

BRAKES

SERVICE INSTRUCTION LEAFLET

ISSUED BY
BENTLEY MOTORS (1931) LTD.



BM/J1

SB/GS. 2/IP.

Subject :

BRAKES, GENERAL INFORMATION.
 $3\frac{1}{2}$ and $4\frac{1}{4}$ Litre Models.

Date
of 16th March, 1946.
Issue

I. GENERAL DESCRIPTION.

The Bentley four wheel braking system incorporates a servo motor of the dry disc clutch type driven through worm gearing from the main drive shaft in the gearbox. The linkage is so arranged to provide assistance in both forward and reverse motion, but a proportion of rear braking is achieved by direct manual pedal pressure entirely independent of the servo. The illustration below shows the layout of the Bentley braking system.

IMPORTANT

THE CONTENTS
OF THIS
DOCUMENT ARE
STRICTLY
CONFIDENTIAL
AND ARE NOT
TO BE
TRANSMITTED
TO ANY
UNAUTHORIZED
PERSON.

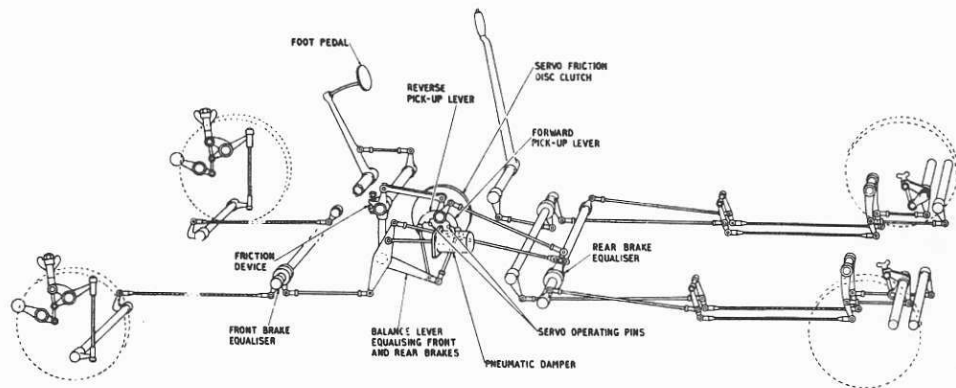


DIAGRAM OF BRAKING SYSTEM

Initial pressure on the brake pedal brings the rear brakes into operation and further pressure engages the servo, which through the medium of a special T shaped balancing lever, augments the direct rear braking effort and at the same time applies the front brakes.

The net result is that about half of the total braking effort is applied to the front wheels. During braking, however, the forward momentum of the car imposes a greater weight on the front wheels thereby rendering it highly improbable that they will ever become locked.

A point worthy of note is that in the event of both rear wheels locking during violent braking, the servo ceases to assist the manual effort, and imposes no more loading on either front or rear brakes, thus assisting the driver to maintain control of the car.

Both front and rear brakes are provided with a separate equalising mechanism to ensure even braking on each side, and there is also a compensating device between front and rear.

continued:

As the front brakes are solely servo operated, a frictional damping device is provided to prevent their sudden or violent application. Noisy release of the servo levers is prevented by a pneumatic damper, which acts in one direction only, a non-return valve eliminating any damping effect during the application of the brakes

The hand brake lever operates an entirely independent set of shoes within the rear brake drums.

The actual brake shoes are of the two shoe direct cam operated type of cast aluminium. An auxiliary tipping shoe is pivoted on each main shoe, the object being to eliminate the tendency to squeaks by maintaining a damping effect on the brake drums by virtue of the relatively heavy bedding at the toe of each shoe.

An anti-judder device is fitted to the front brakes on all but the early $3\frac{1}{2}$ Litre Bentleys. It consists of a pivoted bob weight mounted on a bearing attached to the brake carrier plate. This bob weight is so connected to the brake actuating mechanism that its inertia is in opposite phase to that of the brake mechanism and therefore cancels out any torsional oscillation.

II. POSSIBLE COMPLAINTS.

The various complaints likely to be met with are set out in the following table together with the cause and remedy. In diagnosing troubles, it is well to remember the following points:-

- (a) The bodies on Bentley cars vary considerably in weight and this may account for certain complaints of inefficiency of the brakes due to the additional weight of the vehicle.
- (b) Brake squeaks have been found to be aggravated by the conditions of use. For instance, in certain cases the brakes may be used continually in town and this constant light application produces a glazed surface on the liners which causes groans on pulling up. On the other hand, continual and heavy application of the brakes during hard driving in the open country may overheat and burn the linings and this subsequently causes a predisposition to squeaks.
- (c) Water in the brakes temporarily destroys the frictional properties, and in cases of complaint the owner or driver should be advised to exercise restraint when washing down the inside of the wheels and brakes with the hose.
- (d) Wartime restrictions have resulted in certain well tried and approved liner material being rendered unobtainable, and substitutes have perforce had to be resorted to which may not have the characteristics necessary to ensure freedom from squeaks etc.

Complaint.	Cause.	Due to.	Remedy.
Brakes inefficient.	I. Brake liners glazed or worn out.	Wear & tear.	Reline.
	II. Oil on brakes.	(a) Too much oil in axle box. (b) Excessive use of one shot.	Clean out drums and reline.
	III. Servo inefficient.	(a) Servo liners glazed, worn or oily. (b) Incorrect adjustment.	Reline servo. Re-adjust.
	IV. Water on brakes.	Ingress of water during washing.	Dry off by application of brakes.
	V. Incorrect adjustment.	Wear or Neglect.	Re-adjust.
Brakes squeak or groan.	I. Liners glazed.	Constant light application only.	Rough up and re-bed liners or reline.
	II. Liners overheated.	Violent use of brakes.	Reline.
	III. Brake drums rusted	Condensation.	Brakes require using.
	IV. Drums distorted.	Overheating due to prolonged use.	Regrind drums.
Brakes grab or thump.	I. Excessive travel.	Incorrect adjustment.	Re-adjust.
	II. Front brakes come on first.	(a) Insufficient damping. (b) Excessive travel rear brakes.	Tighten up swinging arm on servo. Adjust rear brakes.
	III. Fierce brakes.	Incorrect bedding of brakes.	Re-bed.
Brakes pull to one side.	I. Oil on brakes.	Excessive use of one shot.	Clean out brakes or reline.
	II. Unequal bedding.		Re-bed.
	III. Uneven adjustment.		Re-adjust.
Brakes fade.	Overheated liners.	Prolonged or violent application of brakes.	Reline.
Heavy pedal pressure.	Servo inefficient.	Servo liners glazed or oily.	Reline servo.

SERVICE INSTRUCTION LEAFLET

ISSUED BY
BENTLEY MOTORS (1931) LTD.



BM/J2

SB/GS. 4/IP.

Subject :

BRAKES - ADJUSTMENT.
3½ and 4¼ Litre Models.

Date
of 16th March, 1946.
Issue

IMPORTANT

THE CONTENTS
OF THIS
DOCUMENT ARE
STRICTLY
CONFIDENTIAL
AND ARE NOT
TO BE
TRANSMITTED
TO ANY
UNAUTHORIZED
PERSON.

I. GENERAL.

As the linings wear with use, the amount of lever movement and pedal travel before the brakes are applied increases, and after a certain point becomes excessive causing such faults as inefficiency, thump or pulling to one side. Therefore it is important that very careful attention should be paid to the adjustment of the brakes to obtain the best results.

The adjustment of the foot brakes is effected by means of wing nuts on the brake back plates. The handbrake, however, is adjusted by means of threaded rods variable in length and coupled to cam operating levers below the rear axle.

II. METHOD OF ADJUSTING.

(A) Front and Rear Foot Brakes.

It is most important that only the fingers are used to turn the wing nuts. They are formed with cam shaped bosses bearing on cylindrical trunnions in such a way that rotation of the nut through 90° causes the brake shoes to be moved towards the drum as the cam rides over the trunnion. This movement is carefully predetermined and is equal to the normal clearance between shoes and drum when the shoes are in the off position. Screwing on the nut through a further 90°, that is a total of half a turn, allows the shoes to return to an off position, which is half a turn of the adjustment nearer to the drum. The adjustment is self-locking.

To obtain correct adjustment (not immediately after relining) the nut should be screwed up until the cam action described prevents further rotation with the fingers, owing to the shoes being in contact with the drums. The setting will then be correct, and the adjustment locked if the nut be turned back one-quarter of a turn. When adjusting after relining the nut should be turned back three half turns and then re-adjusted, as above, after a period of running. This is to allow for "growth" of the liner during the initial heating up period.

After adjusting the front brakes it is important that the front axle be jacked up to check that the brakes do not rub on either lock.

(B) Rear Hand Brake.

With the handbrake right off, the adjustment should be tested by pulling the inside brake rope with the hand and measuring the travel of the rope necessary to apply the brake. This travel should not be less than $\frac{5}{8}$ ". To adjust, remove the clevis pin from the jaw connected to the lever on the handbrake actuating shaft. Slacken the nut on the jaw pinch bolt and screw the jaw on or off the rod according to the adjustment required. The adjustment should be equal on both sides.

SERVICE INSTRUCTION LEAFLET

ISSUED BY
BENTLEY MOTORS (1931) LTD.



BM/J3

SB/GS.1/IP.

Subject :

BRAKES. RE-BEDDING AND RELINING.
3½ and 4¼ Litre Models.

Date
of 28th March, 1946.
Issue

IMPORTANT

THE CONTENTS
OF THIS
DOCUMENT ARE
STRICTLY
CONFIDENTIAL
AND ARE NOT
TO BE
TRANSMITTED
TO ANY
UNAUTHORIZED
PERSON.

GENERAL.

In the event of it being necessary to examine the brakes, the hubs and brake drums must first be removed as described in BM/V1. It should then be obvious whether the complaint is due to the brakes requiring relining, i.e, worn out or oil soaked, or whether roughening up and re-bedding will be adequate.

It must be emphasized that in all cases where the external adjustment has been used up a reline is essential, in spite of the fact that the liners may appear to be capable of a second life by internal adjustment.

It should be noted here that Bentley liners are somewhat thicker than the general standard, and this is an essential feature in the design of the brakes to obviate the possibility of the rivet heads ever coming into contact with the brake drums, thereby scoring the drums, and probably causing overheating and distortion of the aluminium shoes by heat transference from the drums.

Any attempt to secure further service from worn liners by lengthening the brake toggles is therefore discouraged, and for this reason our early models had the brake toggle jaws drilled and pinned to the toggles after their correct initial setting. The only circumstances under which the toggles should be lengthened is after the brake drums have been reground and new liners fitted. Nevertheless there may be cases where unauthorised adjustment has been carried out as a means of obtaining extra life out of the liner. In all such instances the toggles must be reset when relining.

The various operations which may be necessary are set out in the following order.

- I. Brake drums.
- II. Re-bedding of liners.
- III. Setting of auxiliary shoes.
- IV. Removal of brake shoes.
- V. Relining of shoes.
- VI. Cutting and bedding of new liners.

continued:

I. BRAKE DRUMS.

Clean the brake drums and examine surface for ribbing, scoring, distortion, or overheating. If it is intended to reline the brakes, in all cases the drums should be reground. Do not remove the drum from the hub for this operation, but grind as a complete assembly, thus making sure that the drum is concentric with the hub bearings. The best finish is a ground finish free from chatter marks, although the drums may be bored if preferred. The recommended details for grinding are :-

Wheel.	Norton.
Grade.	45N to 60N.
Diameter.	$3\frac{1}{2}$ "
Speed of wheel.	5500 R.P.M.
Speed of drum.	50 R.P.M. (in opposite direction)

Take as little material out of the drum as possible to obtain a true diameter, otherwise the drums may become too thin, causing distortion and squeaks on application of the brakes. A safe minimum thickness of the drum may be taken as $\frac{1}{8}$ ".

II. RE-BEDDING OF LINERS.

Re-bedding may be effective in the following instances if the linings are otherwise in good condition.

1. Complaints of fierce brakes due to uneven bedding.
2. Brake squeaks or groans.
3. Brakes pull to one side due to unequal bedding.

In some cases it may be found that re-bedding will improve the general efficiency of the brakes.

The drums should be blued and a marking taken on the liners. The liners must then be filed until full length bedding is obtained. If the bedding is satisfactory but glazed, rough up with a coarse file.

In order to avoid the necessity for laborious filing, a special hand operated cutter has been developed which automatically produces 100% bedding.

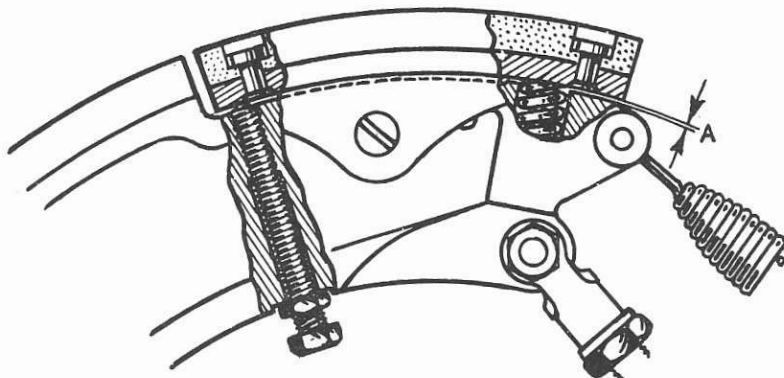
It is important to note that auxiliary shoes must be reset before bedding, as described in the next section. In the event of no bedding being found on the auxiliary liners due to wear, which will naturally have taken place by reason of the spring loading, it may be more profitable to reline the auxiliary shoes only, rather than take off an unnecessary amount of material from the main shoes.

III. SETTING OF AUXILIARY SHOES.

It must be remembered that on normal application of the brakes, the auxiliary shoes are compressed against the spring; therefore any check on the bedding under hand application must be taken

continued:

with the springs fully compressed by means of the adjusting screws provided. The auxiliary shoe must then be reset after bedding, so that a .012" feeler can be inserted between the main shoe and auxiliary shoe. The illustration shows the arrangement of the auxiliary shoes, and indicates the clearance referred to as "A".



This clearance does not vary with running, and after the locknut on the adjusting screw has been tightened, the auxiliary shoe requires no more attention until subsequent relining or re-bedding of the shoes.

IV. REMOVAL OF BRAKE SHOES.

(A) Front.

1. Remove the outer brake shoe carrier plate.
2. Remove the guides from the slots in the brake shoes by withdrawing the split pins and unscrewing the nuts.
3. Extract the split pins and withdraw the pins connecting the toggles to the brake shoes.
4. Push the toggles clear and pull off the brake shoes.

(B) Rear.

1. Extract the split pins in both toggle connections to the brake shoes and remove the pins and toggles.
2. Withdraw the split pins from the spring eye pins and disconnect the springs.

continued:

3. Lift each foot brake shoe and remove the split pin and pins in the hand brake toggles.
4. Bend back the lock washer and unscrew the two pivot bolt nuts on the back of the back plate and remove the bolts.
5. Lift the top foot brake shoe and remove the spring eye pin from the hand brake shoe.
6. Lift the foot brake shoes and pull them off the fulcrum bushes.
7. Remove the fulcrum bushes and pull off the two hand brake shoes.

V RELINING.

Too much importance cannot be attached to the rivetting of the liners to the shoes. The effectiveness of the brakes can be impaired by spongy liners. Any burrs which might be on the faces of the shoes must be removed, and the two central rivets fitted first. After rivetting, the liner must be clamped to the shoe and a reamer passed through the adjacent holes before fitting the rivets. Proceed in a similar manner outwards from the centre until all rivets are fitted.

In order to reline the auxiliary shoes it is necessary to remove them from the main shoes, but before this is done mark each auxiliary shoe and its corresponding position on the main shoe, then proceed as follows:-

1. Release the locknut and turn back the adjusting screw as far as it will go in order to relieve the tension in the spring.
2. Remove the split pin locating the pivot in the shoe, and tap out the pivot.

VI. CUTTING AND BEDDING OF NEW LINERS.

Before commencing cutting or hand bedding of new liners, all external adjustment must be set back to zero, and auxiliary shoes adjusted to eliminate the clearance referred to in Section III. Then, by sliding the brake drum up to the liners, or by rotating the liner cutter, it will be possible to determine whether the toggles require resetting in order to equalise the amount of material to be removed over the length of the liners, and avoid unnecessary waste of material.

The liners should then be carefully filed or cut until the brake drum can just be passed over them. If the cutter has been used, the setting of the cutting tool should not be disturbed when this point is reached.

continued:

The correct clearances have now to be obtained by further filing or cutting. The shoes should therefore be expanded gradually by the external adjusters, and cuts taken with the cutting tool in the same position, until the wing nuts are turned in six half turns. By this method 100% bedding is obtained when the brakes are in the on position. Similar bedding by filing can only be obtained by trial and error.

Finally, the .012" clearance between the auxiliary and main shoes must be restored by means of the adjusting screws, after which the drums may be replaced.

For the initial running period the wing nuts should be turned back three half turns from the fully screwed up position to allow for possible growth of the liners due to heating up. After a short period the setting should again be checked to ensure that the brakes are not binding.