars having the series letters BU, BT, CP, CM, DL, DH. The principal difference between the two arrangements is the position of the adjusting washers and the length of the thrust washers ('B' Fig.4 and 'D' Fig.5). It will be observed upon reference to Fig.4, that an adjusting washer 'A' is fitted at each end of the bearing assembly, whereas in the later arrangement, as shown in Fig.5, an adjusting washer 'E', is fitted between the shouldered end of the needle roller housing 'F' and the thrust washer 'D'.

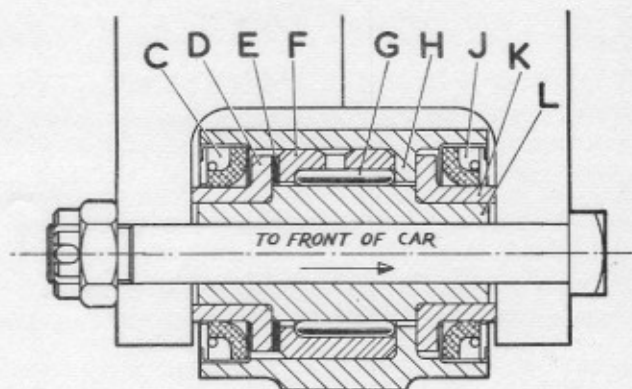
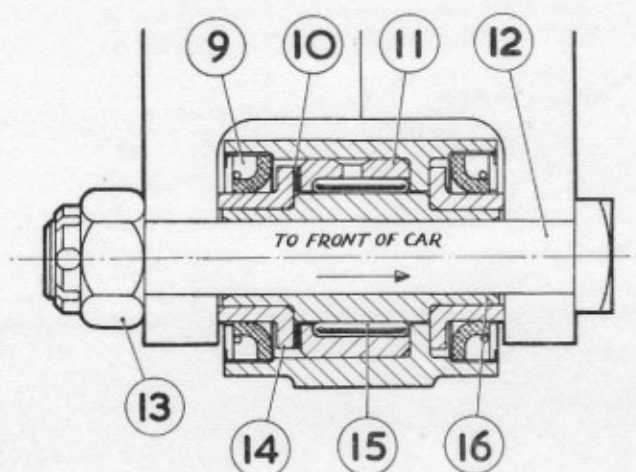


Fig.5.

continued:

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- 9. Oil Seal
- 10. Adjusting washer
- 11. Housing - needle rollers
- 12. Bolt
- 13. Nut
- 14. Thrust washer
- 15. Needle roller
- 16. Fulcrum pin.

Fig. 6

7. TO FIT THE PARTS TO THE LOWER END OF THE YOKE WHICH FORM THE BEARING

- (i) Place a new thrust washer (14 Fig. 6) with the flanged end innermost on to each end of the new fulcrum pin (16) firmly hold the washers against the shoulders of the pin and offer up to the jaw of the bottom triangle levers in which they should be a good push fit by hand. It will most probably be found that the thrust washers will require reducing in length before they and the fulcrum pin can be pushed into position in the jaw of the levers, in which case they can be reduced to the length required by carefully filing the face at the small diameter end which is unhardened.

NOTE: It will be observed upon reference to Fig. 6. that the ends of the fulcrum pin (16) are below the outer end of each thrust washer and this must be borne in mind when reducing the length of the washers. Both washers should be reduced an equal amount and in stages until the required push fit is obtained. It is essential that the faces of each of the thrust washers are kept parallel. After filing, lightly chamfer the small diameter end of the washers. A convenient way of holding a thrust washer for filing is to place the fulcrum pin in a vice (with clamps) and then place the thrust washer on to the pin.

- (ii) With the shouldered end of the needle roller housing (11) to the rear, squarely tap it into position in the yoke until the front end of it makes contact with the shoulder of the yoke, as shown in Fig. 6. The housing should be a tap-in fit.

NOTE: If it is found, in certain cases, that the bore in the yoke has worn due to movement of the roller housing, then it will be necessary to fit a roller housing on which the outer diameter has a layer of copper deposit. A small supply of these housings will be distributed which should only be used when absolutely necessary. Where only coppered housings are at hand, the copper can easily be removed with a file if not required. The thickness of the copper deposit is from .002" to .0025" (0.05 - 0.063 mm.), and it will be found in most cases where one of these housings are required, that it will be necessary to reduce the thickness of the copper deposit by careful filing until the housing is of the required diameter to make it a tap-in fit.

- (iii) Lightly smear the roller path of the housing with a soft type of grease just sufficiently to hold the needle rollers (15) in position. Place 35 needle rollers in the housing, place the fulcrum pin (16) in position and check that it slides freely to and fro along the rollers. Remove the fulcrum pin taking care not to disturb the rollers.

- (iv) The next operation is to fit an adjusting washer 10, Fig.6 (from the range provided) of a thickness which will allow it, when fitted, to have from .002" to .004" (0.05 to 0.10mm.) end float between the end of the housing (11) and the rear thrust washer (14). It is preferable, when possible, to keep the end float nearer the .002" limit rather than the .004" limit.

Proceed as follows:-

- (a) Place one of the thrust washers (14) on to the fulcrum pin and against the thrust washer place a .065" thick adjusting washer G-84776, and from the rear enter these three parts into the yoke, taking care not to let the adjusting washer (10) get trapped between the shoulder on the fulcrum pin and the thrust washer (14). Place the remaining thrust washer on to the front end of the fulcrum pin.
- (b) Next firmly hold by hand the two thrust washers (not the fulcrum pin) towards one another and feel if they can be moved endways. If the endways movement exceeds .004", then try a .070" thick adjusting washer (G-84777) and re-check. Should the end float be found to be less than .002", or should no end float exist, then try a .060" thick adjusting washer (G-84775) and re-check. It will be observed that a thick adjusting washer reduces end float, whereas a thin adjusting washer increases it. If found necessary, a washer may be rubbed down a little.
- (v) Place an oil seal (9) on to each thrust washer with the tip of the leather seal pointing towards the small diameter end of the thrust washer as shown in Fig. 6. Place the thrust washers on to the fulcrum pin, and with a small hammer, lightly and evenly tap the oil seals into position in the yoke.
- (vi) Smear the new bolt (12) with grease, fit it in position (head to front of car), fully tighten up the castellated nut (13), and secure with new split pin (K-4614/2) supplied.

8. FINAL RE-ASSEMBLING OPERATIONS:

- (i) Refit the leather gaiter (if originally fitted).
- (ii) Refit the outer ball joint of the cross-bearing tube to the cross steering lever as follows:-
 - (a) Clean the tapered shank of the ball pin and corresponding hole. Do NOT use a hammer when refitting the ball pin to the lever, but rely on tightening the nut to draw the mating parts firmly together.
 - (b) Grease and place the spherical (steel) mud excluder against the socket of the steering tube joint.
 - (c) Grease and place the spherical (bronze) retaining piece against the mud excluder.
 - (d) Place the pressure spring in position (small diameter end uppermost and enter the ball pin into the lever.
 - (e) Place the locating washer on to the ball pin (small diameter face uppermost) making sure that the flats and lugs of the washer correctly engage with the corresponding flats on the pin and in the lever. Finally tighten the nut and secure with a new split pin (K-4614/Z) supplied.
- (iii) Reconnect the pull rod to the front brake operating lever and secure with a new split pin (K.4613/Z) supplied.
- (iv) With an oil syringe applied to the oil feed plug at the top of the yoke, prime the oil passages in the yoke with S. A. E. 20 oil and reconnect the feed pipe.
- (v) Repeat for the opposite side.
- (vi) Finally inspect that no split pins have been omitted.

The time required to carry out the above is approximately 16 hrs.
Will all Retailers please notify this Service Station of the chassis numbers of cars on which this modification is carried out.