Rear Brakes (All Types) Rebuilding, Modified Parts, Objective and Background

R-R Silver Dawn, Silver Wraith. Bentley MkVI, R Type.

N.W Geeson 2014

Background

The rear foundation brake assembly was really a joint venture between R-R and Girling, although the basic design followed Girling practice and patents, R-R supplied some components to Girling for assembly and also designed certain of the finer details.

Immediately post war the design was based on an update from the Bentley Mk V wedge brake of 1939/40 and the rear brake general arrangement layout was shown in drawing RG 3154 in early 1945. From that point onwards the design went through a series of modifications to improve the durability and operation. Almost every component was altered between 1945 and 1955 but in spite of that fact except for a reversal of the intershoe linkage the basic design remained unaltered.

One often hears of the so called servo lag, that although present should be hardly noticeable. If the owner needs to take particularly really extra care when travelling forward in a confined space, something is clearly wrong. Due to the brake design there is an admitted loss of efficiency in the rearward direction. It is hoped that this article may meet its objectives and make inefficient braking on these cars a thing of the past.

The average owner will usually look over the rear brake assembly, and finding that the brake is purely mechanical operated, will be over joyful that nothing could be simpler. A master of all things mechanical he is sure that rebuilding these rear brakes can be accomplished between T.V commercials………he is about to have a bad day. Nothing is simple on Rolls –Royce products, nothing taken for granted and nothing assumed.

Objectives

There is almost a total failure on the part of those owners who rebuild one of these brakes to understand the relationship between the rear brake lining contact and the brake servo operation. The result in many cases is very excessive brake pedal travel and poor servo operation. One of the objects of this article is to describe the rear brake lining to servo relationship, point out what goes wrong and how to avoid the problems and improve overall braking performance.

As a number of minor but important changes took place during production it is possible for the unwary owner to inadvertently mix up component parts. Some of the later parts can be incorporated into earlier assemblies with dramatic improvements in the operation and durability; therefore repairers should be aware of these subtle differences in the component parts. It is intended to highlight the differences in individual parts.

It is hoped that if an owner rebuilds the rear brakes as described and has followed the instructions in a previous article regarding assembly of the front brakes **(late type cars only), it should vastly improve the braking system operation. Any owner should then only need to seek out and read an intended forthcoming article on the linkages and servo to have brakes in an ex-factory condition.

** Earlier type front brakes can essentially be rebuilt by following this particular article as other than a mechanical actuator instead of a hydraulic one the assemblies are basically the same.

Firstly it is intended to cover the important relationship between rear brake linings and the servo operation. This relationship is often not understood. We shall see how fundamental the rear brake assembly is to the correct operation of the servo, in fact if the rear brakes are not working 100% correctly then neither is the servo. Afterwards the assembly of the rear brakes is described and then this is followed by a detailed description of the various parts.

Any mention of the Bentley MKVI brake assemblies includes the relevant Rolls-Royce models.

A number of different technical terms differ between countries; in this account brake expanders are also referenced as actuators.

Brake Lining Contact ......the importance to Servo operation and pedal travel.

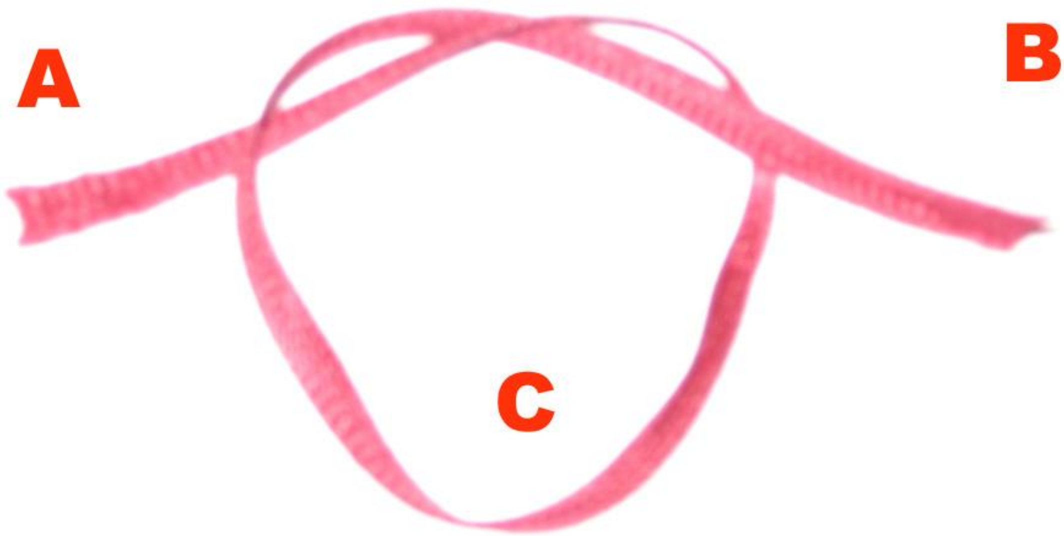

Fig 1. An action will cause an equal and opposite reaction.

Most owners are under the impression that force applied at the brake pedal is directly applied to operate the brake servo. In fact this is not strictly true in the same way that it is impossible to push against anything without having your feet on the floor to react against the effort. It is important to understand the relevance of this situation and I have attempted to use an analogy of a half knot to illustrate the reasoning.

Fig 1 shows an half knot and readers will immediately recognise that if the ends 'A' and 'B' are pulled simultaneously then there will also be a reaction at the loop 'C'. They will also realise that if either of the ends 'A' or 'B' are pulled but the opposite end is not held, then there will be no reaction of the loop at 'C'. The reason is that we need an opposite and equal force to be applied at the opposite end to the one that we are pulling. In practice we would apply that opposite and equal force by pulling both ends at 'A' and 'B', however if we could just hold one end “firmly” at either ‘A’ or ‘B and pull the other end we would also have a reaction at the loop.

Fig 2. How the example loosely fits our brake operation.

Now if we replace the notations with those as shown in Fig 2 and add a circle to represent the brake servo, the forces and requirements may be better understood. Note that the former end ‘A’ is now connected to the rear brakes, the action here being to hold the end “firmly” once the rear brake linings contact the brake drum. From that point onwards any pull force at the former point ‘B’, that force now being applied by the brake pedal, will result in the operation of the brake servo at former point ’C’ and an ever greater effort being applied to the rear brakes. In this analogy the loop at ‘C’ is shown tightening up onto a circle that represents the brake servo, this is a schematic illustration and the actual action is axially, which means a side force operates the cams of the servo.

Further study of the above description will show that any excess movement of the rear brake rod (‘A’) will in turn allow further movement of the brake pedal rod (‘B’). As there is a mechanical advantage gain or compounding of the leverage system from the brake pedal to the brake linings any lost or excess movement at the rear will have an exaggerated effect on brake pedal travel. The farther to the rear in the brake system that the lost motion takes place, the worse the brake pedal travel. This can easily be proven by noting the increase in pedal travel if each rear brake is slacken off by two notches of each brake adjuster, each notch alters the drum to lining clearance by 0.004 inch only, so this experiment would only back the linings off each drum by less than 0.010 inch, yet pedal travel would be very noticeable.

The above hopefully explains why the brake servo is directly affected by excessive rear brake and rod travel. What is of interest to us at this point is to ensure every single scrap of excess movement is removed from the rear brake operation and this will enhance servo operation and reduce pedal travel. It is also of importance to note that unless the rear brake assembly is correct the brake rods cannot be adjusted and set, nor can the servo.

Brake system performance

Firstly we need to define excessive pedal travel and set out to characterize how good the brakes should be in operation.

When these cars were new they literally had the best brakes in the World fitted to a standard production car, not only were they good, they were exceedingly good. A recorded comment from an R-R tester who was comparing different car brakes under severe conditions says it all, after testing a Cadillac, he commented "...........pity the brakes were an optional extra".

Flexibility in the chassis and brake rod system, and the necessary working clearances cause lost motion at the brake pedal, certainly no more than 1.25 inch (30 mm) at most, should be tolerated.

At speed the system or servo lag is probably around the same lag as that experienced when disc brakes are applied in wet conditions. In close quarters like those experienced in rush hour traffic there should be no moments of panic. On my own car I have demonstrated many times that an application of the brake pedal after a free roll downhill of only 3ft to 4 ft. results in a front end dive. Heavy brake pedal application at medium speeds will leave four tyre rubber marks on a road surface. On two occasions M.OT testers have commented that the car achieves a higher 'Tapley' brake meter reading than many new 4x 4 vehicles. Admittedly like all drum brake cars they need more care taking during reversing movements.

Admittedly, many owners will not recognise the above comments in connection with their own car, but hopefully the data encompassed here will ensure that they can bring their car up to the normal standard. In short there should be no doubt about the braking performance.

Note: A 'Tapley' meter is an instrument, or more correctly a deceleration meter that is used during testing to check brake retardation when it is undesirable or impossible to brake test on rollers. It is necessary to use a meter because these cars should not be brake tested on rollers.

Excess brake travel caused by parts that are external to the foundation brake.

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Fig 3. A Bentley MkVI rear spring showing the likely points of breakage.

Fig 4. Bentley R type front shackle, a prise bar needs inserting between the bracket and spring eye to highlight shackle wear.

Fig 5. Wear on the threaded part of this shackle pin will add to the brake pedal movement.

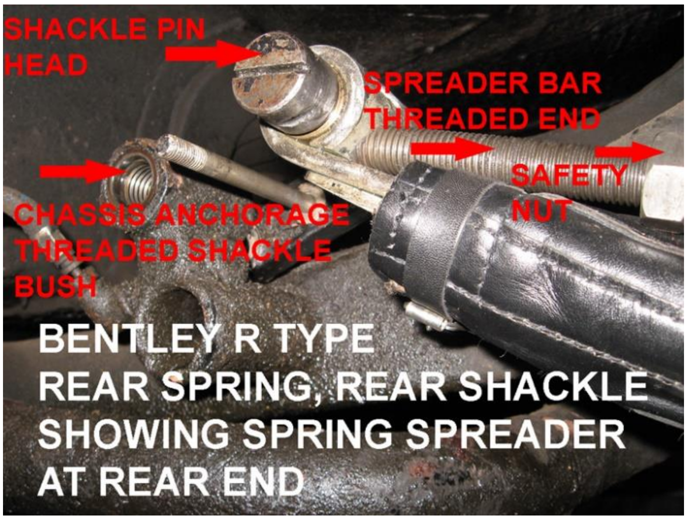

Fig 6. Just for the inquisitive ones, showing just where the spreader bar sits at the rear end, if you need to spread a spring.

To enable this article to be kept as simple as possible the descriptions of mechanical components has been limited to the area from approximately the rear spring front shackle line rearwards. It has been assumed that the brake linkage is roughly adjusted in accordance with that described in the workshop manual.

Excess wear at the rear end of the car that is not directly in the brake rod linkage is usually limited to the following points. As the rear brakes are operated by rods that depend upon these linkages being pulled forward against an axle mounted brake actuator assembly, any axle movement will have direct implications on brake pedal movement.

Rear Springs

Rear road springs need checking to ensure that their main leaves have not broken, as this will allow the complete rear axle on one side to move fore and aft as brakes are applied and released. A similar movement will occur if there is excessive wear in the rear spring front shackle pin. Fig 3 illustrates the most likely point of leaf breakage, which can also occur right adjacent to the main leaf front spring eye just under the black coloured leather spring gaiter shown in Fig 4. If wear is present in the front threaded shackle pin it will usually show up as a wear or rust witness mark around the shackle pin washer as shown also in Fig 4. The spring gaiter will need at least partial removing if it is suspected that a spring leaf is broken so that a thorough inspection can be made of the leaves. Leaf breakage normally occurs when the shackle pins have seized at some time due to lack of lubrication. Fig 5 shows a close view of a threaded front shackle pin.

Some idea of the wear in the shackle pin will be gained if a tapered bar or tyre lever is inserted between the spring eye and shackle bracket and moved up and down.

To satisfy our most inquisitive readers Fig 6 shows the rear end of an R type rear spring illustrating here the opposite end of the spring spreader bar being used in Fig 4 to spread a spring.

Equaliser Bar

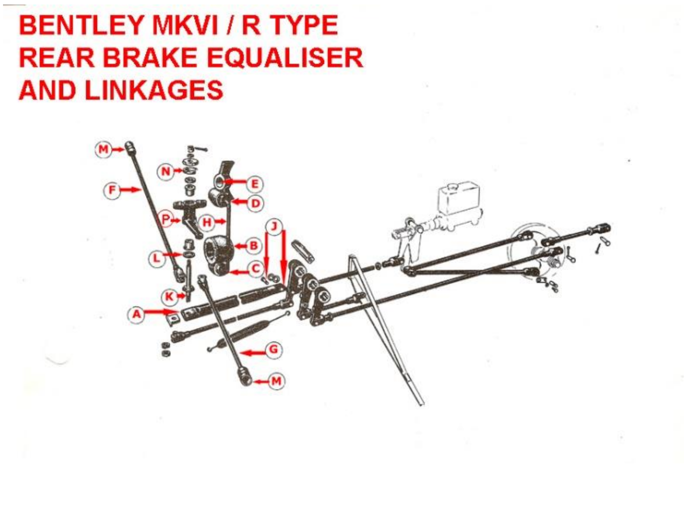

Fig 7. **Later type rear brake equaliser linkages, early assemblies hung from the R.H axle tube on a rubber strap.**

Fig 8. This equaliser bar clevis pin is in dire shape, at this point you are close to full brake failure.

Fig 9. An equaliser with severe rubber rot!

The equaliser linkage is so called because it divides the total pulling effort applied to the brake rods equally between the two rear brakes. This particular part of the brake linkage is carried on a bar called the equaliser bar, shown at A in Fig 7.

Still referring to Fig 7. At the rear end the bar complete with linkage is suspended off the right hand axle tube at point E and at the front end the bar is pivoted off a chassis bracket at J. This point J also shows the clevis pin which allows the pivoting action that is required to keep the angles and pivots of the brake system in synchronisation as the axle rises and falls under the influence of the road springs. The equaliser front anchorage clevis pin is subject to extensive wear as it is continually moving when the car is driven on the road, regardless of whether the brakes are in action or not.

A typical well-worn pin is shown in Fig 8 and regular lubrication with an oil can using EP80 / EP90 will help prevent this horrendous, and potentially dangerous wear. A clevis pin in this condition will allow the brake linkage to move back and forth in the same way as a broken spring leaf. It is a very wise precaution on any of these cars to inspect the condition of this equaliser pin during servicing as breakage will cause brake failure.

It is often necessary to remove adjacent chassis fittings and ream out the chassis bracket to allow an oversize equaliser bar clevis pin to be fitted. Of course the equaliser bar will also need dismounting from the axle tube end to ream the hole at the forward end of the bar, and perhaps more likely renew the rear three mounting rubbers at Fig 7 points B and D. In the worst case the rubbers will look something like those in Fig 9 these are in a very sorry state, and are a factor in this car having very poor brakes!

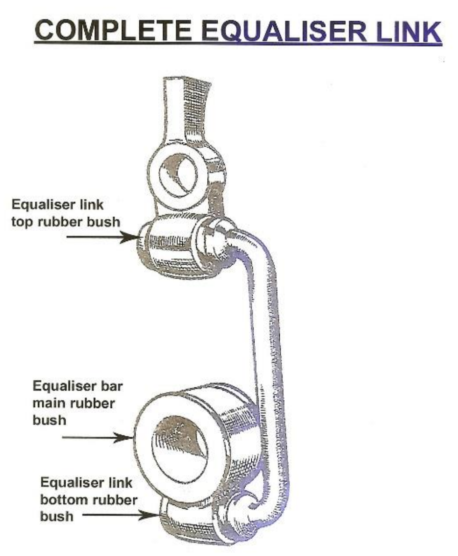

Fig 10. A closer look at what those rubbers should look like.

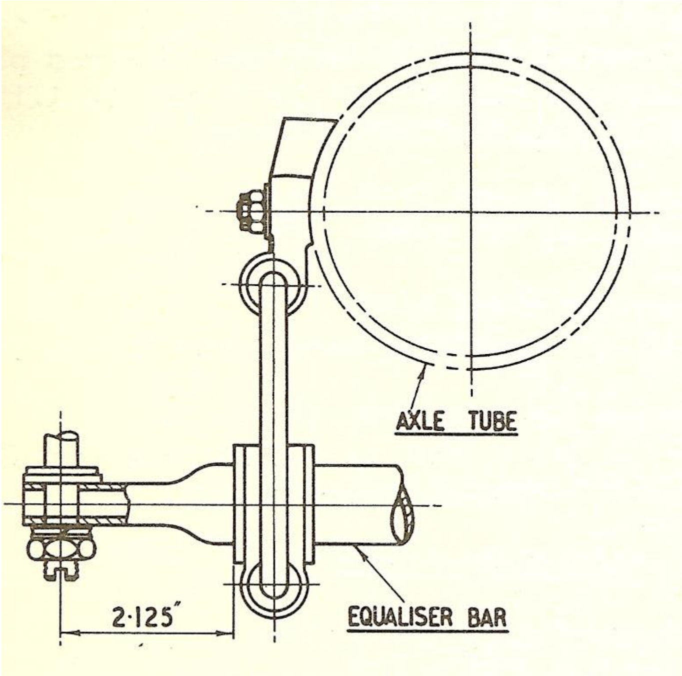

Fig 11. Take care to check the equaliser bar sits in this position.

Fig 12. Equaliser pin showing how they suffer from water ingress, at least remove and grease yours!

The positioning of these rubbers is also shown again in Fig 10 and Fig 11. Note, that the larger bottom fixing is positioned in an upstanding situation, which allows the rear brake cross rods to run level across the rear of the axle. If this larger end is positioned downwards the cross brake rods run in a vee form when viewed from the rear of the car, and do not pull straight.

When the large bush is replaced it is necessary to slide the complete equaliser link complete with the bush, as shown in Fig 10, all the way down the equaliser bar from the FRONT end. The bush cannot be fitted from the rear end of the bar. It is advisable to clean and actually paint the bar and let it dry before attempting to fit a bush. Prior to fitting, the bar is then liberally coated in WD 40 and the bush assembly slid smartly down the bar without stopping. It is a brave man who stops when fitting one of these bushes, once stationary the grip of the bush needs seeing to believe and moving the bush from the resting point is not a good option. Fig 11 shows clearly the final positioning of the equaliser bush. This position is important in order to allow for rear road spring deflections and axle movement without such movements applying the rear brakes. The two smaller bushes on this assembly are mounted on the equaliser link and the bushes are captured on the link by the ends of each link leg being riveted over. Other details of this equaliser bar and a sketch of a suitable replacement drop link can be found by viewing... *Rear Axles....What Fails and Why (Part 3)*.... on this web site.

Other than wear in the clevis pins that secure the brake rods it may be likely that the clevis pin holes in the lever item P in Fig 7 need welding up and re-drilling to suit the clevis pins. The pivot pin item K in Fig 7 is vulnerable to water damage as can be seen in Fig 12. These pins, part number RG 3558, are available extremely cheaply from dealer sources. Under normal circumstances one would also renew the bushes but I would caution against doing so unless they are really worn, and they are normally expensive. It is rare for these bushes to excessively wear, such wear and corrosion is usually restricted to the pin. Before assembly the lever needs cleaning and soaking in oil for 24 hours for the Oilite bushes to absorb oil, and then grease applying liberally between the bushes. The felt weather seals shown at L and N in Fig 7 can be replaced with suitable 'O' rings. In any event once the equaliser assembly has been rebuilt it is important to check that the top tin cover mounted above N in Fig7 does not rotate under the retaining nut. If rotation is not checked the top cover could wear through, rotation needs eliminating by judicial shimming and/or ensuring the top nut is not over tightened.

Assembly and setting of the rear brakes

The objective is to achieve the following three situations, and in fact if any of these three situations are not met it will be impossible for the brakes or the brake servo to work correctly. These settings must be completed in the following order.

1. Brake shoe linings must contact the brake drum exactly *squarely*.

2. Brake shoe linings must be *centralised* to contact the drum simultaneously, prior to setting the inter shoe linkage.

3. The inter shoe linkage must finally be set to achieve a *"balanced condition"* so that the shoes contact the drum simultaneously.

This section describes how the brake shoes are assembled and the internal linkages correctly set up but the reader would be very wise to read up the descriptions that follow this section and describe the individual parts. For example if a rebuilder were to replace the brake dust shield plate with another without knowing the differences, he would not be aware of potential problems until the brake drum was fitted. At that point he would have to remove the complete brake and half shaft assembly to change the dust shield plate, not a satisfactory situation, and one that can be avoided. Most of the images in this section are shown off the car for clarity, but all the rebuilding can be done on the vehicle without trouble.

Each car will require a different approach depending upon the period since the rear brake parts were last serviced. It is therefore not easy to present a definite chronological order of repair and although the mounting of the brake shoes is one of the first jobs discussed here it is necessary to check all the following features, repair or assembly of minor components before finally mounting the brake shoes.

Drums

The brake drum should be checked for ovality, but beware that any ovality is not of a temporary nature caused by the car having been parked with the hand brake applied over a long period. In such an instance it may be found advantageous to heat up the drum in a domestic oven to about 125 C for one hour and then leave to air cool. Very slight surface cracking can usually be ignored. Beware of any twist in the steel front plate and note in particular that these drums are made in two pieces, a cast drum and a steel face plate. Always use three drum securing screws (never two), and make sure the heads are below surface level. Under no circumstances refit a road wheel until you are absolutely sure the drum is located fully on its spigot, failure to do so will result in a distorted drum face plate.

Inter shoe linkage

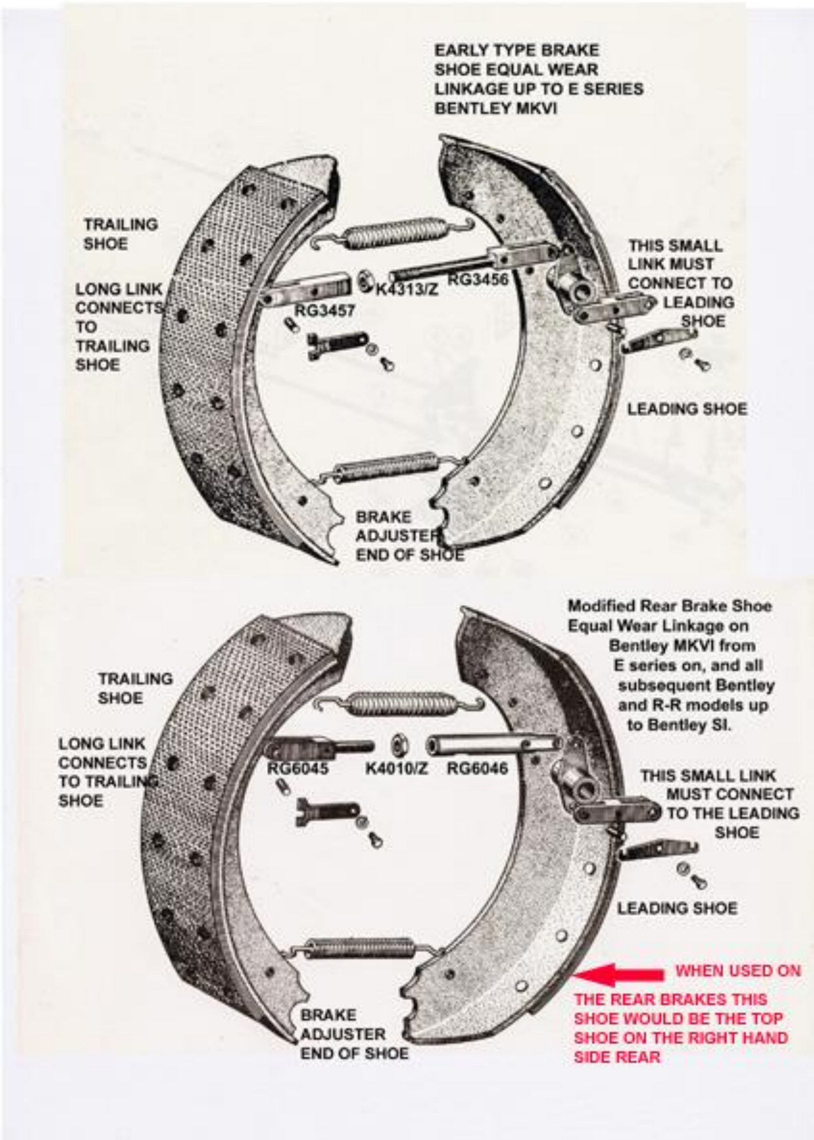

Fig 13. Early and late brakes, they need indexing around by 90 degrees to view as a rear brake because this image shows the front brake arrangement.

The intershoe linkage positions shown in these images are correct and are at variance with those shown in various parts books, which provide an incorrect view. The company reversed the position of the brake shoe inter shoe linkages in a bulletin recall action and it is important that the linkages are positioned as shown in these views.

The shoe linkages allow the lining surface pressures to equalise on both linings and therefore the lining wear is equalised between the leading and trailing shoe linings.

Note that these illustrations in Fig 13 were originally drawn up to show the *front brake* shoe aspects, and in the case of rear brakes are identical except that the brake assemblies are indexed 90 degree anti-clockwise.

The text notation on Fig 13 shows the correct components. Owners should therefore take note that the *SMALL link joins the LEADING brake shoe to the SWIVEL link*. Originally bulletins such as RB 63 dated 23

January 1950 made the modification clear in respect of front brakes but unfortunately the parts manual images remain incorrect. Many brake systems on these cars remain built up incorrectly with the short link and swivel link coupled to, and adjacent to, the trailing shoe.

Fig 13 also shows the two distinct linkage systems that have been fitted, the later RG 6046 and RG 6065 links and associated parts, (in the lower view) should be fitted to every car. It should be noted this applies to both front and rear brakes on Bentley cars prior to B1GT (and equivalent R-R chassis) and to rear brakes only, after that chassis number. These later links are stronger and do not bend.

It is very important to understand the relationship between the brake back plate mounted brake actuator, adjuster, the shoes / linings and the inter shoe linkage. In particular the intershoe linkage pivots off the *fixed* brake back plate anchor, but in action the shoe ends are powered off the adjuster and actuator, the latter being allowed to *slide* in its mounting plate. Any owner would be wise to absorb this fact before continuing any further, once the concept is mastered the reason for carefully following the assembly technique will be better understood.

Linings, Shoes and assembly

The rear brake shoes and linings are essentially identical across all models and chassis ranges. The rear brake linings and part number only varied due to alternative materials being used. The brake is 12.250 inch across the brake drum diameter and each brake lining covers 102 degrees radially of the drum surface and is some 2.250 inches wide.

In essence the lining has an inner radius of 5.800 inches and outer of 6.105 inch. They were 0.322 inch (+.015) thick, not 0.312 inch, which is now commonly used and will suffice with standard brake drums. Some 12 rivets in 6 rows hold each lining, the end rows are positioned 6 degrees from each end and then every 18 degrees along the lining length around the surface radius. Riveting was originally done so that a 0.003 inch feeler could not be passed between shoe and lining, but now days modern lining bonding eliminates the gap troubles and provides a firmer brake. Each end of the lining need chamfering off for about one inch where it contacts the drum friction facing, this prevents a tendency for the lining to grab and tilt the shoe around the direction of travel.

Each brake shoe is notched at the end where it located on the adjuster, the opposite end has a radius where it locates on the actuator plunger.

General shoe assembly

Fig 14. Rear Brake back plate unit ready to accept the shoes.

Fig 15. Trailing shoe hung off brake return spring.

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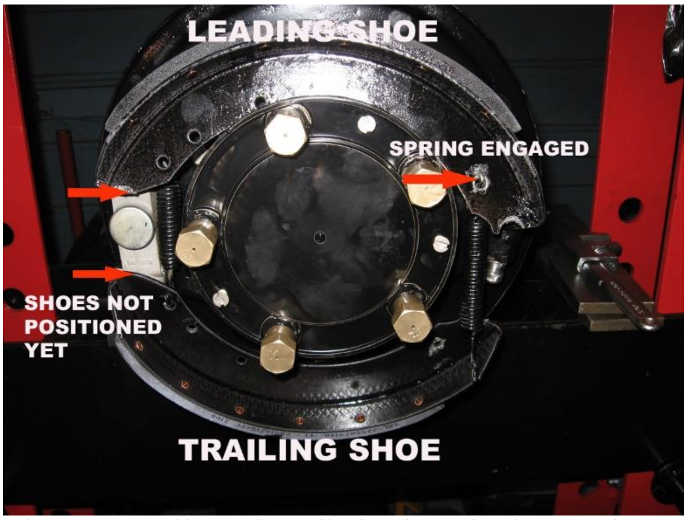

Fig 16. Leading shoe linked to the inter shoe spring.

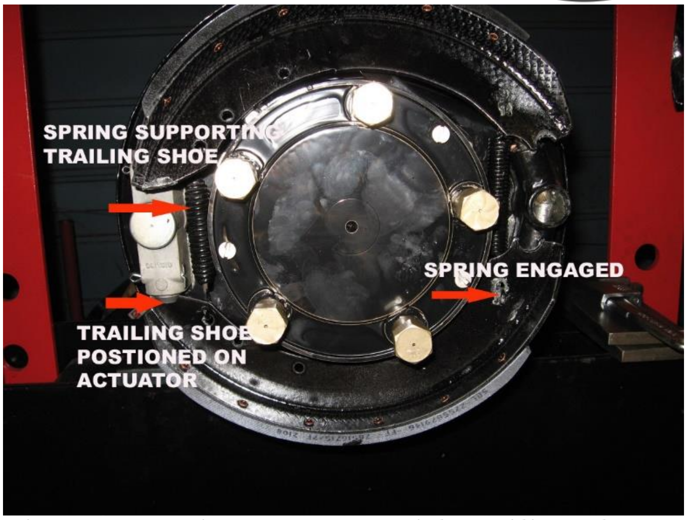

Fig 17. Engaging actuator with trailing shoe.

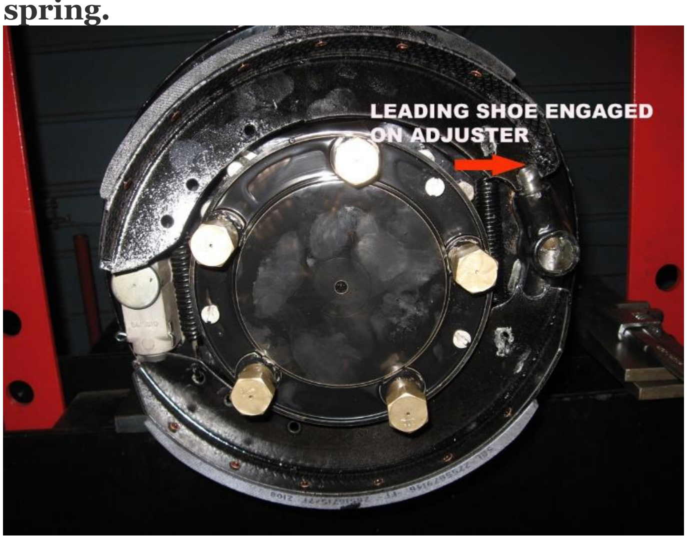

Fig 18. Leading shoe engaged on the adjuster.

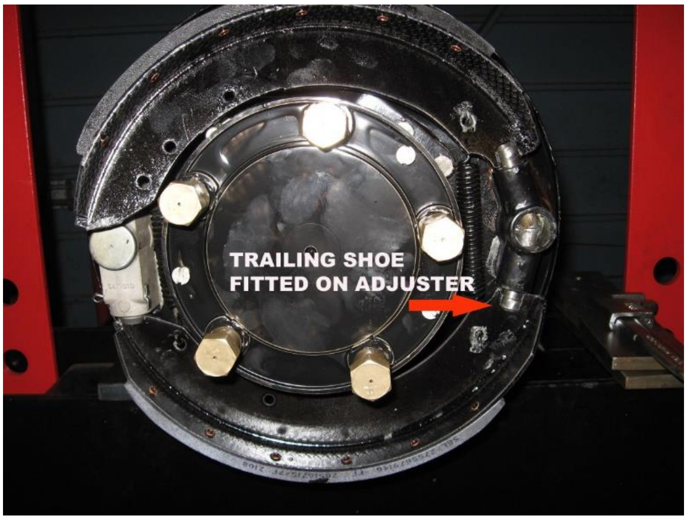

Fig 19. Trailing shoe engaged on the adjuster

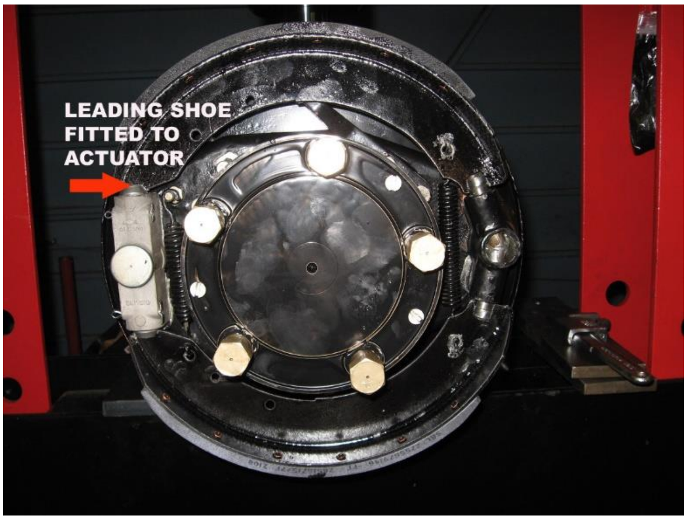

Fig 20. Engaging the leading shoe on the actuator.

Fig 14 shows the view of the brake that has no doubt faced many owners, in this case the right hand side. The assembly of the actuator and adjuster shown fitted to the back plate in this view, is discussed in detail later, but note how the heads of the split pins in the actuator are on the outside. This positioning makes removal easier at some later date.

The adjuster retaining set screws must be approx. two turns slack so that the adjuster can rotate in its mounting hole under the influence of brake shoe pressure.

On the opposite side of the back plate the actuator is mounted on two studs mounting twin coil spring washers and castel nuts that are split pinned. The castel nuts should be tightened, and then slackened, at a minimum one full turn before the split pins are fitted. High melting point grease should be applied lightly between the actuator and back plate faces and the actuator must be movable and slide by hand through the limits of the back plate fixture hole. Very high melting special actuator grease is still available very cheaply, and is suitable for both actuators and adjusters.

See Fig 15 and attach the shoe return spring to the trailing shoe and back plate anchor as shown. Position the leading shoe and fit its shoe spring adjacent to the brake adjuster as in Fig 16. Take care to insert this spring from behind the shoe without bending the spring end. Engage the opposite end of the shoe spring in the trailing shoe and then engage the other end of the trailing shoe into the slot in the actuator as illustrated in Fig 17. Next engage the leading shoe end on the adjuster Fig 18, followed by positioning the trailing shoe on the adjuster as in Fig 19. Finally position the leading shoe onto the actuator, which will complete the brake shoe mounting Fig 20.

SHOE STOP AND LINKAGE ARRANGEMENT AND ADJUSTMENT

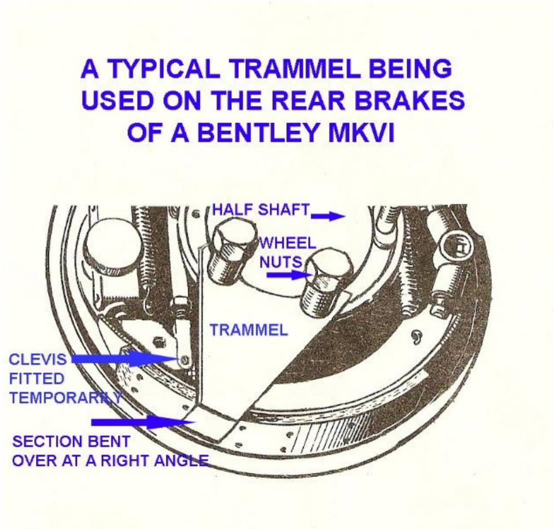

Fig 21. A simple trammel in use

It is imperative to follow the shoe stop and linkage adjustment instructions most carefully because carelessness or ignoring the procedure and order will lead directly to excessive brake pedal travel and servo operation inefficiency.

Some sort of trammel similar to the one shown in Fig 21, or an old segmented brake drum is necessary to accomplish the final linkage and shoe setting. Do not attempt to set these brakes without some form of trammel. A trammel is an adaptor, which can be fitted to the hub face and can then traverse the lining facing at 90 degrees to the hub face. In this section are images showing an old R type front brake drum being used, which although providing the right guidance does not fit fully over the linings, but nevertheless does the job. A better alternative tool which can also be used on other R-R/ Bentley brakes is shown later in Fig 70 and the Appendix.

SHOE TILT…….THE SITUATION TO AVOID

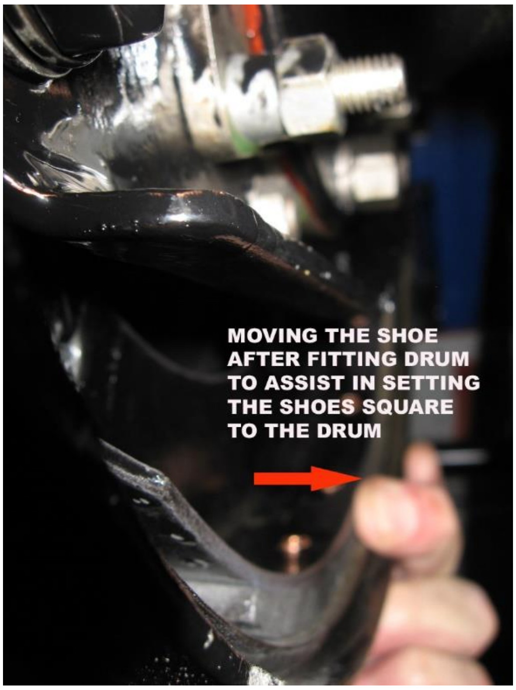

Fig 22. Sometimes the shoes may need shaking side to side to free them, if they bind in the drum.

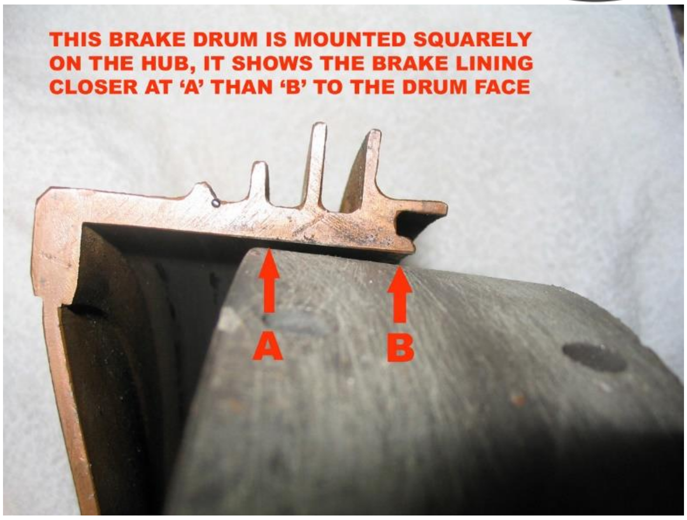

Fig 23. Showing how the shoes can tilt in relationship to the drum friction surface.

In connection with the rear brakes, but not the front, the brake dust shield back plate can be moved over towards the rear axle centre to provide access from the rear. For clarity Fig 22 shows the view with this dust shield removed.

The object at this point is to ensure that when the brake shoes are applied by the action of the brake pedal, that the linings come into contact with the drum exactly squarely and simultaneously. First let us consider the implications on this particular braking system if the shoes are *not* applied squarely.

If the brake shoes approach the brake drum at a slight angle when the brakes are used, see Fig 23, either the inside or outside of the lining will initially touch the drum. When brake adjustment took place this same situation will have happened. The operator or owner suspecting nothing of the wrong internal adjustment will have backed off the brake adjuster to be able to clear the drum. In practice this will be much too far and will result in excessive brake pedal travel to bring the linings into contact with the drum.

When backing off the rear brake adjuster from a drum locked position if more than two clicks are required the reason should be investigated. Often the owner or even a specialist will presume that a brake drum is distorted because it appears to foul one lining only each revolution of the drum. This can, will and does happen when the inter shoe linkage is not set correctly.

Let us assume, and it is more often the case on these cars, that in addition to brake shoe tilt one brake shoe is also going to touch the drum before the opposite shoe. Both these faults will have occurred through maladjustments of the brake shoe guide and the inter shoe links. After a longer travel than normal because of incorrect brake adjustment the lining will eventually come into contact with the drum under the influence of pedal pressure. If the shoe tilt is acute the shoe will jam at an angle and the linkage will try to centralise and bring the other shoe into drum contact and start to retard the car. Unfortunately true centralisation of linkage, shoes, actuator and adjuster will be at variance with the components and they will be fighting each other. The shoes meantime will try and pivot around the inter shoe linkage mounted off the back plate *fixed* pin instead of the adjuster and actuator. All a disaster waiting to happen, and all the time the brake pedal is travelling ever downwards. If further retardation is required and the driver presses the pedal further the offending shoe or shoes will straighten up sharply and contact the drums squarely. The pedal will then give the feeling that the drum has expanded or fade has taken place. If both rear brakes are incorrectly adjusted as described the pedal may have travelled two thirds of its possible distance. Of course whilst all this excess movement is taking place the brake servo will not be actuated correctly.

If we now reflect and refer to Fig 1 and Fig 2 once again and read the sections at the beginning of this article we may now begin to understand why the car has excess pedal travel and poor servo operation.

Let us now examine how this state of affairs can be avoided

ADJUSTING THE BRAKE SHOE GUIDES OR SHOE STOPS

Fig 24. Detaching a brake shoe to gain access to a shoe stop.

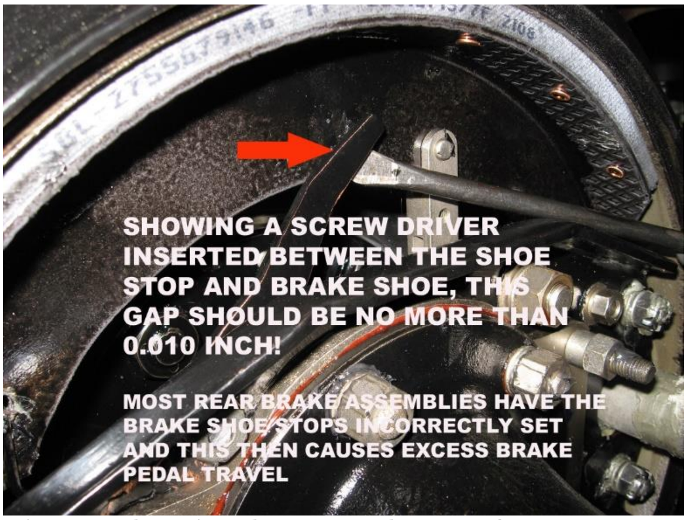

Fig 25. Showing how much out of adjustment some of these shoe stops are found in service.

Fig 26. A correctly aligned brake shoe and lining.

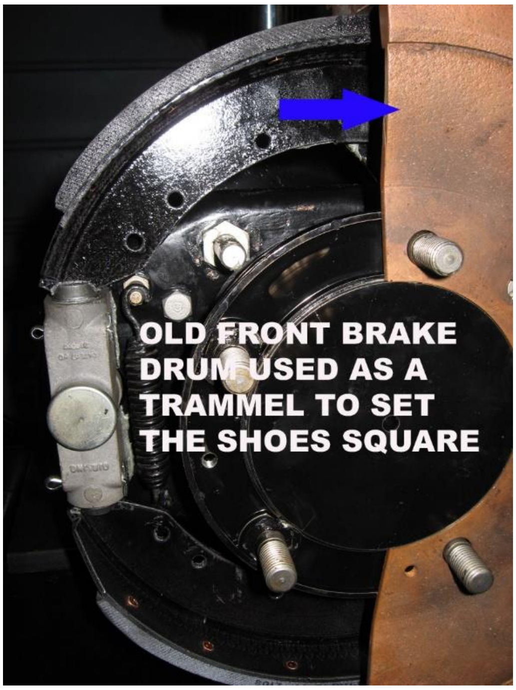

Fig 27. Another view of an old brake drum that has been segmented to allow easy access.

The brake shoe guides need adjusting to ensure the linings are going to contact the drum squarely. Note that the brake shoes should tend to pull back towards the brake back plate under the influence of the inter shoe return spring adjacent to the adjuster, and rest on the guides.

At this point the shoes are fitted but no intershoe linkage is finally coupled, although it can be fitted for ease, but NOT coupled by leaving out one clevis pin. The trammel is once again positioned to check lining contact. Shoe guides can / must be bent to achieve the correct orientation to the shoe vertical face. One of the easiest ways is to slip a cranked ring spanner or wrench over the stop end and apply pressure back or forth, it is also possible to slide a F shaped adjustable spanner around the guide. It may be necessary to remove a brake shoe temporarily Fig 24 to gain access to the shoe guide.

Fig 25 shows, with dust shield removed for clarity, a large gap between the shoe guide or shoe stop and the brake shoe, and if this occurred when the linings were in full contact with the drum there would always be a potential for shoe tilting. The factory allowance for this gap was 0.010 inch maximum but I would seriously advise owners to aim much lower and nearer 0.003 inch if possible. In this situation every thou' counts as any error, which is magnified back through the linkage leverage system to the pedal.

It is permissible to have the allowed gap, so in effect allowing the shoe in its off position to lie back towards the brake back plate. Once applied the shoe would then straighten up and contact the drum surface squarely. It is NOT permissible for no gap to be present so that the shoe is tilted away from the back plate as in this situation the shoe can NEVER straighten up to the drum without severe strain.

The method is to fit a trammel to the exposed half shaft face see Fig 21, or Fig 26 and Fig 27 using an old drum segment, or with great care use the existing drum and temporarily lay the back dust plate away from the brake assembly. The objective being to check that the lining faces are square to the brake drum surface when the shoe guides are adjusted within the parameters previously discussed.

Fig 23 illustrates the situation to avoid when the lining is going to come into contact with the drum in a tilted condition. Here we need measurements A and B to be identical and the shoe guides need bending to achieve that situation. When using a segmented drum Fig 26 and Fig 27 or a trammel (see appendix) it is possible to adjust up the brake using the normal adjuster whilst measuring or keeping an eye on the shoe stop/guide gap.

In the case of using the existing drum a different approach will be required. The shoes will need to be adjusted tight up to the drum and the gap between the shoe and shoe stop will then need measuring with feeler gauges and the shoe stop gap adjusted according. Access will have to be from the rear in this instance.

Whatever the method used it is very time consuming adjusting shoe stops / guides, however perseverance will be rewarded with excellent brakes.

At this point the brake linings will be contacting the drum squarely and now the shoes must be centralised to the drum.

BRAKE SHOE CENTRALISATION

This centralisation is extremely important for any brake but in particular with this specific type of R-R inter shoe linkage. To centralise the shoes and the inter linkage pivot centre point, proceed as follows.

The actuator *must be free* to slightly slide either up or down and *very importantly* the brake adjuster retaining set screws must be slackened back two turns to allow the adjuster to move on the back plate. It is permissible to slacken the adjuster retaining screws prior to setting the shoe stops previously discussed if this helps to achieve square application of the shoe / lining to the drum. Once the brake shoes have been assembled the brake drum must be fully fitted and the brake adjuster taken up tight to centralise the shoes in the drum. At that point the brake adjuster set screws should be tightened and the adjuster turned back to allow and the brake drum to be removed. The shoes / linings will now attack the drum surface *squarely* and also be *centralised*.

Take note that the top brake lining will drag even with the adjuster turned back, so only turn it back enough to remove the drum. This shoe lining dragging is explained later

The objective here has been to centralise the brake adjuster and brake shoes.

Fitting and adjusting brake inter shoe linkage.

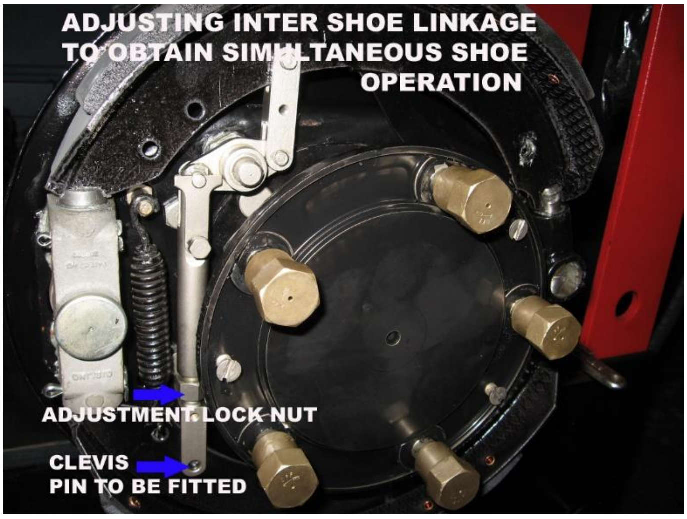

Fig 28. Inter shoe linkage fitted but lower clevis pin left out…

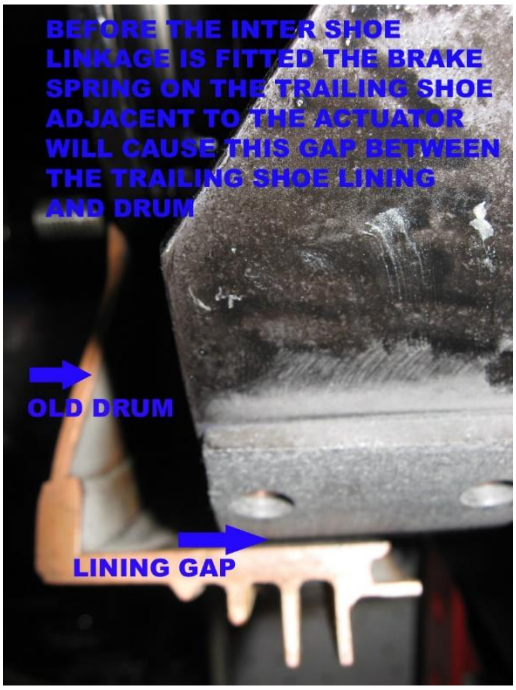

Fig 29. If the inter shoe link clevis is removed the action of the shoe return spring will bias the shoes.

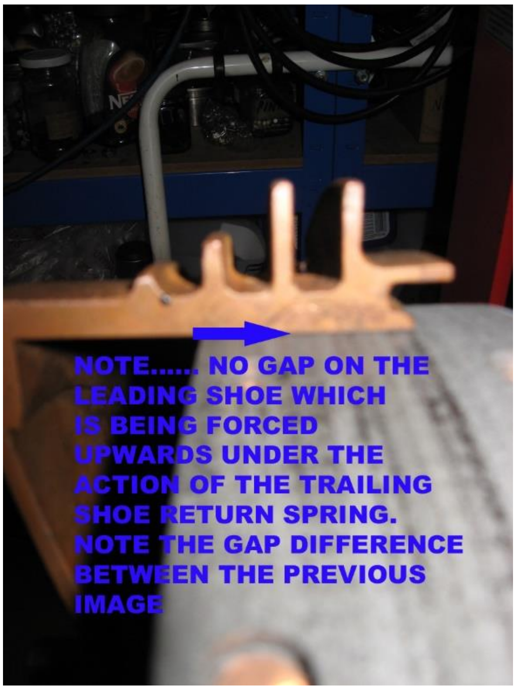

Fig 30. The top lining hard against the drum when the inter shoe clevis has been removed.

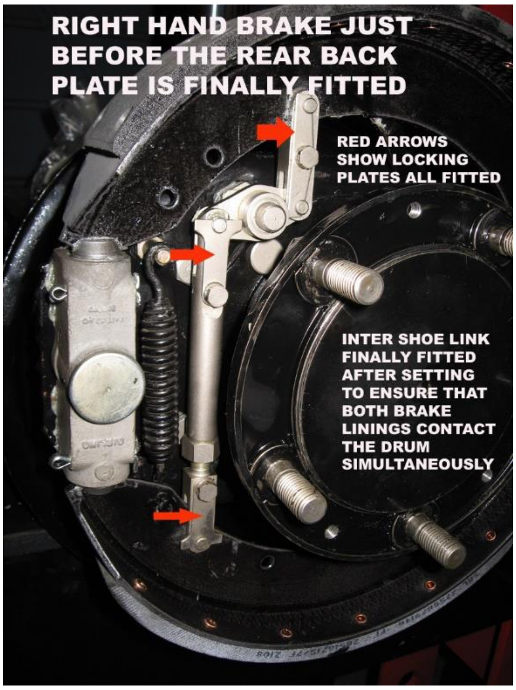

Fig 31. All locking plates in position and secured almost ready for fitting the brake drum.

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Fig 32. Applying a little grease around the locating spigot for the drum will prove dividends later.

Once the shoe stops have been finely adjusted and the shoes centralised the inter shoe linkage can be set. Remember at this point to disregard any illustration in parts books or manuals that show different assembly of the inter shoe linkage than is shown in this article. It may be necessary at this stage to remove and refit the brake shoes to assemble the inter shoe linkage.

The inter shoe linkage should be assembled as shown in Fig 28 with the short link attached to the leading shoe. Assembly of this linkage can be carried out before the shoe stops are set providing the bottom clevis pin is not in position as shown, and this is also to be the condition up to the point of setting the inter shoe linkage.

It is *important to understand* that at any time that the intershoe linkage is decoupled and has a clevis pin removed that the brake shoes will move upwards. This is clearly shown in Fig 29 and Fig 30, with the shoe lining contacting at the top and gapped at the bottom under the influence of the shoe to back plate return spring.

Once again a trammel or segmented brake drum arrangement are the best tools to use and it is assumed that one or other is used in the following description. If feeler gauges are used between the brake drum and linings instead of the correct tools good accuracy will be required or brake inefficiency and pedal travel will result.

The adjusting thread and adjustment locking nut at the lower end of the linkage in Fig 28 should be free to turn and slightly lubricated.

This inter shoe "balanced condition" is achieved by adjusting the screwed fork*** on the inter shoe linkage and then replacing the clevis pin so that the trammel or segmented drum face is just touching both linings equally as the half shaft / hub is rotated. To check the balanced condition the brake adjuster will need adjusting steadily while the linings to trammel gaps are observed. Once this balanced condition is obtained slacken the two set screws again holding the brake adjuster to the brake carrier and fit the brake drum. Screw up the brake adjuster hard. Tighten up the brake adjuster retaining set screws and slacken the brake adjuster to its correct setting.

Note: In order to screw the long link fork it may be necessary to temporarily remove the clevis from the top short link, so that the former fork can be swung out from the bottom shoe web and adjusted.

At this stage it should be possible to trial test the settings by adjusting up the brake adjuster and by backing off the adjuster two clicks when the brake linings should clear the drum. An exception may occur when new linings have been fitted and / or the brake drum is slightly distorted. On a good well adjusted brake the linings will clear by releasing just one click.

If in doubt a test can be made by applying chalk to the drum friction face, fitting the drum and adjusting the brake whilst turning the drum by hand until the drum cannot be turned any more. Then slacken the adjuster and remove the drum and examine the lining contact patches, adjust the inter shoe linkage as required to obtain even contact.

Finally remove the drum and secure all the lock plates on the intershoe linkages as seen in Fig 31. Refit the brake dust shield backing plate making sure that the steel washer is fitted over the back of the adjuster, *followed* by the rubber sealing ring and then the dust shield plate. At the expander or actuator end the large concertina rubber shield will need positioning over the actuator body and securing with a rubber 'O' ring to form a seal.

Finally clean and lightly grease the half shaft to drum location ridge Fig 32 and fit the drum and adjust the brake.

Brake assembly notes

During the course of the last two adjustments it will have been necessary to remove the brake drum a number of times. On no account short cut the retention of the drum by trying to hold it in place, on each and every occasion ensure all three screws are used to retain the drum and that their heads do NOT protrude from the drum. The drums tend to skew under their own weight and it is not possible to carry out the settings unless the drum has fully located on the location register and is secured by screws. This same advice applies when using a segmented drum, except only two screws will be used.

It will be found that it is necessary to refit the hand wheel to the rear of the brake adjuster and fit the adjuster wheel locking nut to prevent the wheel unscrewing. This can be tedious but must be done and will be more of a chore if either a trammel or segmented drum is not used.

The later R type chassis rear brake adjusters did not have hand wheels fitted and the adjusters were modified to a square head to accept a spanner or wrench. This is an easier system, particularly since the hand wheel lock nuts come slack in service unless the adjuster end is riveted. In the next part of this article the individual components of the brake are discussed including the easy modification to the brake adjuster to the later standard. The rebuilding of the brake assembly will be slightly easier if the adjuster is modified to a square head.

Intershoe link pins can be oiled lightly after assembly and a touch of high melting point grease can be applied to the end abutments of each brake shoe and between the shoes and shoe stops to prevent squeaks.

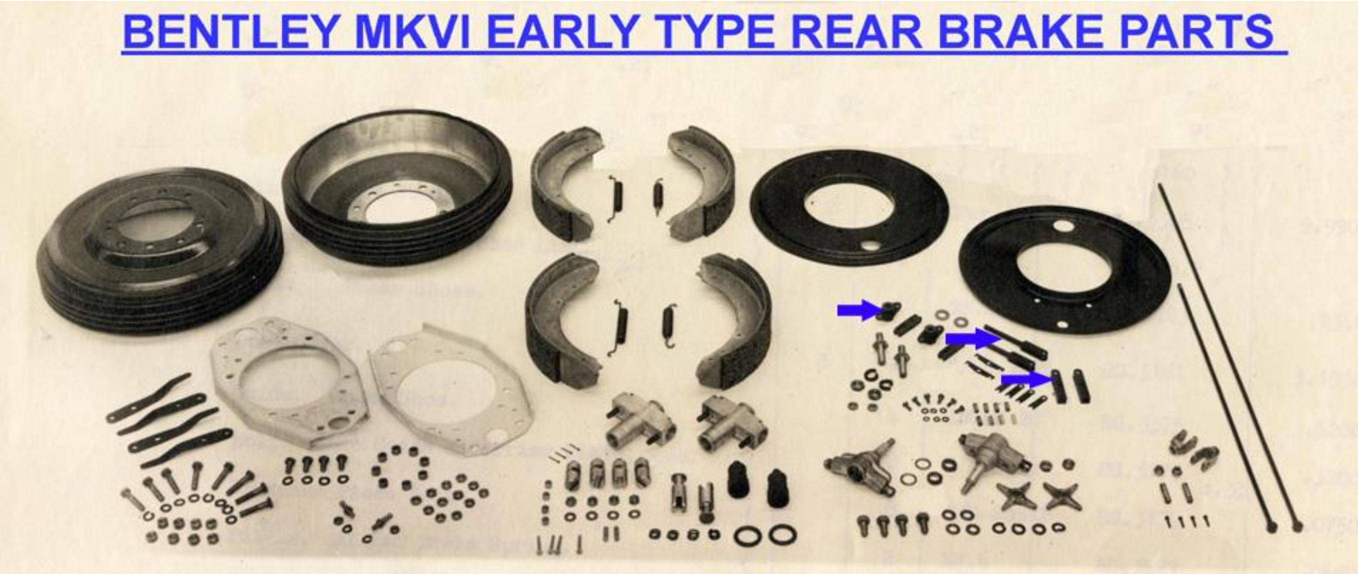

Fig 33. Brake parts for the very early MkVI series

Fig 34. Face plate of the rear drum showing how it attaches to the cast iron drum section during manufacture.

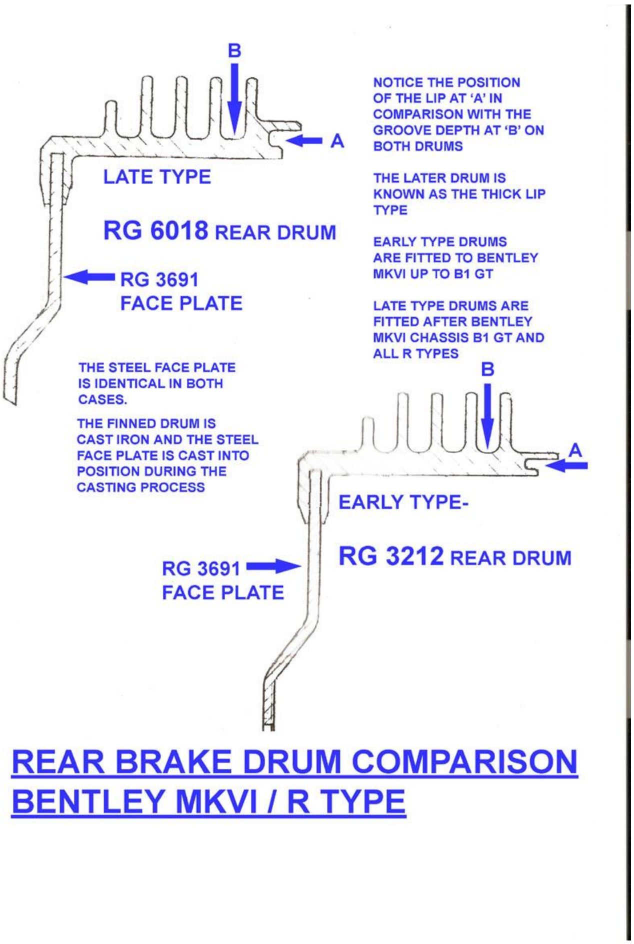

Fig 35. Cross sections of the RG 3212 early, and the RG 6018 late type rear brake drums.

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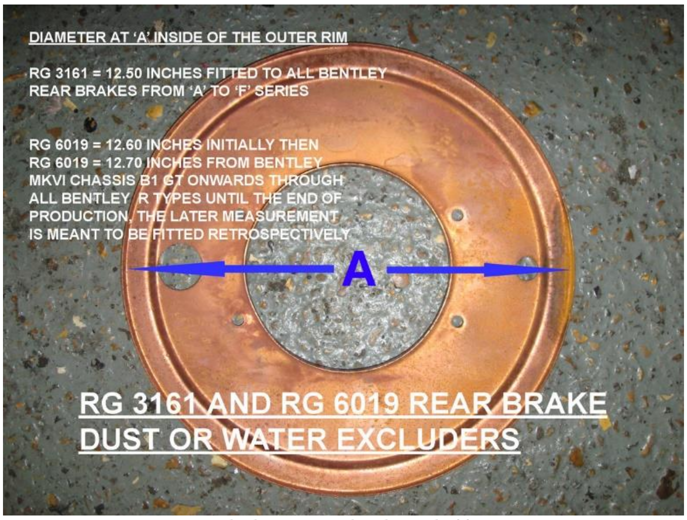

Fig 36. Water and dust excluder differences

Fig 37. Broken Fins, caused by incorrect removal

Fig 33 shows a general view of the component parts from an early rear brake assembly, most of these major parts are discussed in the following paragraphs.

Brake Drums and Water/Dust back plate excluders

The drums are made from two pieces, that is the finned outer section and the face plate which spigots onto the wheel studs are two different parts and made from two different materials. The face plate is pressed out of steel and then punched around its periphery with 30 holes of 0.375 inch diameter. This steel face plate is then very accurately inserted into the mould in which cast iron is then poured to make the drum. The outer cast section is very heavily finned to assist cooling and is finally ground to 12.250 inches internal diameter with an allowance for in service regrinding to 12.300 inches.

It is worth noting that no R-R product with drum brakes has ever had cast iron face plates, either the drums have been all steel or have been two piece constructions with steel face plates. There are a number of reasons for this construction; the one most likely to appeal to a fast driver in mountainous territory is that the design is very unlikely to produce brake fade.

The test standard for the last of the Silver Cloud / Bentley S series cars with drum brakes was to accelerate from rest to 100 mph and then brake to a complete stop and then repeat the exercise continuously until the linings were worn out, without brake fade. It is a standard that has never been met by any other car manufacture Worldwide with drum brakes. A fade standard that should be almost achievable on the earlier cars.

A number of one piece cast iron replacement drums have been produced by suppliers and it is largely up to the car owner as to whether they are satisfied with the braking standards that one piece drums can offer when replacement time comes around. I am inclined to use the rather meticulous approach that R-R offered originally, but the majority of car manufacturers nevertheless went the route of the cheaper one piece alternatives. Perhaps that is why R-R always led the field in braking standards whilst drum brakes lasted. The writer has no long term experience with fully cast drums on R-R chassis.

The Bentley chassis from A to F series, and equivalent R-R models, used a RG 3212 drum but all chassis from G series onwards utilised the RG 6018 drum. Both drums used the same GB 3691 face plate see Fig 34 but differed at the open end of the drum. The differences between the drums can be seen in Fig 35 by comparing the height of point 'A' with the bottom of the groove at point 'B'. The later drum being another attempt by R-R to stay ahead of the game in the braking field with the thicker edge lip forming a belt around the open end of the drum. This assists in preventing 'bell mouthing' of the drum open end.

It is important to realise the differences between the drums as they are matched to the water/dust excluder type that can be used. Early RG 3212 drums use a RG 3161 excluder, whilst later RG 6018 drums are matched to excluder RG 6019. Fig 36 highlights the differences and if you ever fit the wrong excluder, this is the first component to be fitted to an axle tube after a full axle or brake strip, you will be due to have a very bad day.

The edge lip of these excluders is very accurate and the lip of the wrong excluder cannot be reworked easily, it may appear to be so but that is not the case. Fit the wrong one and you are about to change it, so if in doubt try fitting the excluder into the groove at the open end of the brake drum. Drums and excluders can be changed in matched pairs if the need is desperate and the move to the thick lip drum and excluder is in the right direction.

There is just one fly in the ointment, the very early RG 6019 excluders had their diameters increased and a number of Bentley 'G' and 'H' series chassis still have smaller diameter RG 6019 excluders. Originally these suffered on occasion by the excluder fouling the drum on corners and the usual fix was to turn out the drum excluder groove a little to cure the trouble. No problem unless you come to use one of these early units or you try and fit a new brake drum. In which case you will need to increase the drum groove width to clear the excluder and offer forgiveness for calling your drum supplier unprintable names, it's not his fault!

The drums are drilled and tapped on the face plate to accept 0.250 inch BSF set screws to aid the removal of the drum. Suitable screws should be used when the drums are removed if they show the least signs of resistance to move. The screws engage the face plate thread and push the drum squarely off their spigot location. If you do not possess any BSF set screws you should be able to loan one from a chassis location where they usually abound in some numbers. You will be about number 2 million (many have gone before) if you consider using a hammer or lead, copper, hide or rubber mallet to remove a stubborn brake drum. It is like hitting your pet goldfish it is going to leave you with a broken fin see Fig 37 but it will still not move, so use the correct method in the first instance. Worthy of note is those broken brake drum fins contribute considerably to unbalance on either front or rear axles..........avoid them if you can.

Inter shoe linkage

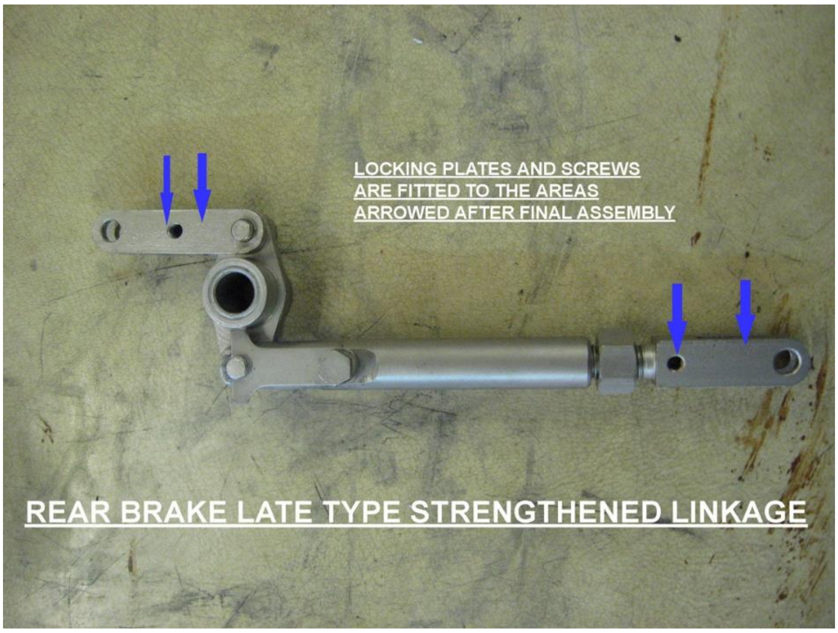

Fig 38. Later type heavy-duty intershoe linkage.

The inter shoe linkage rocker arm contains an Oilite bush that pivots on a pin retained in the brake carrier. It is advisable to place this rocker and its attached linkage in a jar of oil for 24 hours before assembly so that the Oilite bush can absorb oil. To achieve this the bush /part should be heated up a little to open the pores in the material before being placed in oil.

Very early chassis roughly before ‘E’ series used a light linkage, but from ’E’ series onwards (this includes about 8 chassis at end of ‘DZ’ series) the linkage was remodelled and strengthened. The arrows shown in Fig 33 point towards the earlier type brake linkage but Fig 38 shows an example of the later linkage and every effort should be made on early model Bentley MKVI chassis to swap to the later linkage. The later design provides a firmer brake pedal feel and is not inclined to distort.

Rear Brake Adjuster

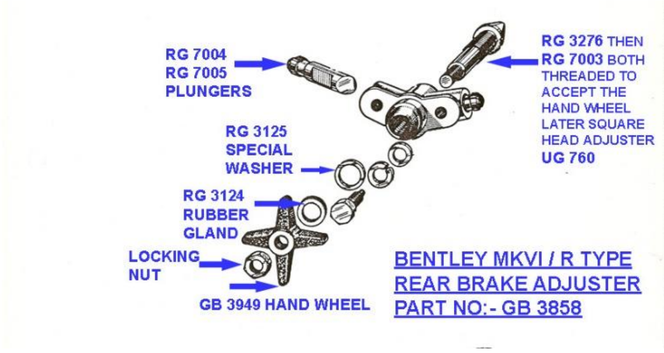

Fig 39. Rear brake adjuster

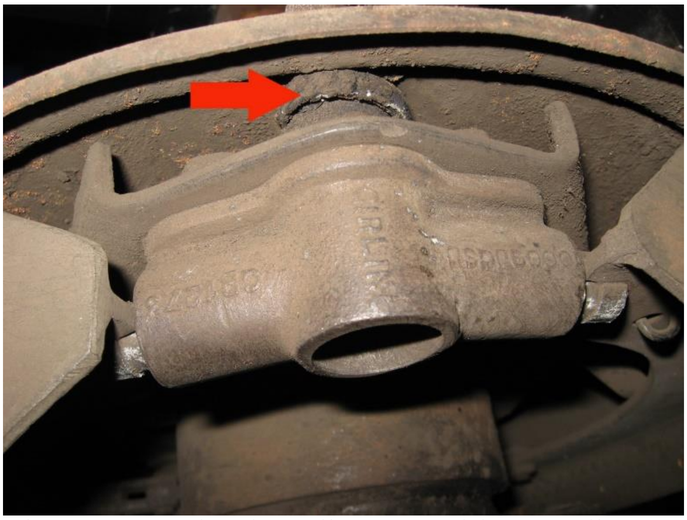

Fig 40. Rear brake adjuster rubber sealing washer needing renewal

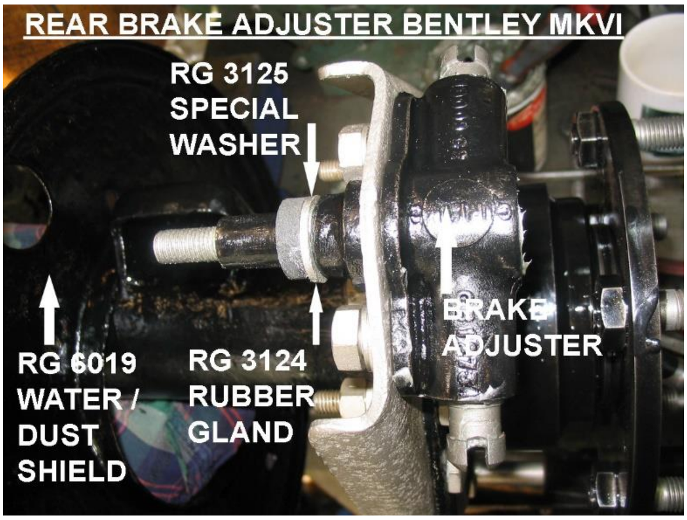

Fig 41. Special washer and rubber gland assembled onto the brake adjuster

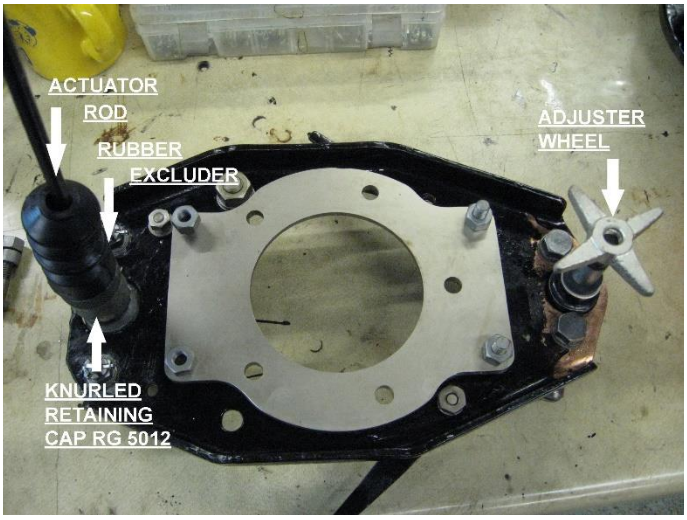

Fig 42. Brake shoe carrier details showing assembled parts

Fig 43. Early and very late type threaded adjuster cones.

This adjuster started life at the end of May 1938 and was supplied by New Hudson Ltd and the initial GB prefixed part numbers were the original New Hudson piece numbers. Subsequently Girling supplied the adjuster unit and in April 1948 new R-R post war RG prefix part numbers were issued to replace the GB prefix numbers. This will explain why some parts appear to have completely different part numbers for the same item.

Fig 39 shows the general arrangement of the parts in the GB 3858 brake adjuster. The most notable point to watch when assembling is to ensure that the plungers or tappets are positioned correctly. When the RG 7003 threaded adjuster is screwed up each rotation should produce four clicks on the adjuster, if more are felt the plungers are fitted in the wrong position and should be reversed. Before disassembling adjusters it is wise to mark one end of the adjuster and its adjacent plunger to aid assembly. The two retaining set screws have a nose extension which captures the plungers and prevents them falling out of location.

The RG 7003 adjuster cone is threaded 0.625 inch diameter 20 tpi and is removed by screwing it inwards towards the brake assembly. During assembly this cone and the mating plungers need lubricating with high melting point grease or adjuster grease that is specially made for this purpose.

It is also important to remember to first position the special washer RG 3125 onto the adjuster thread and then the rubber gland RG 3124 before finally replacing the water excluder shield during brake assembly. It is surprising how many adjusters lack these parts, which are a defence against water ingress. The Red arrow in Fig 40 shows the rubber gland on a brake adjuster still in service, this one is ready for renewing but has served its purpose well. Fig 41 clearly shows the position taken up by the washer and gland before the water / dust shield is refitted.

Although the brake adjuster hand wheel will be needed to be fitted temporarily Fig 42 to the brake assembly a number of times it should not be fitted permanently until the time arrives to refit the road wheels. At that time a new half nut will need screwing on behind the adjuster and the adjuster end riveting over the nut. For those owners who do not like this idea, including the writer, salvation is in the next paragraph.

Near the end of R type production the adjuster cone was modified by the simple expedient of cutting off the threaded section and forming a square 0.500 inch across the flats, see Fig 43. It is feasible and in fact preferable to carry out this modification on any threaded adjuster. Forming a square on the adjuster overcomes the need to fit a locking nut and riveting the end of the adjuster after first having replaced the adjuster hand wheel. These hand wheels are malleable cast iron and do not take kindly to any rough treatment and they have an annoying habit of screwing off the adjuster when the brakes are adjusted. The later R type square adjuster was destined to last all the way through the life of rear drums brakes on R-R / Bentley cars.

Rear Brake Expander / Actuators

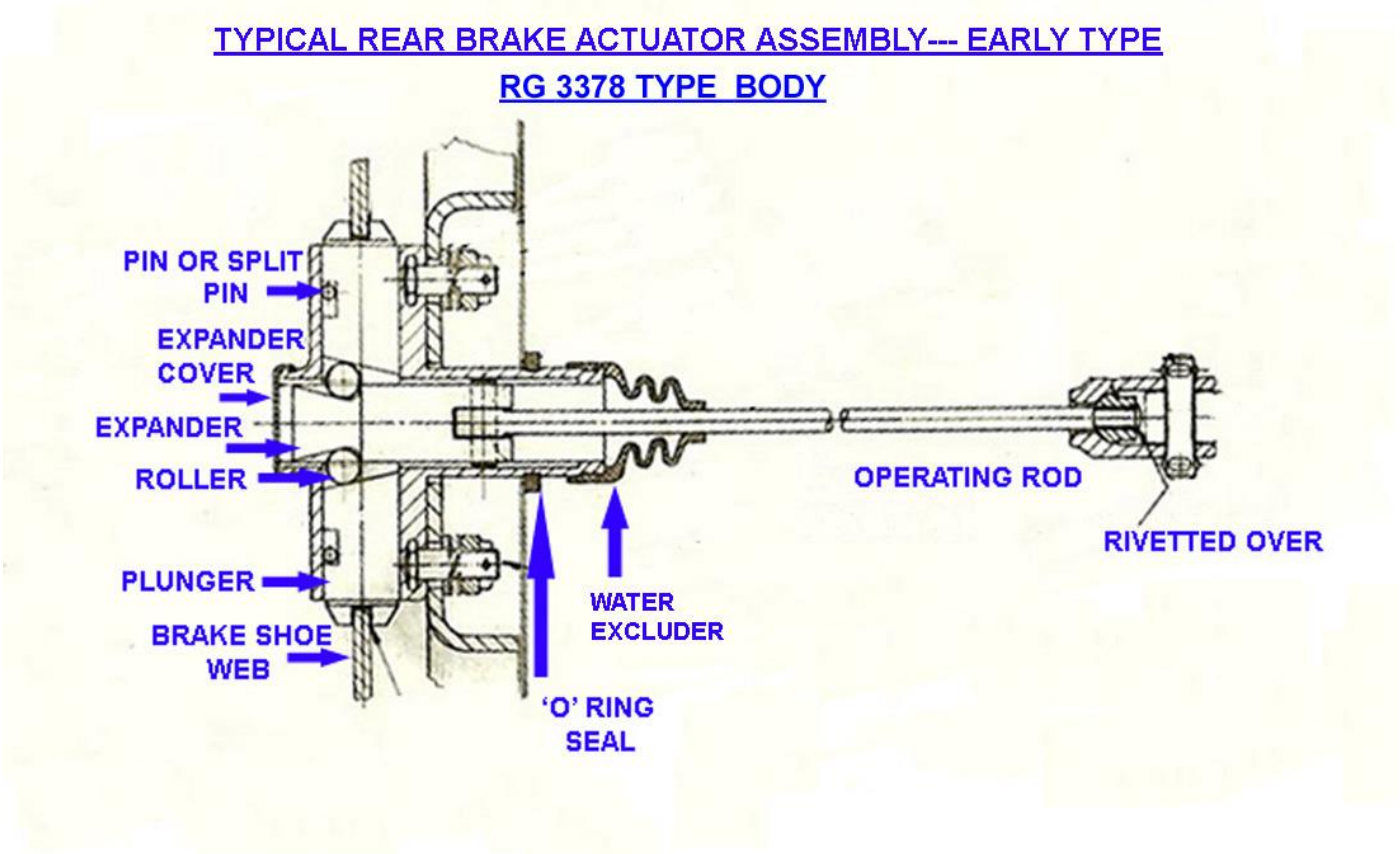

Fig 44. Details of a very early rear brake actuator.

Nearly all the modifications to the rear actuators were done to cure sticking, fierce or unbalanced braking. Importantly to the home mechanic, the changes sometimes involved simultaneous alterations to other components such as balance levers and the servo cam ramp angles. For example the change from 9 degree actuators to 13 degree was accompanied by a change to the servo cam ramp angle. With care later components can be substituted, particularly the fitting of an actuator internal return spring.

In order to understand the changes made to the actuators it is better to examine all of the separate components so that the owner may understand the changes and recognise the actuator type.

The actuator itself works on the principle of pulling on a brake rod that is attached to a tapered cone expander, which is arranged to move horizontally within an alloy housing. It is so called because the expander operates against two rollers positioned between two tapered faced plungers that are expanded or pushed apart during any brake application. As the actuator plungers are in direct contact with one end of each brake shoe, the brake shoe linings are forced against the drum friction surface. The actuator plungers, rollers and expander are all contained in an alloy cast housing. Fig 44 shows a typical very early actuator assembly.

The actuator for the Bentley model, including the Silver Dawn and Silver Wraith were always the same at any single time in the production run. That is to say that as modifications were introduced the modified actuator itself was fitted across the model range. The only component that differed at any instant was the actuator operating rod, this was longer on the left hand side of all models than the right side, and in any event both right and left hand rods were always longer on the Silver Wraith than the other models. This was due to the wider rear axle track width on the Silver Wraith.

It is however important to realise that the operating rod formed part of the actuator assembly and therefore the part numbers of the Silver Wraith actuator assemblies were always different to the other models *but* providing the operating rods are changed over the actuators are identical for right and left hand and for any model at a *given* time in production. In short, the actuator can be adapted to fit any brake by changing the operating rod.

First, a description of the stripping and rebuilding of a typical actuator will assist in recognition of the parts, followed by a more detailed listing of chronological alterations to the parts.

Actuator strip and rebuild

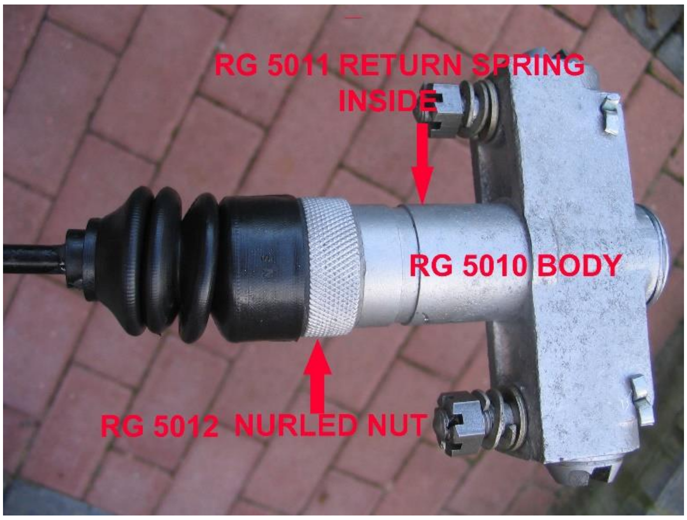

Fig 45. A rebuilt brake actuator

Fig 46. Typical corrosion that can be repaired.

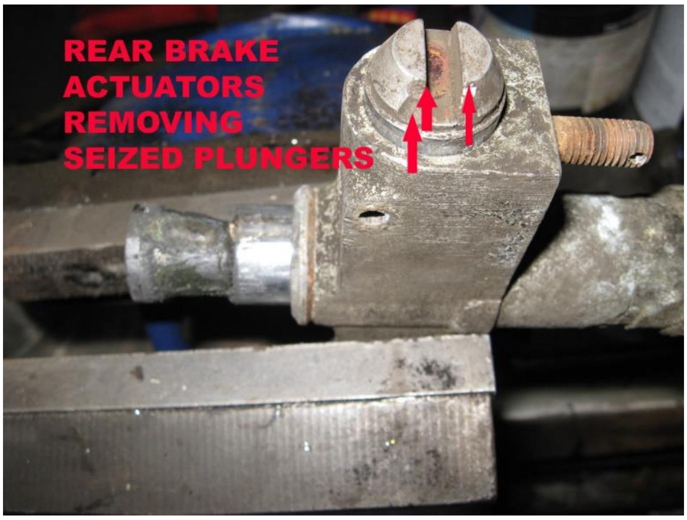

Fig 47 Actuator seized plungers showing previous removal damage.

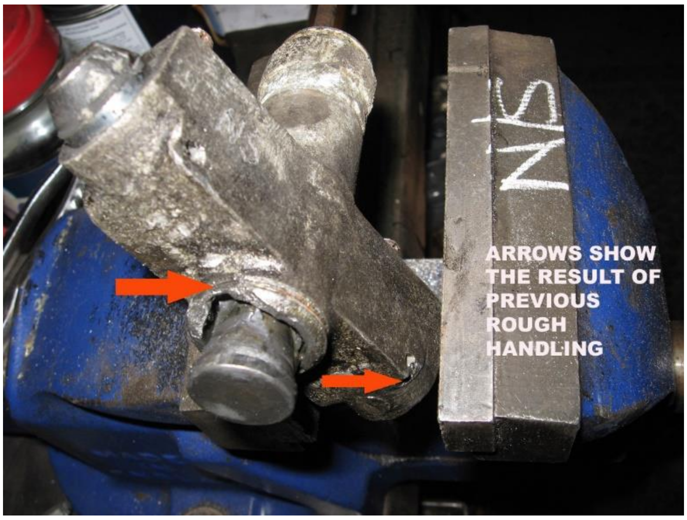

Fig 48 Actuator damage by forcing off the end cap.

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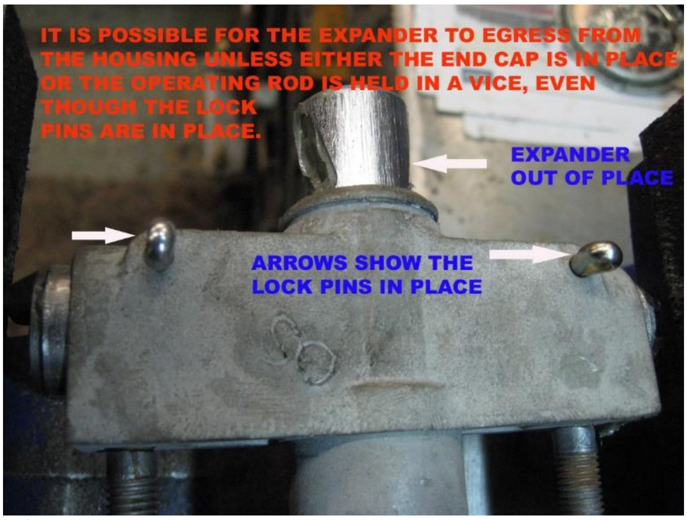

Fig 49 Actuator cone egress

Fig 50 Actuator cone to rod retaining pin

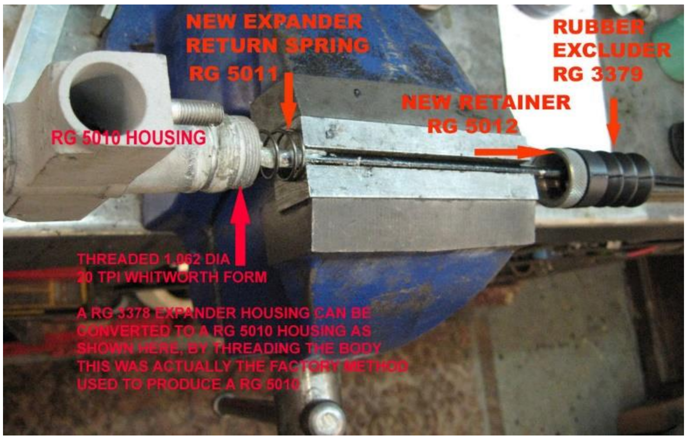

Fig 51 Actuator main parts

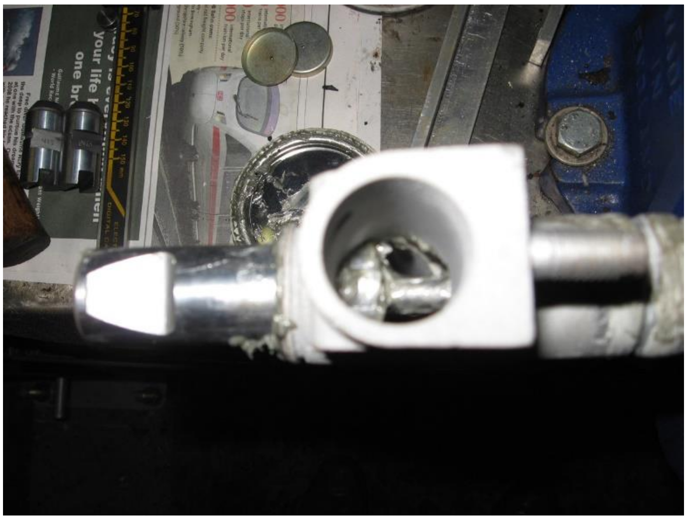

Fig 52 Actuator start of assembly

Fig 53 Roller RG 3384

Fig 54 Pin replacement

Fig 55 Actuator cover RG 7088

Fig 56 Tool to replace RG 7088

Fig 57 Tool cross section

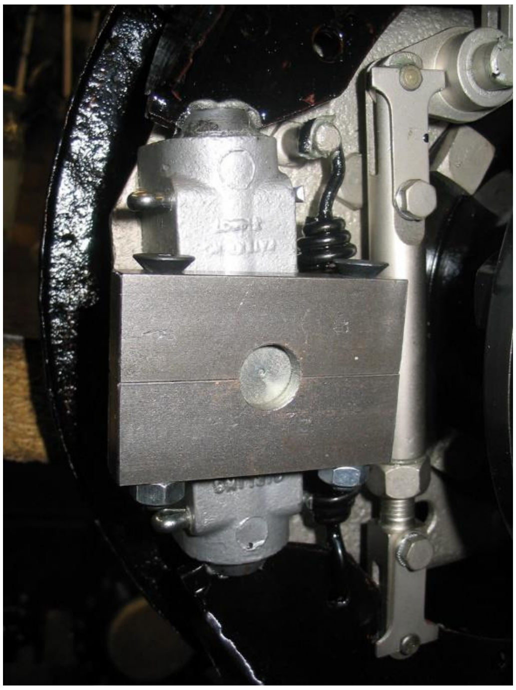

Fig 58 Tool for RG 7088 in use on a car

Most owners will want to achieve a finished product as shown in Fig 45. The majority will probably initially start with an actuator with extensive corrosion as in Fig 46 and be worried about achieving a working unit.

A few points are worth consideration. In most instances the corrosion occurs on an exposed surface that is not under an operating load and therefore can be easily repaired as shown later. The second point to remember is never to try to twist the two holding studs or they will break out of the casting as they are cast in during manufacturer. Thirdly do not try to turn solidly seized plungers by holding the housing and using a blunt instrument in the slot of the plunger. If this is tried, the plunger top will break usually before the housing, but both will sustain damage, as shown by the arrows in Fig 47 and Fig 48. Soak the actuator in penetrating fluid or diesel, after wiping off gently heat the alloy housing to expand it away from the plungers and then gently coax out the plungers.

The order of stripping is to remove the actuator complete with its operating rod from the brake carrier after removing the split pins and undoing the castellated nuts and capturing the special dual coiled spring (Thackeray) washers. When finally reassembling the complete actuator to the brake carrier remember to tighten up the castellated nuts onto the double coiled spring washers and then undo the nuts at least one full turn before engaging the split pins. Do not use excess force on the nuts as the studs are cast into alloy!

Mark the actuator body according to its position, either L.H or R.H, and also mark the operating rod by labelling. Carefully remove the RG 7088 tin end cap by drilling the flat section to weaken the structure and then using a set of side cutters or pincers to peel away the end cap edges. You would be wise not to attempt to push out the rod and force the actuator expander to eject the cap from the housing; this is likely to break the housing. In the 60 years since they were made these casting have deteriorated and need careful handling. Even though the split pins may be in place retaining the plungers the expander cone itself can come out of the housing, so beware, and see Fig 49.

Remove the split pins, two plungers and the two rollers. Push the rod and eject the expander cone, using a punch tap out the rod pin as shown in Fig 50. Separate the rod and expander cone. At this point it is possible to collect the RG 5011 internal spring if one is fitted and remove the RG 3379 rubber boot.

If it is desired that the alloy retaining nut requires removing for any reason proceed as follows, otherwise it is feasible to rebuild an actuator with the nut in position. It is unlikely that the alloy RG 5012 retaining nut will unscrew from the actuator body, do not try force or the body is liable to shear. Currently these retaining nuts are available, so ensure you have an adequate supply and then carefully saw off the old retaining nut by sawing at right angles to the thread at each side of the nut. Do not damage the expander body, as it is only necessary to cut through part of the nut’s thread on each side to relieve its hold on the main body.

To re-assemble, clean and inspect all the parts for damage. The roller, expander and plunger operating surfaces must be free of flat spots or depressions otherwise this type of brake will tend to stick on after application. In addition the brake application can be very variable once the working parts contact a flat spot or depression. This variation can be alarming and is made worse because wedge operated brakes are extremely effective but suffer from none linear operation. That is, input power is not in proportion to brake retardation. The rollers will tend to stick, and slide instead of free rolling if they come into contact with a wear depression in any surface.

First ensure the correct operating rod is going to be mated with the correct actuator body (see later Fig 61, Fig 62). Place the RG 3379 rubber excluder, RG 5012 retaining nut and RG 5011 spring onto the actuating rod, as shown in Fig 51. Place the actuator body on the end of the operating rod and push the rod through the body so that the expander can be fitted and the connecting pin driven through the eye of the rod. Grease the assembly using only brake actuator grease, which is intended for high temperature applications. Fig 52 shows the expander and rod connected and the expander being engaged again with the body, the pin ends having engaged in grooves in the body.

Fully engage the expander by pulling on the rod and then holding the rod in a vice to keep the expander cone withdrawn against the spring as in Fig 53. Grease each plunger and position a roller using grease for its retention then engage each plunger in the body, shown in Fig 53. Replace the retaining pins, or correct sized split pins into the body to capture the plungers. Replace the pins with their tails inboard so that in service they can be withdrawn without having to remove the actuator from the brake carrier plate, Fig 54. Firmly hold the plungers into the body as spring action can still eject the expander, previously shown in Fig 49. Lightly grip the assembly across the plunger tops in a vice, or obtain the help of a second person to keep the assembly intact during the time the end cap is being replaced.

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Place a new RG 7088 end cap on the end of the body and very lightly peen over the edges see Fig 55. To make a neat job of this exercise it is worthwhile making up a tool to complete the swaging as in Fig 56, Fig 57 while Fig 58 shows the same tool being used on a car.

Cut off the split pin ends leaving very short tails and just widen the tail ends out to prevent them working out of the actuator body. Pull the outer ends of the rubber excluder over the rib of the actuator body and secure the rubber excluder to the actuator by wrapping around a plastic 'tie' or 'O' ring.

Eventually slide the excluder section that contacts the operating rod outwards towards the road wheel, clean the rod and apply glue to the rod letting the rubber slide back again into position. The subsequent bonding between rod and rubber will prevent water ingress.....note, water going in, cannot get out and it is sensible to cleanly punch a small drain hole in the bottom of the excluder. Bonding the excluder to the rod can only be done easily after the brake back plate is fitted. It can be achieved beforehand, but possible fouling of the back plate makes the task awkward. See also in the appendix.

Actuator body repair

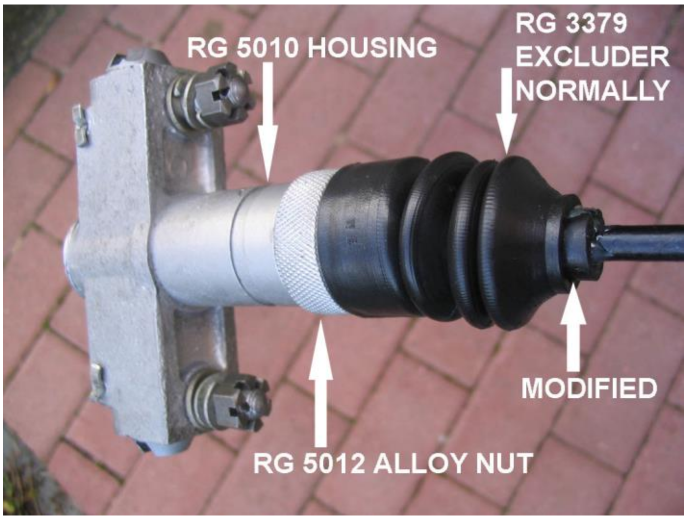

Fig 59 Actuator main assembly parts

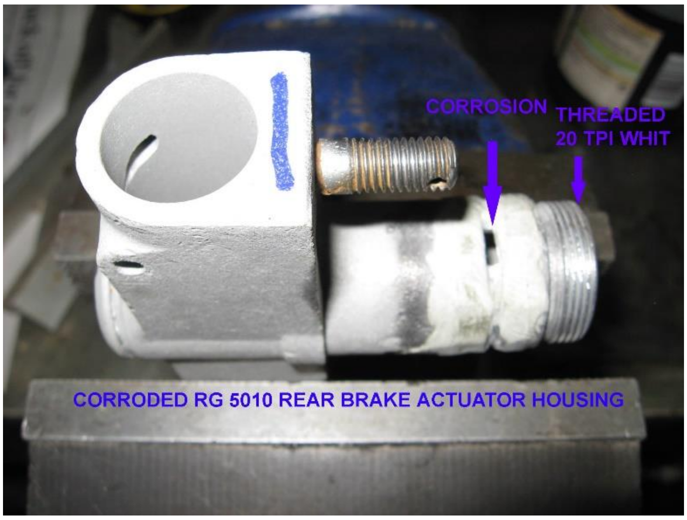

Fig 60 Actuator alloy body under repair

Fig 60a Hole in actuator body that can be repaired

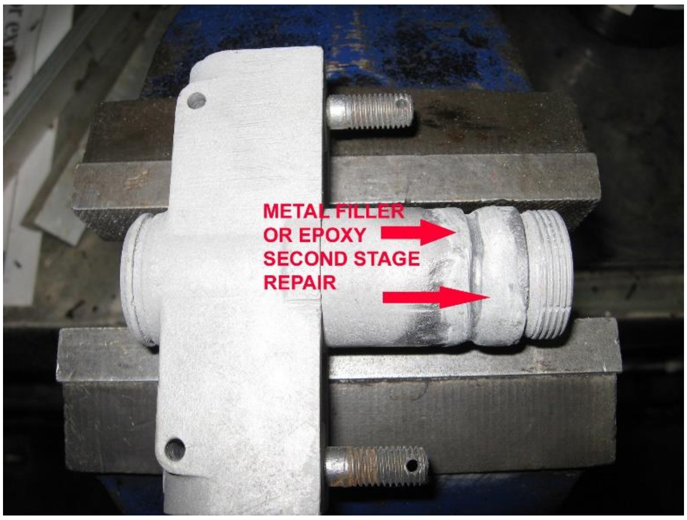

Fig 60b Second stage of repair, ready for last application of epoxy.

Fig 60c Actuator bodies after anodising, but before repair

Fig 59 shows a reconditioned actuator in the condition we all desire but Fig 60 shows the frequently found condition of these actuators discussed above. As discussed elsewhere it is possible to clean up the damage by turning but if the corrosion is severe often the worst can be ground out and replaced with metal filler or epoxy as shown in Fig 60a and Fig 60 b.

In Fig 60 c a pair of actuator bodies are shown after they have been industrial anodised. This process was carried out to prevent further in service corrosion after the initial heavy corrosion had been removed but before applying metal filler.

Actuator, Cones, Plungers and rods

REAR BRAKE DETAILS

MODEL	DESC	EXP'DER	HOUSING	EXP CONE	PLUNGER	DEG	ROD	FROM	TO	NOTES
BENTLEY	EXP L.H	RG 3388	RG 3378	RG 3381	RG 3380	9	RG 3168	B2 AK	B15 CD	
MK6 / R	EXP R.H	RG 3387	RG 3378	RG 3381	RG 3380	9	RG 3169	B2 AK	B15 CD	
BENTLEY	EXP L.H	RG 3763	RG 3378	RG 4396	RG 4395	13	RG 3168	B17 CD	B345 CD	
MK6 / R	EXP R.H	RG 3175	RG 3378	RG 4396	RG 4395	13	RG 3169	B17 CD	B345 CD	
BENTLEY	EXP L.H	RG 5569	RG 3378	RG 5009	RG 4395	13	RG 5520	B345 CD	B501 CD	IN EACH BLOCK THERE WAS AN OVERLAP OF CHASSIS TAKING EARLIER OR LATER EXPANDERS
MK6 / R	EXP R.H	RG 5568	RG 3378	RG 5009	RG 4395	13	RG 5519	B345 CD	B501 CD	
BENTLEY	EXP L.H	RG 5400	RG 5010	RG 5009	RG 4395	13	RG 5520	B2 DA	B144 JO	
MK6 / R	EXP R.H	RG 5399	RG 5010	RG 5009	RG 4395	13	RG 5519	B2 DA	B144 JO	
BENTLEY	EXP L.H	RG 6366	RG 5010	RG 6362	RG 4395	13	RG 5667	B146 JO	LAST R TYPE	
MK6 / R	EXP R.H	RG 6367	RG 5010	RG 6362	RG 4395	13	RG 5666	B146 JO	LAST R TYPE	
R-R	EXP L.H	RG 5400	RG 5010	RG 5009	RG 4395	13	RG 5520	SBA 4	SDB 2	
S/DAWN	EXP R.H	RG 5399	RG 5010	RG 5009	RG 4395	13	RG 5519	SBA 4	SDB 2	
R-R	EXP L.H	RG 6366	RG 5010	RG 6362	RG 4395	13	RG 5667	SDB 2	LAST S/D	
S/DAWN	EXP R.H	RG 6367	RG 5010	RG 6362	RG 4395	13	RG 5666	SDB 2	LAST S/D	
R-R SWB	EXP L.H	RG 3390	RG 3378	RG 3381	RG 3380	9	RG 3289	WTA 1	WDC 17	
S/WRAITH	EXP R.H	RG 3389	RG 3378	RG 3381	RG 3380	9	RG 3290	WTA 1	WDC 17	
R-R SWB	EXP L.H	RG 5433	RG 5010	RG 5009	RG 4395	13	RG 5522	WDC18	WME 12	
S/WRAITH	EXP R.H	RG 5432	RG 5010	RG 5009	RG 4395	13	RG 5521	WDC18	WME 12	IN EACH BLOCK THERE WAS AN OVERLAP OF CHASSIS TAKING EARLIER OR LATER EXPANDERS
R-R SWB	EXP L.H	RG 6365	RG 5010	RG 6362	RG 4395	13	RG 5669	WME14	LAST S/W	
S/WRAITH	EXP R.H	RG 6364	RG 5010	RG 6362	RG 4395	13	RG 5668	WME14	LAST S/W	
R-R LWB	EXP L.H	RG 6799	RG 5010	RG 6362	RG 4395	13	RG 6795	ALL SILVER WRAITH		
S/WRAITH	EXP R.H	RG 6798	RG 5010	RG 6362	RG 4395	13	RG 6794	LONG WHEELBASE		

RG 3381	NO NOTCH PROVISION FOR RETURN SPRING
RG4396	NO NOTCH PROVISION FOR RETURN SPRING
RG 5009	EXPANDER CONE NOTCHED TO ACCEPT RETURN SPRING
RG 5010	MODIFIED TO ACCEPT RG 5011 RETURN SPRING AND RG 5012 THREADED NUT
RG 6362	MODIFIED WITH TWO FLAT SECTIONS TO PREVENT DAMAGE BY THE ROLLERS

Fig 61 Actuator list of parts and chassis changes

Bentley MkVI / R Type and Rolls-Royce Silver Dawn and Silver Wraith

REAR TRANSVERSE BRAKE RODS

PART NO	CENTRE TO CENTRE FROM OUTER EYE TO INBOARD FORGED SPHERICAL PIECE	HAND	USED ON
RG 5670	19.575 INCH (497.2 mm)	R.H	BENTLEY & SILVER DAWN
RG 5671	30.075 INCH (763.9 mm)	L.H	BENTLEY & SILVER DAWN
RG 5672	20.075 INCH (509.9 mm)	R.H	SILVER WRAITH S.W.B
RG 5673	30.575 INCH (776.6 mm)	L.H	SILVER WRAITH S.W.B

Fig 62 Transverse rod list

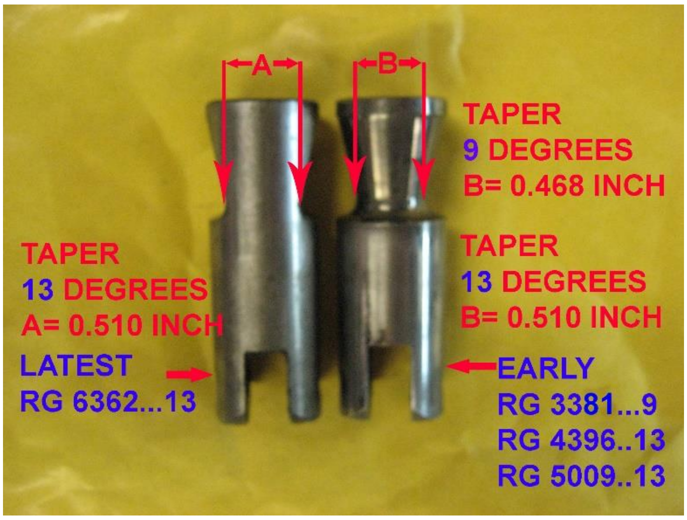

Fig 63 Actuator cone differences

Fig 64 Actuator cone types

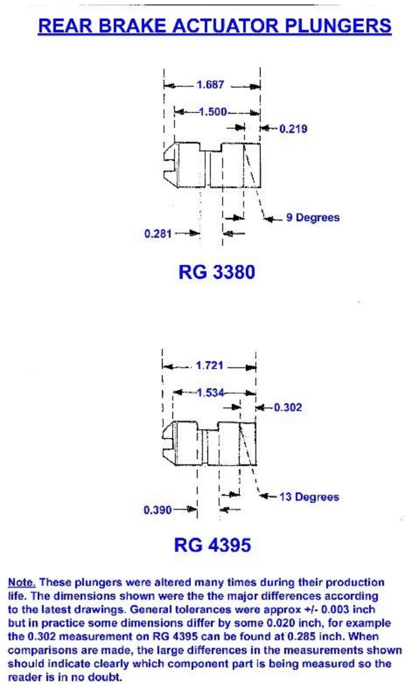

Fig 65 Actuator plunger types

To assist in identifying the actuator parts and rods so that swapping over may be accomplished to help any shortages of spare parts, the part numbers of the different actuators and operating rods are shown in Fig 61 and Fig 62. These part numbers are those that the owner will see in the relevant parts books and are / were available as spare parts, but some other actuators were used on production for short periods.

These none listed actuator units were Bentley MkVI and R-R Silver Dawn RG 5587 and RG 5588, R-R Silver Wraith RG 5589 and RG 5590, all with 9 degree wedge operation. In addition RG 5570 and RG 5571 with 13 degree wedge operation were used on R-R Silver Wraith. All these units had the latest RG 5010 housings, RG 5012 alloy spring retaining nuts and RG 5011 return springs.

All the various part numbers to make up the different actuators can be seen by referring to Fig 63 and Fig 64.

For those with an historical interest the 13 degree actuators on Phantom IV rear brakes were RG 6109 and RG 6110, both with the latest housing, nut and return spring.

If it is necessary to utilise different actuators and the intention is to change the rods to suit the particular chassis then care needs taking to check some points. The operating angles affect both the plungers and expander face angles and the two expanders and four plungers must have identical operating angles, although original or modified parts could be used.

The four highly loaded rollers must be inspected to be sure their surface are circular and on no account have any flat sections, otherwise the inexpensive rollers should be renewed.

In order that the correct 9 or 13 degree actuator plungers can be checked Fig 65 shows their respective dimensions and Fig 61 their appropriate compatibility with other parts.

By the early 1950's the abundance of types of operating rods had been replaced by four rods covering the entire range, except for Silver Wraith LWB and Phantom IV see, Fig 62, These rods were fitted to the RG 6000+ part number range of actuators. The latest rods can all be recognised, as the inner end nearest the axle centre is a spherical forged shape. Prior to this a screwed spherical fixture had been screwed tightly onto the inner threaded rod end, after the link connector had been slid on the rod, the rod end was then peened or riveted over. This different method of fixing at the inner end gave rise to an alternative method of measuring the rod lengths and early and later measurements are not compatible from the drawings, but Silver Wraith rods are always 0.500 inch longer than those on other models. Throughout their lives the brake rods have been both lengthened and shortened by small amounts to achieve alteration to their operating angles, so some tolerance in lengths should be allowed.

Actuator Housing RG 3378 and RG 5010

These housings are fairly simple to identify. The early RG 3378 is not threaded at the inner end while the RG 5010 is threaded 1.062 inch 20 T.P.I Whitworth form as seen in Fig 51.

Fig 46 shows the extensive salt corrosion that can take place and providing the damage is in the area of the actuator extending from the back plate to the axle centre this can be repaired with normal epoxy. If required the housing can be turned down very slightly in a lathe and an alloy tube can be made and split into two sections to embrace and locate around the housing. The split halves can be bonded in position for a permanent repair.

The RG 5010 housings were made by the expedient of tapping the thread onto the RG 3378 housings. Fig 45 and Fig 46 show how the RG 5012 nut screws onto the housing to retain the RG 5011 internal return spring.

Appendix

Fig 66 Rubber dust covers RG 3379 plan view

Fig 67 Rubber dust covers RG 3379 side view.

Fig 68 Rod with bonded fuel hose

Fig 69 Rubber dust cover and rod modified.

RG 3379 DUST EXCLUDER

The rubber type dust excluder RG 3379 seen on the right in Fig 66 and Fig 67 can be replaced by a common excluder as shown on the left. This has an advantage in that it can be positioned over the inner rod fork if required to fit it to the actuator body. The larger inner hole does though need special consideration to make it weather proof. This can be achieved by bonding some fuel hose to the transverse rod as seen in Fig 68. This has proven in practice to prevent water running laterally across the rod and under the rubber excluder. Fig 69 illustrates how the two rubber parts fit after assembly.

TRAMMEL

Fig 70 Brake shoe trammel tool

The trammel shown in Fig 70 is nicely designed and easy to use as it is adaptable to a number of cars in the R-R / Bentley range. It is not always easy for the home mechanic to find an old brake drum and this tool will fit the bill in those circumstances.

It is made by David Terry of Holland and available through Flying Spares.

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