

FIG 11 :7 Cleaning and lubricating the piston. Note the special tool preventing excessive movement of the piston

new seals and the system filled with fresh fluid. While the system is dismantled examine all the metal pipelines carefully and renew any that show signs of corrosion or have been dented by stones.

11 :3 Flexible hoses

These are fitted between the suspension and frame to allow the pressure to be transmitted while the suspension moves. When removing or refitting flexible hoses great care must be taken not to twist or strain the flexible portion otherwise the hose will be damaged. The hoses must also be refitted without twisting them otherwise they will move the brake caliper, causing the friction pads to rub against the disc.

A typical hose-to-frame attachment is shown in FIG 11 :4. Before removing or disconnecting a hose either drain the hydraulic system or seal off the reservoir so that fluid does not flow out. Hold the hexagons of the hose with a spanner and then undo the union nut D with another spanner, making sure that the metal pipe does not twist with the union nut. Once the union is disconnected remove the clip C and free the hose from the bracket. The other end of the hose can then be unscrewed from the brake caliper, allowing the flexible portion to rotate freely.

Refit the hose in the reverse order of removal. Special tools are made for checking the angle of the bracket to ensure that the hose will clear the road wheel under all positions of the suspension and steering.

The flexible hoses should be renewed after a life of five years, even if they still appear sound.

11 :4 Removing brake calipers

Only if the caliper requires dismantling or complete removal from the car does the flexible brake hose have to be disconnected. If the caliper is being removed for attention to the suspension then the hose should be left connected, as this will save having to bleed the brake system after the parts have been reassembled. If the hose is disconnected then the brake system must be bled after reassembly.

The attachments of a front caliper are shown in FIG in FIG 11 :5. To remove the caliper, extract the pins J and swing back the clamps K so that the caliper can be removed.

The removal of the rear calipers is similar but it is necessary to disconnect the handbrake cable. On later models it will be necessary to unscrew the nut O and free the guide plate P, shown in FIG 11 :6, before the cable can be disconnected by removing the pin Q.

When refitting the caliper use new pins and anti-rattle rubber tubes. Refit the caliper in the reverse order of removal, making sure that it is correctly positioned and that all the parts are clean and free from oil or grease.

11 :5 Renewing friction pads

The pads should be renewed when their total thickness is less than 5.5mm (.217 inch) and they must be renewed before the lining is so worn that there is metal to metal contact. **Pads must not be renewed individually, but always in axle sets. Do not intermix brands or different grades of lining material.**

Remove the caliper as described in the previous section, without disconnecting the flexible hose. **Remove only one caliper at a time and make sure that the brake pedal is not pressed with the caliper free.** Remove the old brake pads.

Use a blunt-nosed tool to carefully prise out and remove the dust seal from around the piston. Pour a little methylated spirits over the end of the piston to wash away dirt and allow it to air dry. Fit the tool Fre.12A, as shown in FIG 11 :7, to prevent the piston from coming out too far and gently press on the brake pedal so that the piston comes out by approximately 3mm ($\frac{1}{8}$ inch). Use a **paint brush** and methylated spirits to wash away any dirt remaining and when the parts are dry grease the piston all round the circumference, using the brush to apply the grease as shown in the figure. Tighten the screw on the special tool so that the piston is pressed fully back into the cylinder. **During this operation check the level of the fluid in the master cylinder reservoir and syphon out any excess to prevent it overflowing.** Fit the new brake pads and refit the brake caliper before starting work on the other brake calipers.

On the front brakes the pads may be fitted with flanges at the ends, to prevent excessive **wear and bruising** when the pads make contact with the caliper. On the earliest models no flanges may be fitted while on the latest models there may be flanges at either end. On the intermediate stages flanges were fitted to one end only and in such cases the flanges should be fitted to make contact with the top of the caliper, as shown in FIG 11 :8.

On the rear brakes lubricate the threads and eye of the adjuster as well as the pivot point of the lever and contact point of the spring.

11 :6 Servicing a caliper

A sectioned view of the caliper is shown in FIG 11 :9. **The parts of the automatic adjuster must not be dismantled, or removed from the piston.**

1 Remove the caliper from the car and disconnect the flexible hose. Take out the brake pads and brush away all loose dust and dirt. If need be wash with methylated spirits.

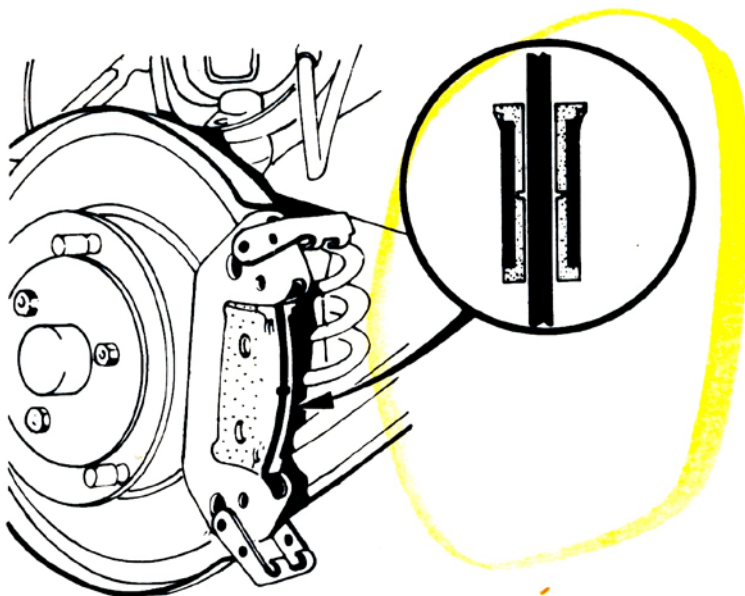


FIG 11:8 The correct method of fitting brake pads with only one flange

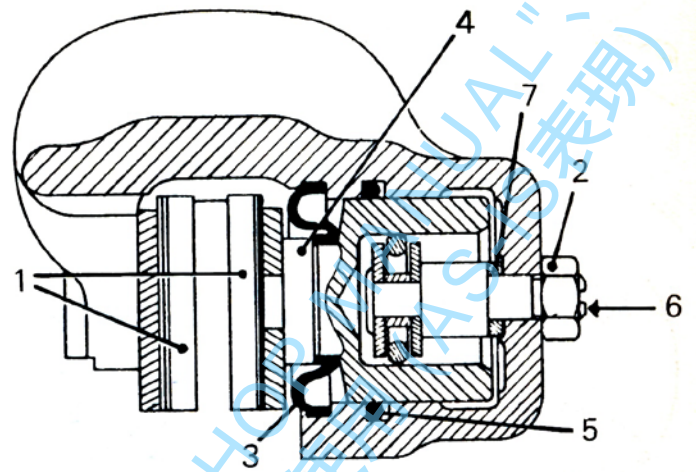


FIG 11:9 Sectioned view of a brake caliper

Key to Fig 11:9 1 Friction pads 2 Nut 3 Dust seal
4 Piston 5 Seal 6 Adjuster screw 7 Copper seal

- 2 Carefully prise out the dust cover 3 using a thin flexible tool that has no sharp edges. Hold the screw 6 with a screwdriver and unscrew the nut 2 using a 14 mm ring spanner. Gently push out the piston and adjuster assembly from the bore of the caliper, using a drift made of soft-metal such as bronze and not larger than 7mm ($\frac{9}{32}$ inch) in diameter. If necessary tap lightly on the end of the drift, using a plastic mallet so that the drift acts on the end of the screw 6.
- 3 Use a thin, flexible tool to remove the O-ring 5 from its groove in the cylinder bore, **taking extreme care not to score or scratch the surface of the bore.** Unscrew and remove the bleed screw.

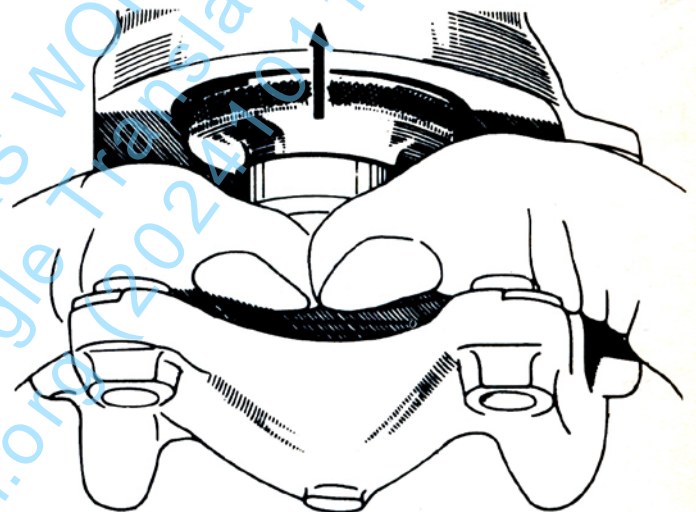


FIG 11:10 Pressing the piston back into the cylinder

- 4 Wash all the parts in methylated spirits. The only other solvent that may be used for cleaning is hydraulic fluid but this will take longer than methylated spirits to remove dirt. **The use of any solvent is dangerous as some may remain to contaminate and rot the new seals.**
- 5 Examine the bore of the cylinder for wear, scoring or any other damage. If the bore is not perfectly smooth and polished then a complete new caliper must be fitted. The piston and adjuster assembly must be renewed if the piston surface shows any signs of scoring or damage. Discard all the old seals, including the copper seal 7, and fit new ones on reassembly.
- 6 Wet the O-ring 5 with a little clean hydraulic fluid and fit it back into its groove. Use only the fingers and make sure that the O-ring is fully and squarely seated. Fit a new copper seal 7 onto the shoulder of the adjuster. Lubricate around the piston with a little hydraulic fluid and carefully enter it back into the bore. **Take great care not to cock the piston so that it jams and damages the bore.** Carefully press the piston down the bore using **only thumb pressure**, as shown in FIG 11:10. **The piston must not be tapped or forced to insert it.** Use a thin screwdriver through the hole in the caliper to guide the screw 6 of the adjuster through. The caliper and piston should be held vertical during this operation.

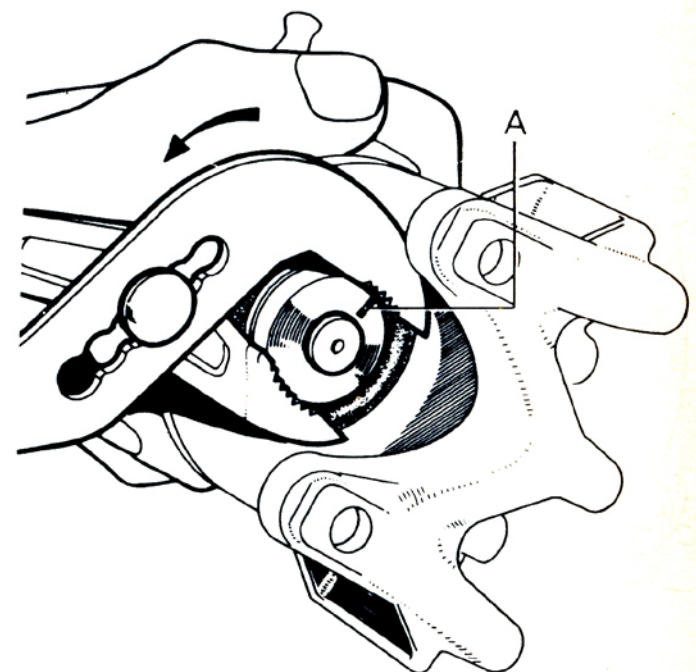


FIG 11:11 Aligning the mark on the piston (indicating the gap in the snap ring of the adjuster) with the bleed screw

- 7 **The gap in the snap ring of the adjuster must be in line with the bleed screw otherwise air inside the piston cannot escape and bleeding**

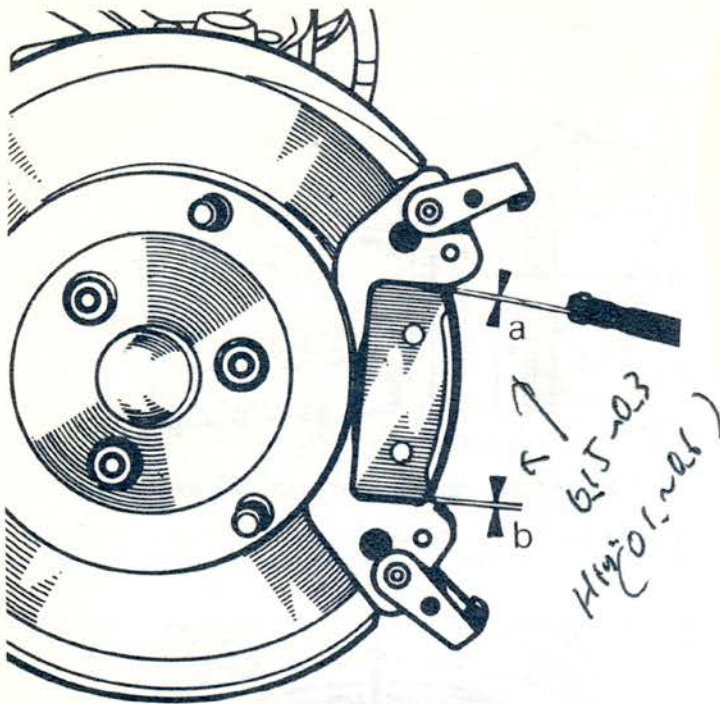


FIG 11:12 Checking the end clearance of the friction pads

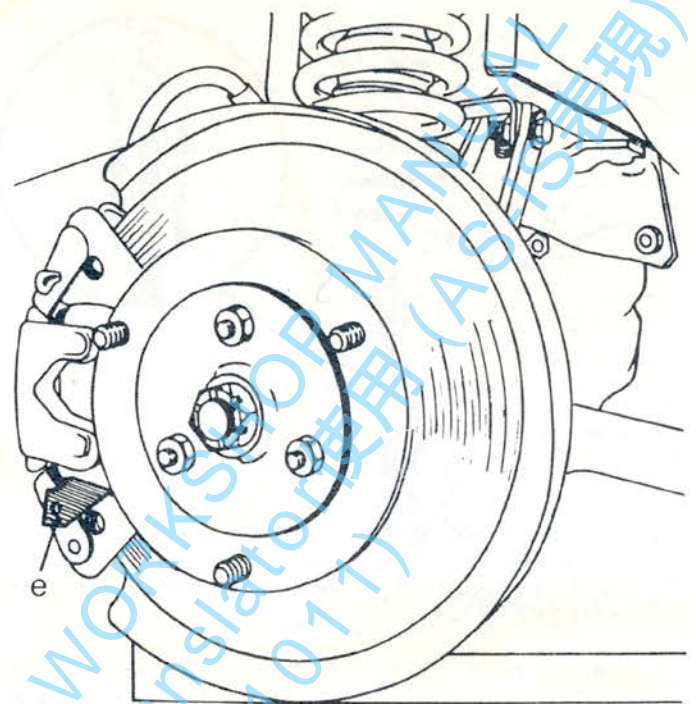


FIG 11:13 Shims fitted to reduce excessive pad end clearance

the brakes will be practically impossible. A mark **A** is made on the piston in line with the gap during manufacture, shown in FIG 11:11, and this mark may be electro-etched or a drill point mark. Turn the piston using a pair of grips as shown in the figure until the mark is in line with the bleed screw. Lightly brush Spargraph grease around the outer circumference of the piston and press it fully back into position. Hold the adjusting screw 6 with a screwdriver, to prevent the piston and adjuster assembly from rotating, and refit the nut 2 to a torque load of 1.5 kg m (10 lb ft).

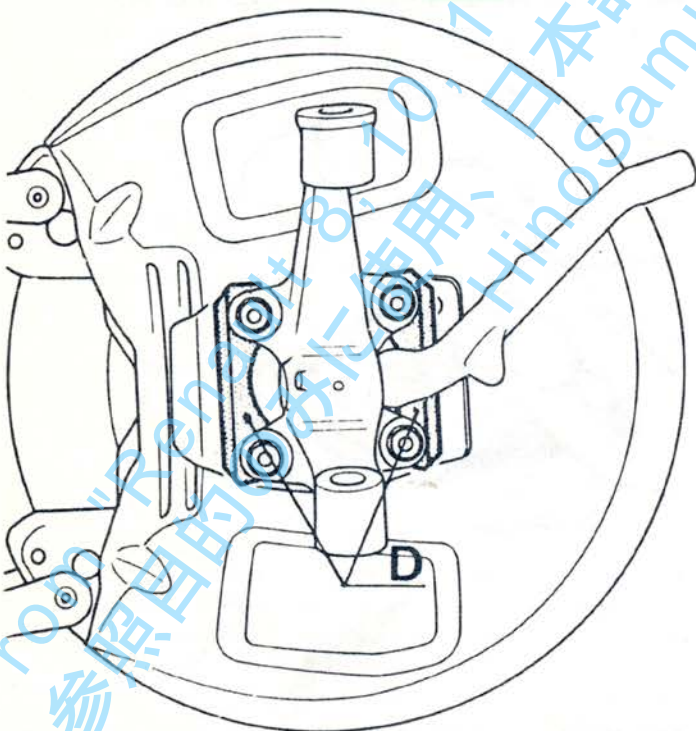


FIG 11:14 Shims for adjusting the caliper bracket on front wheels

8 The caliper should be tested using air pressure while immersed in a bath of methylated spirits. Any air leaks indicate a defect. Prevent the piston from moving out by using the special tool Fre.12A or a suitable bar of metal. The test pressure should be progressively raised and leaks checked for at each test pressure. Start at .7 kg/sq in (10 lb/sq in) and increase the pressure by 5 lb/sq in at each test until the maximum pressure of 1.5 kg/sq cm (20 lb/sq in) is reached. Because of the equipment required it is best to leave the testing to an agent but, provided that the parts have been carefully checked and reassembled, a calculated risk can be taken and the pressure test dispensed with. If the test is carried out the lubrication with Spargraph grease should be left until after the test.

9 Refit the dust cover 3. **Before refitting the caliper refill it with fresh hydraulic fluid, as this will make subsequent bleeding easier.** Leave the bleed screw out when filling and tilt the caliper around to remove as much air as possible. Refit the caliper in the reverse order of removal, remembering to use a new copper seal for the union of the flexible hose.

11:7 The brake discs

Because of the design of the hubs and discs it is impossible to remove the brake discs without removing the hubs. The removal of the front brake discs is dealt with in **Chapter 9, Section 9:3**, while the removal of the rear brake discs is dealt with in **Chapter 8, Section 8:5**. Before freeing the disc from the hub make alignment marks so that the parts will be reassembled in their original positions.

Slight concentric scoring will occur with normal use and wear but deep scores or radial scores will adversely affect the braking efficiency. **The discs must not be machined** and if they are so scored or distorted as to affect braking then new discs must be fitted.

If the discs and pads are dirty or lightly contaminated with oil or grease they should be cleaned with trichlorethylene and deposits removed by gentle rubbing with emery-cloth.

When the brake discs have been refitted they should be checked for runout. Mount a DTI (Dial Test Indicator) on the suspension so that the stylus rests vertically on the outer operating face of the disc. Rotate the hub and disc through one complete turn and check the runout on the disc. The runout should not exceed .3 mm (.012 inch) at a diameter of 250 mm (9 $\frac{7}{8}$ inch). If the runout is excessive try rotating the disc in relation to the hub and if this fails to cure excessive runout then a new disc must be fitted.

11 : 8 The caliper bracket

For effective and quiet brake operation it is essential that the brake pads and caliper are accurately positioned in relation to the rotating brake disc.

Use feeler gauges to measure the clearance **a** between brake pad and caliper bracket, as shown in FIG 11 : 12. The clearance should lie between .15 and .30 mm (.006 to .012 inch). If the clearance is excessive then shims can be fitted as shown at **e** in FIG 11 : 13 to reduce the clearance.

Shims can be fitted between the suspension and brake to ensure that the disc runs centrally between the caliper. The shims fitted for the front brakes are shown in FIG 11 : 14. Only one shim may be fitted at each position on the front brakes but it is permissible to use only one shim per brake so as to correct any tilt and the shims are only available in .05mm (.020 inch) thickness. The rear brakes must be shimmed parallel using one shim at each position, shown in FIG 11 : 15. Shims for the rear brakes are available in three different thicknesses, .05 (.020, 1 (.040), and 1.5 (.059). To check on the shim thicknesses required, measure with feeler gauges between the disc and caliper at the points **a** and **b** shown in FIG 11 : 16. The shims must be adjusted so that the gaps are both within the correct tolerances of $2.5 \pm .5$ mm (.079 to .118 inch).

It should be noted that if the caliper brackets require removal then the complete hub assemblies must also be removed, as for removing brake disc (see Chapters 8 and 9).

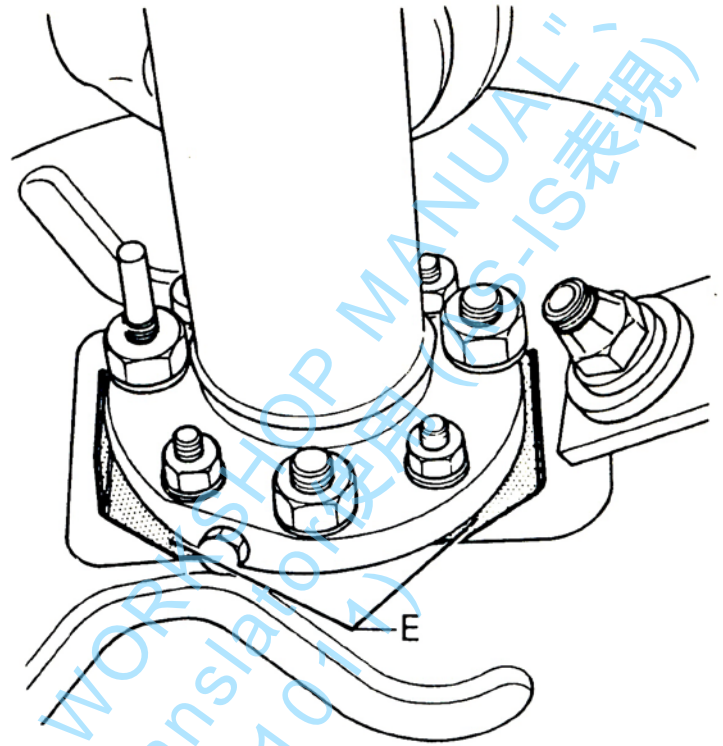


FIG 11 : 15 Shims for adjusting the caliper bracket on rear wheels

Swinging links:

These can be checked for position but special gauges are required so the work should be left to an agent. If the links are worn or damaged they can be removed by carefully drilling out the rivet that secures them. The inner side of the caliper bracket should then be drilled out to $8 + .1 + .2$ mm (.319 to .323 inch) as shown at **A** and the other side slightly chamfered as shown at **B** in FIG 11 : 17. The swing link is then secured using a new pin and the pin peened using the special tool No. Fre.17

11 : 9 The brake pressure distributor

On the earlier models the valve limits the maximum pressure reached in the rear brake circuit. If the valve is fitted with a white plug then the pressure is limited to $50 + 8 - 0$ kg/sq cm (710 to 820 lb/sq in) but if the valve

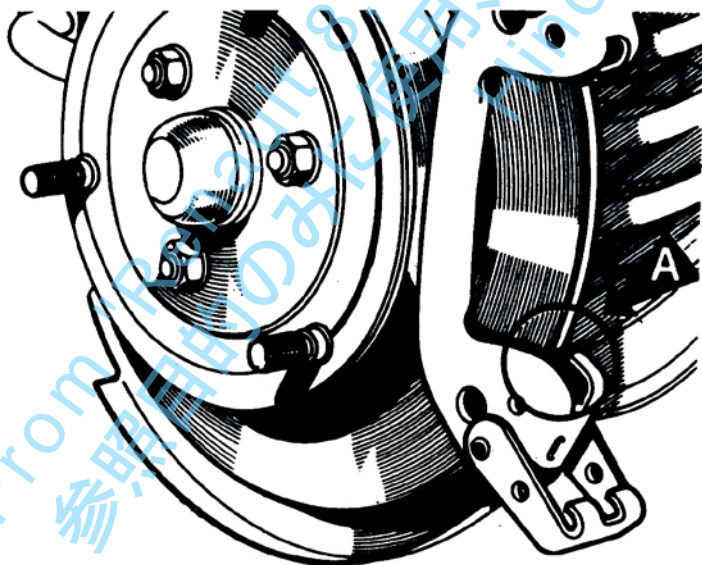
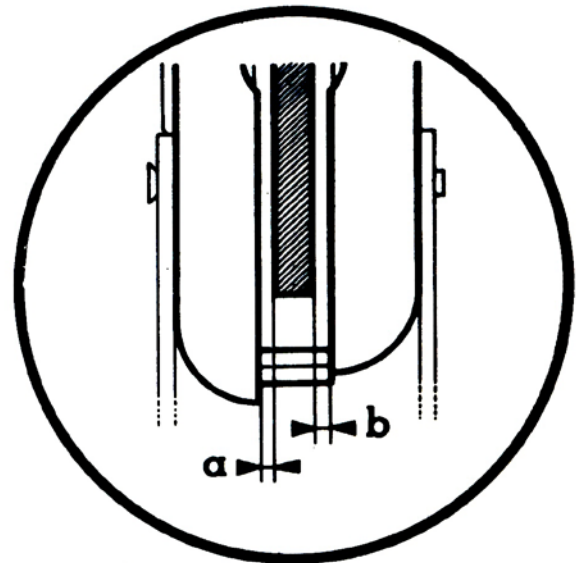


FIG 11 : 16 Checking the shimming for the caliper bracket



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11:4 Removing brake calipers

Only if the caliper requires dismantling or complete removal from the car does the flexible brake hose have to be disconnected. If the caliper is being removed for attention to the suspension then the hose should be left connected, as this will save having to bleed the brake system after the parts have been reassembled. If the hose is disconnected then the brake system must be bled after reassembly.

The attachments of a front caliper are shown in FIG in FIG 11: 5. To remove the caliper, extract the pins J and swing back the clamps K so that the caliper can be re-moved.

The removal of the rear calipers is similar but it is necessary to disconnect the handbrake cable. On later models it will be necessary to unscrew the nut O and free the guide plate P, shown in FIG 11:6, before the cable can be disconnected by removing the pin Q

When refitting the caliper use new pins and anti-rattle rubber tubes. Refit the caliper in the reverse order of removal, making sure that it is correctly positioned and that all the parts are clean and free from oil or grease.

11:4 ブレーキキャリパーの取り外し

キャリパーを分解したり、車から完全に取り外す必要がある場合にのみ、フレキシブル ブレーキ ホースを外す必要があります。サスペンションの点検のためにキャリパーを取り外す場合は、ホースを接続したままにしておく必要があります。こうすることで、部品を再組み立てした後にブレーキ システムのエア抜きを行う必要がなくなります。ホースを外す場合は、再組み立て後にブレーキ システムのエア抜きを行う必要があります。

フロント キャリパーの取り付けは、図 11: 5 に示されています。キャリパーを取り外すには、ピン J を抜き取り、クランプ K を後ろに回してキャリパーを再び取り外せるようにします。

リア キャリパーの取り外しも同様ですが、ハンドブレーキ ケーブルを取り外す必要があります。後期モデルでは、ピン Q を取り外してケーブルを外す前に、図 11:6 に示すように、ナット O を緩めてガイド プレート P を解放する必要があります。

キャリパーを再取り付けするときは、新しいピンとガタつき防止ゴム チューブを使用します。キャリパーを取り外しの逆の順序で再取り付けし、正しく配置されていること、すべての部品がきれいで油やグリースが付いていないことを確認します。

11:5 Renewing friction pads

The pads should be renewed when their total thickness is less than 5.5 mm (.217 inch) and they must be renewed before the lining is so worn that there is metal to metal contact. Pads must not be renewed individually, but always in axle sets. Do not intermix brands or different grades of lining material.

Remove the caliper as described in the previous section, without disconnecting the flexible hose. Remove only one caliper at a time and make sure that the brake pedal is not pressed with the caliper free. Remove the old brake pads.

Use a blunt-nosed tool to carefully prise out and remove the dust seal from around the piston. Pour a little methylated spirits over the end of the piston to wash away dirt and allow it to air dry. Fit the tool Fre.12A, as shown in FIG 11:7, to prevent the piston from coming out too far and gently press on the brake pedal so that the piston comes out by approximately 3mm (f inch). Use a paint brush and methylated spirits to wash away any dirt remaining and when the parts are dry grease the piston all round the circumference, using the brush to apply the grease as shown in the figure. Tighten the screw on the special tool so that the piston is pressed fully back into the cylinder. During this operation check the level of the fluid in the master cylinder reservoir and syphon out any excess to prevent it overflowing.

Fit the new brake pads and refit the brake caliper before starting work on the other brake calipers.

On the front brakes the pads may be fitted with flanges at the ends, to prevent excessive wear and bruising when the pads make contact with the caliper. On the earliest models no flanges may be fitted while on the latest models there may be flanges at either end. On the intermediate stages flanges were fitted to one end only and in such cases the flanges should be fitted to make contact with the top of the caliper, as shown in FIG 11: 8.

On the rear brakes lubricate the threads and eye of the adjuster as well as the pivot point of the lever and contact point of the spring.

11:5 摩擦パッドの交換

パッドは、総厚が 5.5 mm (0.217 インチ) 未満になったら交換する必要があります。また、ライニングが摩耗して金属同士が接触する前に交換する必要があります。パッドは個別に交換するのではなく、必ず車軸セットで交換してください。ライニング材のブランドやグレードを混ぜないでください。

前のセクションで説明したように、フレキシブル ホースを外さずにキャリパーを取り外します。一度に1つのキャリパーのみを取り外し、キャリパーがフリーの状態ではブレーキペダルが押されていないことを確認します。古いブレーキパッドを取り外します。

先端が丸い工具を使用して、ピストンの周囲からダスト シールを慎重にこじ開けて取り外します。ピストンの端に少量のメタノールを注ぎ、汚れを洗い流して自然乾燥させます。

ピストンがあまりに突き出ないように、図 11:7 に示すようにツール Fre.12A を取り付け、ピストンが約 3 mm (f インチ) 突き出るまでブレーキ ペダルを軽く押します。ペイント ブラシとメタノールを使用して、残っている汚れを洗い流し、部品が乾いたら、図に示すようにブラシを使用してグリースを塗布し、ピストンの周囲全体にグリースを塗ります。特殊ツールのネジを締めて、ピストンがシリンダーに完全に押し戻されるようにします。この操作中に、マスター シリンダー リザーバー内の液体のレベルを確認し、あふれないように余分な液体を吸い出します。

他のブレーキ キャリパーの作業を開始する前に、新しいブレーキ パッドを取り付け、ブレーキ キャリパーを取り付け直します。

フロント ブレーキでは、パッドがキャリパーに接触したときに過度の摩耗や傷がつかないように、パッドの端にフランジが取り付けられている場合があります。最も古いモデルではフランジが取り付けられていない場合がありますが、最新のモデルでは両端にフランジがある場合があります。中間段階ではフランジは片端にのみ取り付けられており、このような場合にはフランジはキャリパーの上部に接触するように取り付ける必要があります (図 11: 8 を参照)。

後部ブレーキでは、アジャスターのねじとアイ、レバーのピボット ポイント、およびスプリングの接触ポイントに潤滑油を塗ります。

11:6 Servicing a calipe

A sectioned view of the caliper is shown in FIG 11: 9.

The parts of the automatic adjuster must not be dismantled, or removed from the piston

1 Remove the caliper from the car and disconnect the flexible hose. Take out the brake pads and brush away all loose dust and dirt. If need be wash with methylated spirits.

2 Carefully prise out the dust cover 3 using a thin flexible tool that has no sharp edges. Hold the screw 6 with a screwdriver and unscrew the nut 2 using a 14 mm ring spanner. Gently push out the piston and adjuster assembly from the bore of the caliper, using a drift made of soft-metal such as bronze and not larger than 7mm (32 inch) in diameter. If necessary tap lightly on the end of the drift, using a plastic mallet so that the drift acts on the end of the screw 6.

3 Use a thin, flexible tool to remove the O-ring 5 from its groove in the cylinder bore, taking extreme care not to score or scratch the surface of the bore. Unscrew and remove the bleed screw.

4 Wash all the parts in methylated spirits. The only other solvent that may be used for cleaning is hydraulic fluid but this will take longer than methylated spirits to remove dirt. The use of any solvent is dangerous as some may remain to contaminate and rot the new seals.

5 Examine the bore of the cylinder for wear, scoring or any other damage. If the bore is not perfectly smooth and polished then a complete new caliper must be fitted. The piston and adjuster assembly must be renewed if the piston surface shows any signs of scoring or damage. Discard all the old seals, including the copper seal 7, and fit new ones on reassembly.

6 Wet the O-ring 5 with a little clean hydraulic fluid and fit it back into its groove. Use only the fingers and make sure that the O-ring is fully and squarely seated. Fit a new copper seal 7 onto the shoulder of the adjuster. Lubricate around the piston with a little hydraulic fluid and carefully enter it back into the bore. Take great care not to cock the piston so that it jams and damages the bore. Carefully press the piston down the bore using only thumb pressure, as shown in FIG 11:10. The piston must not be tapped or forced to insert it. Use a thin screwdriver through the hole in the cliper to guide the screw 6 of the adjuster through. The caliper and piston should be held vertical during this operation.

7 The gap in the snap ring of the adjuster must be in line with the bleed screw otherwise air inside the piston cannot escape and bleeding the brakes will be practically impossible. A mark A is made on the piston in line with the gap during manufacture, shown in FIG 11:11, and this mark may be electro-etched or a drill point mark. Turn the piston using a pair of grips as shown in the figure until the mark is in line with the bleed screw. Lightly brush Spargraph grease around the outer circumference of the piston and press it fully back into position. Hold the adjusting screw 6 with a screwdriver, to prevent the piston and adjuster assembly from rotating, and refit the nut 2 to a torque load of 1.5 kg m (10 lb ft).

8 The caliper should be tested using air pressure while immersed in a bath of methylated spirits. Any air leaks indicate a defect. Prevent the piston from moving out by using the special tool Fre. 12A or a suitable bar of metal. The test pressure should be progressively raised and leaks checked for at each test pressure.

Start at .7 kg/sq in (10 lb/sq in) and increase the pressure by 5 lb/sq in at each test until the maximum pressure of 1.5 kg/sq cm (20 lb/sq in) is reached. Because of the equipment required it is best to leave the testing to an agent but, provided that the parts have been carefully checked and reassembled, a calculated risk can be taken and the pressure test dispensed with. If the test is carried out the lubrication with Spargraph grease should be left until after the test.

9 Refit the dust cover 3. Before refitting the caliper refill it with fresh hydraulic fluid, as this will make subsequent bleeding easier. Leave the bleed screw out when filling and tilt the caliper around to remove as much air as possible. Refit

the caliper in the reverse order of removal, remembering to use a new copper seal for the union of the flexible hose.

11:6 キャリパーの整備

キャリパーの断面図を図 11: 9 に示します。

自動調整装置の部品は分解したり、ピストンから取り外したりしないでください。

1 キャリパーを車から取り外し、フレキシブル ホースを外します。ブレーキパッドを取り外し、ほこりや汚れをすべてブラシで払い落とします。必要に応じて、メタノール アルコールで洗います。

2 鋭利なエッジのない薄くて柔軟なツールを使用して、ダスト カバー 3 を慎重にこじ開けます。ドライバーでネジ 6 を押さえ、14 mm のリングスパナを使用してナット 2 を緩めます。直径が 7 mm (32 インチ) 以下の青銅などの軟質金属でできたドリフトを使用して、ピストンと調整装置アセンブリをキャリパーのボアからゆっくりと押し出します。必要に応じて、プラスチック製の木槌を使用してドリフトの端を軽くたたき、ドリフトがネジ 6 の端に作用するようにします。

3 薄くて柔軟性のあるツールを使用して、O リング 5 をシリンダー ボアの溝から取り外します。ボアの表面を傷つけたり引っかいたりしないように細心の注意を払います。ブリードスクリューを緩めて取り外します。

4 すべての部品をメタノールで洗います。洗浄に使用できる他の溶剤は油圧液だけですが、メタノールよりも汚れを落とすのに時間がかかります。溶剤の使用は危険です。溶剤が残っていると、新しいシールが汚染され、腐ってしまう可能性があります。

5 シリンダーのボアに摩耗、傷、その他の損傷がないか調べます。ボアが完全に滑らかで磨かれていない場合は、新しいキャリパーを完全に取り付ける必要があります。ピストンの表面に傷や損傷の兆候が見られる場合は、ピストンとアジャスター アセンブリを交換する必要があります。銅シール 7 を含む古いシールはすべて廃棄し、再組み立て時に新しいシールを取り付けます。

6 O リング 5 を少量のきれいな油圧液で濡らし、溝に戻します。指だけを使って、O リングが完全にまっすぐに収まっていることを確認します。新しい銅シール 7 をアジャスターの肩に取り付けます。

ピストンの周囲に少量の油圧液を塗り、慎重にボアに戻します。ピストンがコックしてボアが詰まって損傷しないように十分注意してください。図 11:10 に示すように、親指の圧力だけでピストンを慎重にボアに押し込みます。ピストンを叩いたり、無理やり挿入したりしないでください。クリッパーの穴に細いドライバーを通し、アジャスターのネジ 6 を通します。この操作中は、キャリパーとピストンを垂直に保持する必要があります。

7 アジャスターのスナップリングの間隙は、ブリードスクリューと一直線になっている必要があります。そうしないと、ピストン内の空気が逃げることができず、ブレーキのブリードが事実上不可能になります。ピストンには製造時にギャップに合わせてマーク A が

付けられます (図 11:11 参照)。このマークは電気エッチングまたはドリル ポイント マークです。図に示すように、一対のグリップを使用してピストンを回し、マークがブリード スクリューと一直線になるようにします。ピストンの外周に Spargraph グリースを軽く塗り、完全に元の位置に戻します。ピストンとアジャスター アセンブリが回転しないように、ドライバーで調整ネジ 6 を押さえ、ナット 2 を 1.5 kg m (10 lb ft) のトルク負荷で再度取り付けます。

8 キャリパーは、メタノール溶液に浸した状態で空気圧を使用してテストする必要があります。空気漏れがあれば、欠陥があることを示します。ピストンが動かないように、特殊工具 Fre. 12A または適切な金属棒を使用します。テスト圧力を徐々に上げ、各テスト圧力で漏れがないか確認します。

0.7 kg/平方インチ (10 ポンド/平方インチ) から始めて、最大圧力 1.5 kg/平方 cm (20 ポンド/平方インチ) に達するまで、各テストで圧力を 5 ポンド/平方インチずつ上げます。必要な機器があるため、テストは代理店に任せるのが最善ですが、部品が慎重にチェックされ、再組み立てされている場合は、計算されたリスクを負って圧力テストを省略できます。テストを実行する場合は、Spargraph グリースによる潤滑はテスト後まで残しておきます。

9 ダスト カバー 3 を取り付けます。キャリパーを再度取り付ける前に、新しい油圧液を補充します。これにより、その後のエア抜きが容易になります。充填中はエア抜きねじを外したままにして、キャリパーを傾けてできるだけ多くの空気を抜きます。取り外しの逆の順序でキャリパーを再度取り付けます。フレキシブル ホースの結合部には新しい銅シールを使用することを忘れないでください。

11:7 The brake discs

Because of the design of the hubs and discs it is impossible to remove the brake discs without removing the hubs. The removal of the front brake discs is dealt with in Chapter 9, Section 9: 3, while the removal of the rear brake discs is dealt with in Chapter 8, Section 8:5

Before freeing the disc from the hub make alignment marks so that the parts will be reassembled in their original positions.

Slight concentric scoring will occur with normal use and wear but deep scores or radial scores will adversely affect the braking efficiency. The discs must not be machined and if they are so scored or distorted as to affect braking then new discs must be fitted.

If the discs and pads are dirty or lightly contaminated with oil or grease they should be cleaned with trichlorethy-lene and deposits removed by gentle rubbing with emery-cloth.

When the brake discs have been refitted they should be outer operating face of the disc. Rotate the hub and disc checked for runout. Mount a DTI (Dial Test Indicator) on the suspension so that the stylus rests vertically on the through one complete turn and check the runout on the disc. The runout should not exceed .3mm (.012 inch) at a diameter

of 250mm (9 inch). If the runout is excessively rotating the disc in relation to the hub and if this fails to cure excessive runout then a new disc must be fitted.

11:7 ブレーキ ディスク

ハブとディスクの設計上、ハブを取り外さずにブレーキ ディスクを取り外すことはできません。フロント ブレーキ ディスクの取り外しについては、第 9 章、セクション 9:3 で説明されています。リア ブレーキ ディスクの取り外しについては、第 8 章、セクション 8:5 で説明されています。

ディスクをハブから取り外す前に、部品を元の位置で再組み立てできるように位置合わせマークを付けます。

通常の使用と摩耗では、わずかな同心円状の傷は発生しますが、深い傷や放射状の傷はブレーキの効率に悪影響を及ぼします。ディスクは機械加工してはなりません。ブレーキに影響を及ぼすほど傷や歪みがある場合は、新しいディスクを取り付ける必要があります。

ディスクとパッドが汚れていたり、油やグリースで軽く汚れている場合は、トリクロエチレンで洗浄する必要があります。また、エメリー布で軽くこすって堆積物を取り除きます。

ブレーキ ディスクを再装着したら、ディスクの外側の作動面を上にする必要があります。ハブとディスクを回転させて、振れがないか確認します。DTI (ダイヤル テスト インジケーター) をサスペンションに取り付け、スタイラスが 1 回転してディスクの振れを確認します。振れは、直径 250 mm (9 インチ) で 0.3 mm (0.012 インチ) を超えてはなりません。振れが大きすぎる場合は、ハブに対してディスクを回転させてみてください。それでも振れが大きすぎる場合は、新しいディスクを取り付ける必要があります。

11:8 The caliper bracket

For effective and quiet brake operation it is essential that the brake pads and caliper are accurately positioned in relation to the rotating brake disc.

Use feeler gauges to measure the clearance a between brake pad and caliper bracket, as shown in FIG 11:12

The clearance should lie between .15 and .30 mm (.006 to .012 inch). If the clearance is excessive then shims can be fitted as shown at e in FIG 11:13 to reduce the clearance.

Shims can be fitted between the suspension and brake to ensure that the disc runs centrally between the caliper.

The shims fitted for the front brakes are shown in FIG 11:14. Only one shim may be fitted at each position on the front brakes but it is permissible to use only one shim per brake so as to correct any tilt and the shims are only available in .05mm (.020 inch) thickness. The rear brakes must be shimmed parallel using one shim at each position, shown in FIG 11:15. Shims for the rear brakes are

available in three different thicknesses, .05 (.020), 1 (.040), and 1.5 (.059). To check on the shim thicknesses required, measure with feeler gauges between the disc and caliper at the points a and b shown in FIG 11:16.

The shims must be adjusted so that the gaps are both within the correct tolerances of 2.5 .5 mm (.079 to .118 inch).

It should be noted that if the caliper brackets require removal then the complete hub assemblies must also be removed, as for removing brake disc (see Chapters 8 and 9).

11:8 キャリパー ブラケット

ブレーキを効果的かつ静かに作動させるには、ブレーキパッドとキャリパーが回転するブレーキディスクに対して正確に配置されていることが不可欠です。

図 11:12 に示すように、隙間ゲージを使用してブレーキパッドとキャリパーブラケット間のクリアランス a を測定します。

クリアランスは 0.15 ~ 0.30 mm (0.006 ~ 0.012 インチ) の範囲にする必要があります。クリアランスが大きすぎる場合は、図 11:13 の e に示すようにシムを取り付けてクリアランスを減らすことができます。

ディスクがキャリパー間の中央で動くように、サスペンションとブレーキの間にシムを取り付けることができます。

フロントブレーキに取り付けられたシムを図 11:14 に示します。フロントブレーキの各位置に取り付けることができるシムは 1 つだけですが、傾きを修正するためにブレーキごとシムを 1 つだけ使用することが許可されており、シムの厚さは 0.05 mm (0.020 インチ) のみです。リアブレーキは、図 11:15 に示すように、各位置に 1 つのシムを使用して平行にシム調整する必要があります。リアブレーキ用のシムは、0.05 (0.020)、1 (0.040)、1.5 (0.059) の 3 つの異なる厚さで使用できます。必要なシムの厚さを確認するには、図 11:16 に示すポイント a と b でディスクとキャリパーの間を隙間ゲージで測定します。

シムは、ギャップが両方とも 2.5 .5 mm (0.079 ~ 0.118 インチ) の正しい許容範囲内になるように調整する必要があります。

キャリパーブラケットを取り外す必要がある場合は、ブレーキディスクを取り外す場合と同様に、ハブアセンブリ全体も取り外す必要があることに注意してください (第 8 章および第 9 章を参照)。

Swinging links:

These can be checked for position but special gauges are required so the work should be left to an agent. If the links are worn or damaged they can be removed by carefully drilling out the rivet that secures them. The inner side of

the caliper bracket should then be drilled out to $8+1+2\text{mm}$ (.319 to .323 inch) as shown at A and the other side slightly chamfered as shown at B in FIG 11:17. The swing link is then secured using a new pin and the pin peened using the special tool No. Fre. 17

スイングリンク:

これらの位置は確認できますが、特殊なゲージが必要なので、作業は代理店に任せる必要があります。リンクが摩耗または損傷している場合は、それらを固定しているリベットを慎重にドリルで穴を開けて取り外すことができます。次に、図 11:17 の A に示すように、キャリパー ブラケットの内側を $8+1+2\text{mm}$ (.319 ~ .323 インチ) までドリルで穴を開け、反対側を B に示すようにわずかに面取りします。次に、スイングリンクを新しいピンで固定し、ピンを特殊工具 No. Fre. 17 を使用してピーニングします。