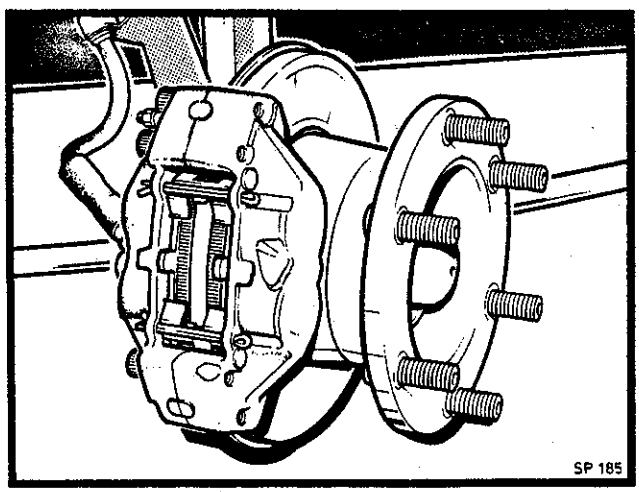
FRONT BRAKES
Vacuum/Hydraulic
4 x 46M Disc Brake Caliper

DESCRIPTION

The caliper assembly is mounted on the stub axle and is composed of four opposed hydraulic cylinders, complete with pistons contained in a cast iron body. The body consists of two parts, the mounting half and the cover half which together straddle the brake disc and are joined together by special high tensile steel bolts, tightened to a controlled torque. Internal fluid passages are interconnected, so that they operate simultaneously.



4 x 46M DISC BRAKE CALIPER

To facilitate bleeding, a bleed screw is fitted to the caliper. The pistons operate to move the friction pads against opposite sides of the disc and are completely self adjusting as the friction material wears in service. A rubber wiper seal is retained in each bore mouth to keep out moisture and dirt. Fitted further into each cylinder bore is a fluid seal which prevents leakage and grips the piston tightly. **Note that the fluid seal is square in section and the cylinder bore groove is tapered.** When the piston is fitted, the seal is compressed to the groove shape, as shown in fig. 2. The friction pads comprise steel backing plates to which the friction material is bonded. The pads, which may be fitted with metal shims, are retained in the caliper recesses by retaining pins and springs which also enable them to be readily inspected and replaced when necessary.

OPERATION

When the brake pedal is depressed, hydraulic pressure enters the caliper mounting half, then through the internal interconnected fluid passages to the cover half. Hydraulic pressure is therefore equalised and causes the opposing pistons to move out forcing the friction pads to grip the disc. As the pistons move out, the fluid seals flex as shown in fig. 1. When the brake pedal is released, hydraulic pressure drops to zero, the seals adopt their original shape and retract the pistons, fig. 2. As the pistons retract hydraulic fluid is returned to the reservoir and the friction pads adopt their correct running clearance to the disc. Friction pad wear is compensated for automatically as each piston gradually moves through the fluid seal and "follows up" the pad before retracting again after each brake application.

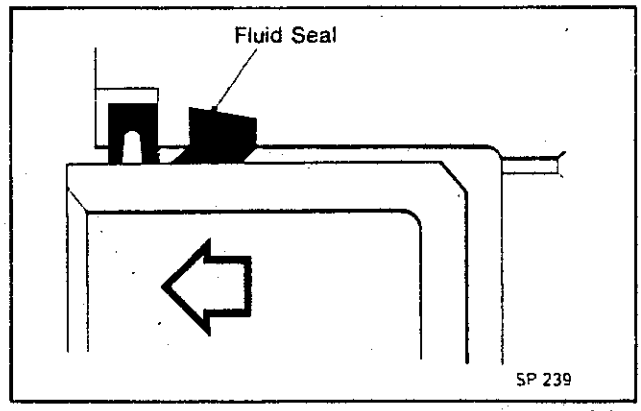


Fig. 1. *Position of fluid seal during outward movement of the piston.*

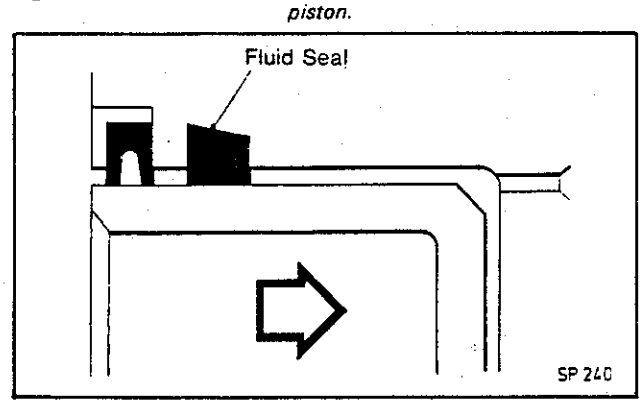


Fig. 2. *Position of the fluid seal with piston retracted.*

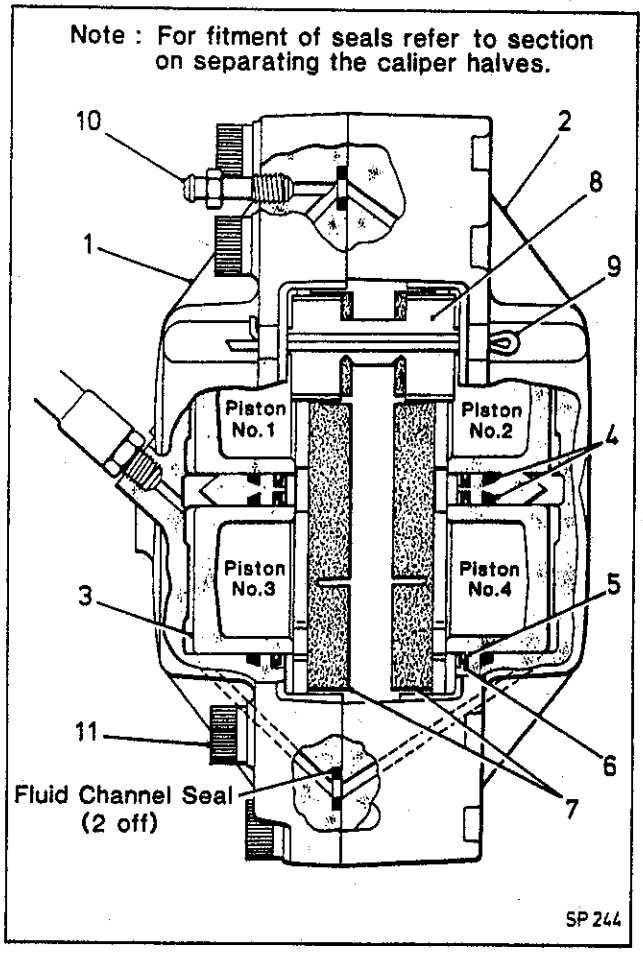


Fig. 3 *Section through 4 x 46M caliper*

FRICTION PAD REPLACEMENT

Always ensure that replacement pads are to the correct specification. To maintain correct braking balance it is imperative that friction pads are replaced in complete axle sets. DO NOT separate the caliper halves to renew the friction pads.

Apply the handbrake, jack up and support the front of the vehicle.

Remove the front road wheels.

Thoroughly clean the outer surfaces of the caliper body using methylated spirit prior to pad removal. A wire brush can be used to remove excessive road dirt.

Depress the pad retaining springs, and using pliers, withdraw the retaining pins.

Withdraw the friction pads from the caliper recesses noting whether metal shims are fitted, and if so, their relative positions.

INSPECTION OF PARTS

Using clean brake fluid or methylated spirit and a lint free cloth, thoroughly clean the friction pad recesses and the exposed part of the pistons.

Carefully examine the surface finish of the pistons, provided that they are undamaged and not corroded the pistons may be re-used.

Lightly smear the piston surfaces and the friction pad recesses with disc brake lubricant.

Check the brake disc for cracks, scoring, or a rust deposit giving the surface a black appearance. Such faults, if severe, render the disc inefficient, therefore renew where there is any doubt. A rust build up on the outside edge of the disc sufficient to prevent correct seating of new friction pads may be carefully removed with a smooth file.

RE-ASSEMBLY

Carefully press each piston back into the caliper bore using a suitable piston clamp. During this operation brake fluid will be displaced. To prevent the reservoir overflowing, open the bleed screw, attach a bleed tube and allow surplus fluid to run into a glass jar.

When the pistons are fully back, retighten the bleed screw.

Check the bearing edges of the new pads for blemishes. High spots on the steel pressure plates may be carefully removed with a smooth file.

Lightly smear the back and edges of the friction pad pressure plates with disc brake lubricant carefully avoiding the friction material.

Insert the new pads and shims, if fitted, into the caliper recesses, fit the retaining springs and secure with the new retaining pins.

Depress the brake pedal firmly several times to locate the friction pads correctly.

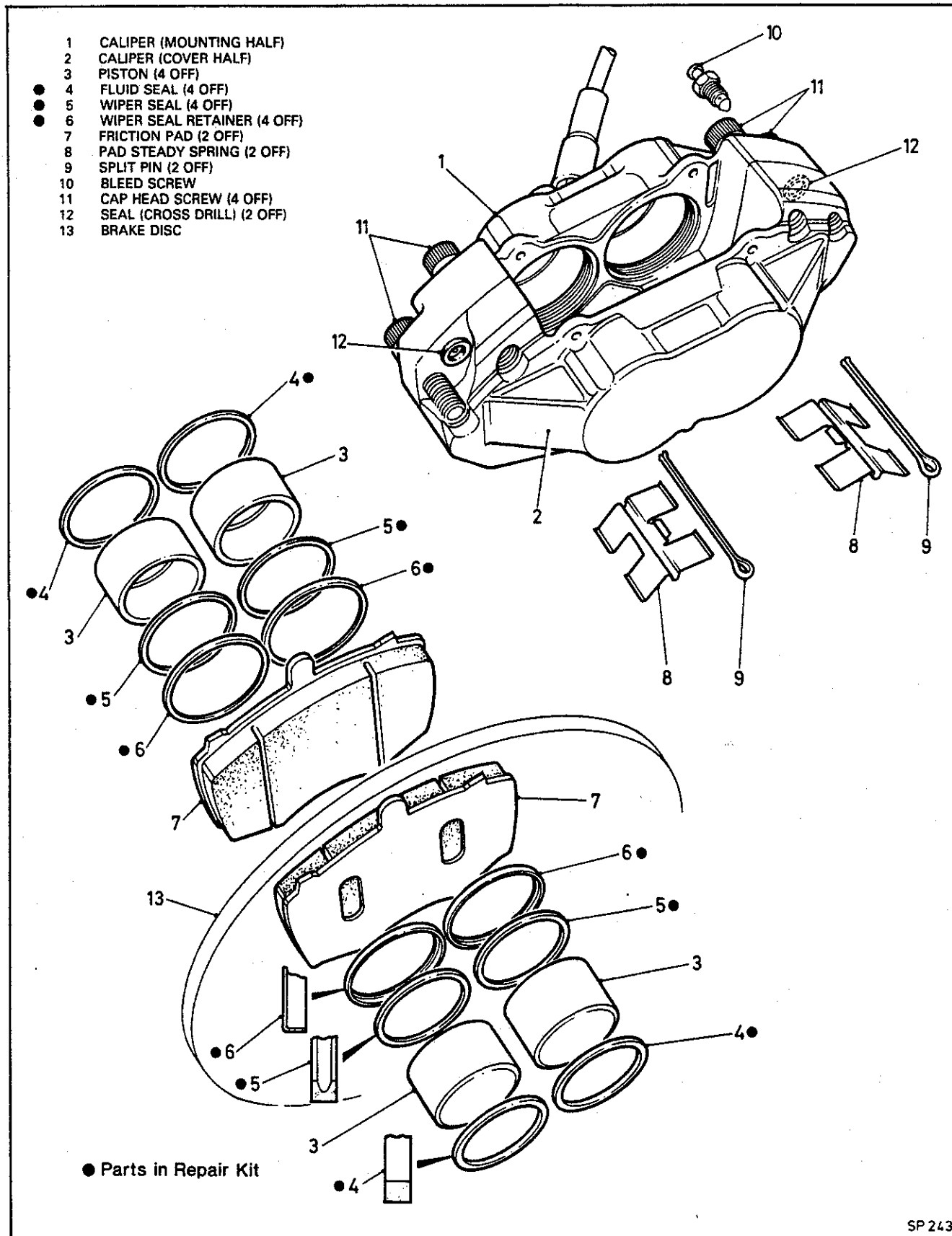


Fig. 4. *Exploded view of 4 x 46M caliper assembly.*

RENEWING CALIPER PISTON SEALS

DO NOT separate the caliper halves to renew the piston seals. Apply the handbrake, jack up and support the front of the vehicle.

Remove the front road wheels.

As previously described under "FRICTION PAD REPLACEMENT", remove the pads from the caliper. If it is intended to refit the pads take note of their original positions.

Release the caliper unit from the mounting bracket and support the assembly to avoid straining the attached brake hose.

Thoroughly clean the outer surfaces and the pad recesses using methylated spirit or brake fluid.

Fit a suitable piston clamp onto the cover half of the caliper to restrain the piston while the opposite one is pushed out by the hydraulic fluid. At the same time place a suitable block of wood between the other pair of pistons to keep them in position.

Place a receptacle under the caliper unit to receive any displaced brake fluid and gently depress the brake pedal to expel the unrestricted mounting half piston sufficient to extract it by hand. Fit a suitable hose clamp to prevent brake fluid loss, then withdraw the piston.

If any piston is seized the only satisfactory remedy is renewal of the complete caliper assembly.

The wiper seal can now be removed by inserting a blunt screwdriver between the retainer and the seal to prise the retainer carefully from the mouth of the bore. Taking great care not to damage the seal grooves in the cylinder bore, extract the wiper seal and the fluid seal.

Thoroughly clean the bore, piston, and particularly the seal grooves with clean brake fluid or methylated spirit only. If the caliper or pistons are corroded, or the condition of them is not perfect, the parts must be renewed.

Coat the new seal with disc brake lubricant. Ease the seal into the bore using the fingers only, ensuring that it is correctly seated in the groove. The fluid seal groove and the seal are not the same section, thus when bedded the seal feels proud to the touch at the edge furthest away from the mouth of the bore.

Slacken the bleed screw on the caliper one complete turn, and after lightly coating the piston with disc brake lubricant, insert it squarely into the bore using the fingers only. DO NOT tilt the piston during insertion and leave approximately 8mm ($^5/_{16}$) projecting from the mouth of the bore.

Coat a new wiper seal with disc brake lubricant and fit it into the new seal retainer. Slide the assembly squarely, seal side first, over the protruding piston and up into the bore mouth. Remove the piston clamp from the cover half and use the clamp to press home the seal retainer and the piston.

Tighten the caliper bleed screw, remove the hose clamp and using the piston clamp to prevent movement of the mounting half piston, depress the brake pedal gently to expel the cover half piston. Refit the hose clamp to prevent fluid loss.

In a similar sequence deal with the cover half piston. Ensure that the bleed screw is slackened when refitting the piston into the bore.

Reposition the wood block and as previously described deal with the other pair of pistons and seals.

Refit the caliper to the mounting bracket and tighten the bolts to the correct torque. Ensure that the bleed screw is tightened before overhauling the other caliper assembly.

Insert the friction pads and shims, if fitted, into the caliper recesses. Fit the retaining springs and secure with the retaining pins. Finally remove the hose clamps.

Refill the reservoir with brake fluid and bleed the system thoroughly AS INDICATED IN SECTION M 190

Replenish the fluid level in the reservoir and operate the brake pedal several times to locate the friction pads correctly. Check the hydraulic system for leaks before road testing the vehicle.

Remember that when new friction pads have been fitted they are not "bedded in" and to do so may take several hundred miles, therefore drive accordingly.

SEPARATING THE CALIPER HALVES

Unless absolutely unavoidable, the cover half and the mounting half of the caliper should not be separated. If there is no alternative to separating the two halves, the fluid channel seals and clamping bolts must be renewed. the clamping bolts are made of special high-tensile steel. Only those bolts specificly supplied for this type of Lockheed disc brake may be used.

On re-assembling the caliper, an accurate torque wrench is essential to obtain the correct tightening torque for the clamping bolts. (Cap head screws).

Extract the friction pads, pistons, seals and retainers as detailed previously.

Disconnect the flexible brake hose and remove the caliper from the vehicle. Extract the clamping bolts to separate the two halves of the caliper. Remove the fluid channel seals.

The oportunity should be taken of the dismantled state to completely overhaul the caliper.

Thorougly clean all retained parts using methylated spirit or clean brake fluid as a solvent. Do not allow the cleaning agent to contaminate the friction pad material.

Insert the seals, retainers and pistons using the piston clamp as described in the appropriate section.

Ensure that the jointing face of each half of the caliper is spotlessly clean and that the threaded holes for the clamping bolts are completely dry. THIS IS MOST IMPORTANT.

Locate the new fluid channel seals in the appropriate half. Place the two halves together, taking great care not to dislodge the seals from the correct position in their recesses.

Fit the new clamping bolts and tighten each bolt progressively to the correct torque.

Refit the caliper to the mounting bracket and tighten the bolts to the correct torque.

Reconnect the flexibel brake hose using a new washer for the connection point on the caliper.

Insert the friction pads and shims, if fitted, into the caliper recesses. Fit the retaining springs and secure with the retaining pins.

Ensure that the bleed screw is in place. Refill the reservoir and bleed the system thoroughly.

Replenish the fluid level in the reservoir and operate the brake pedal several times to locate the friction pads correctly.

Check the hydraulic system for leaks before road testing the vehicle.