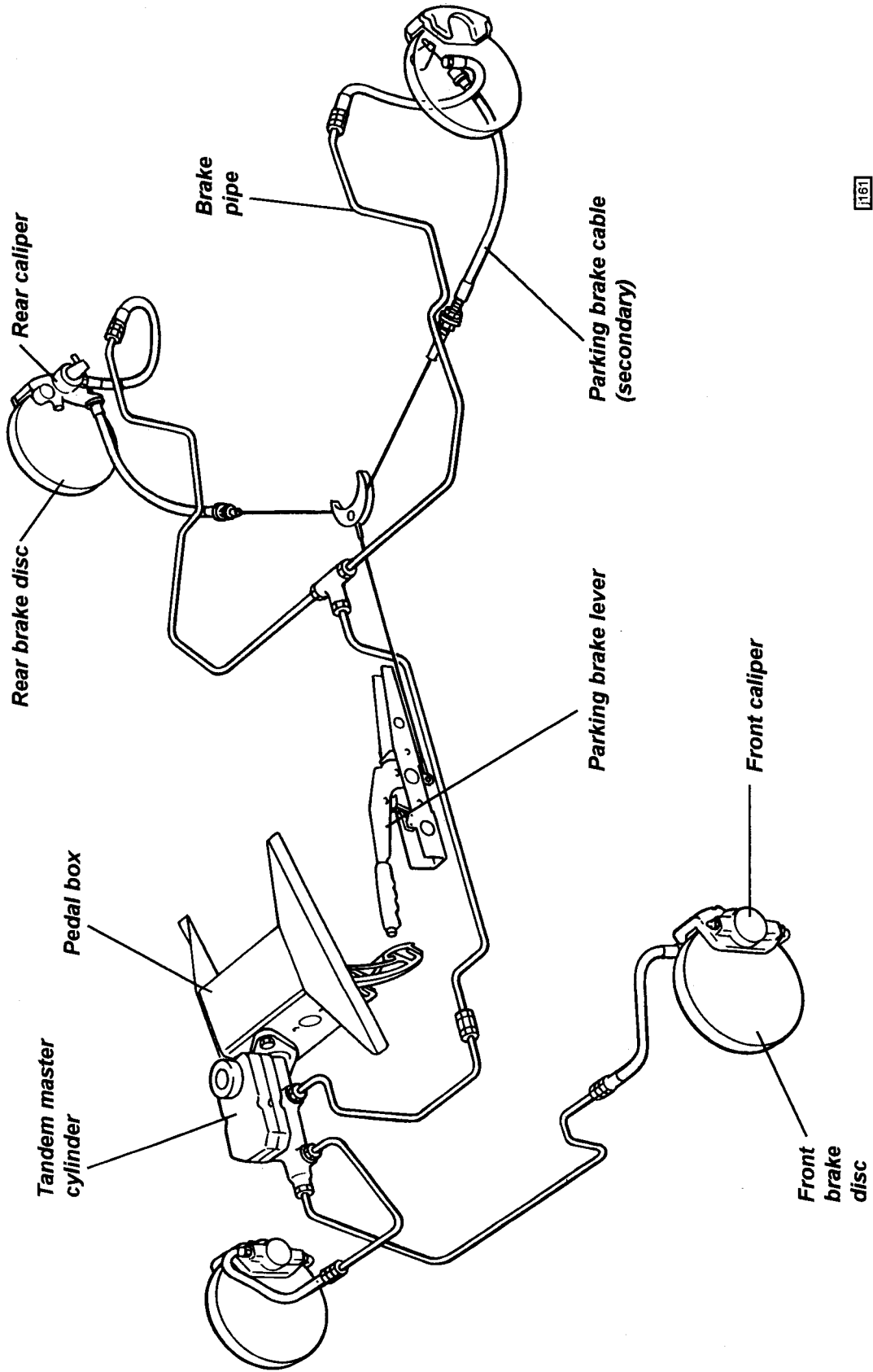


**BRAKE SYSTEM & PEDAL BOX****SECTION JI - ELISE 2001 M.Y. Onwards**

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[161]

GENERAL LAYOUT



### JI.1 - GENERAL DESCRIPTION

The braking system of the Lotus Elise 2001 M.Y. onwards, comprises ventilated discs all round with AP Racing 2-piston fixed calipers on the front and Brembo single piston sliding calipers on the rear. A tandem master cylinder, without servo assistance, operates the calipers via a front/rear split hydraulic circuit. The centrally mounted parking brake lever, operates the rear caliper pistons by control cables.

The AP Racing front calipers, have lightweight alloy bodies housing two opposed pistons, and are mounted via two bolts directly to the rear of the forged steel hub carriers. The rear brakes use Brembo cast iron, single piston calipers, sliding on pins mounted directly to the forged steel hub carriers. A ventilated cast iron brake disc with curved internal vanes is common to all four wheels, and is sandwiched between the road wheels and hubs, retained for convenience by a single countersunk screw. Optional sport discs are cross-drilled for additional cooling, weight saving and improved pad scouring, but are likely to generate increased levels of noise.

The tandem master cylinder is made by ITT, and incorporates a front section to supply both front brakes, and a rear section to supply the rear brakes. A translucent fluid reservoir surmounting the cylinder, services both front and rear circuits, and also, via a flexible hose, the clutch master cylinder. A fluid level sensor is incorporated into the filler cap, and lights a fascia tell tale lamp if the level becomes dangerously low.

The parking brake ratchet lever is mounted between the seats and uses a short primary cable and balancing yoke to actuate a single control cable linked to each rear caliper. Adjustment of the caliper mechanism to compensate for brake pad wear is automatic. The parking brake should be applied by pulling up the lever with high effort, and engaging the highest ratchet setting attainable. When parking the car on a slope, the additional precaution should be taken of leaving the transmission in first or reverse gear and steering the wheels towards the kerb. If the parking brake is applied when the brakes are hot (e.g. after prolonged or vigorous braking), special care should be taken to ensure that the parking brake is securely engaged in order to allow for any potential affect on brake performance as the discs cool.

The braking system is designed to enhance brake performance during high speed driving, with good fade and pad wear characteristics, and have a higher friction level when heated to normal working temperature than when cold. Required pedal effort will reduce as cold brakes become heated to normal working temperature, and the braking efficiency will increase significantly as new discs or pads become 'bedded in'. After fitting new brake components, maximum braking efficiency will be achieved if, for the first few hundred miles, needless heavy braking is avoided, and the brake pads are allowed to 'bed in' fully before being used to their full potential.

### JI.2 - BRAKE FLUID CHECK & CHANGE

Before checking the brake fluid level, ensure that the car is parked on a level surface, and remove the driver's side front body access panel. The level of fluid in the reservoir may be inspected without disturbing the filler cap, and should lie between the 'MIN' and 'MAX' marks moulded on the translucent reservoir body. The level will fall progressively as the brake pads wear in service, and should be checked at each service interval. A sensor incorporated into the filler cap will light a fascia mounted tell tale lamp if the level becomes dangerously low. As a bulb check, the tell tale should light for about six seconds when the ignition is first turned on, but may also be tested by pressing the button on the filler cap, which action should light the tell tale with the ignition switched on.

An internal baffle divides the reservoir into two compartments, with the front section supplying the front brake circuit, and the rear section the rear brakes in addition to, via a short flexible hose, the clutch master cylinder. Service wear of the clutch friction plate will cause fluid to be displaced from the self adjusting clutch slave cylinder, back to the reservoir, and will counteract to some extent the dropping of the level due to brake pad wear.

If the reservoir needs topping up, first clean around the cap to reduce the possibility of contamination before unscrewing the cap; it is not necessary to disconnect the level sensor cables. Take suitable precautions to guard against damage to paintwork caused by brake fluid dripping from the level sensor.

Use only a fresh supply of DOT 4 *non-mineral* type fluid, identified by a yellow and black symbol.



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Do NOT use DOT 5 silicone fluid, or any fluid which has been exposed to the atmosphere for more than a brief period, or any fluid suspected of being wet, dirty or contaminated. Do not overfill. Replace the filler cap securely.

Some service operations, such as replacing brake pads, will result in the displacement of fluid from the hydraulic circuit back into the reservoir. In order to prevent fluid overflowing from the reservoir, it may be necessary to remove some fluid using a 'squeeze bulb' type tool.

**Renewal of Brake Fluid**

Brake fluid absorbs water from the atmosphere over a period of time (hygroscopical), resulting in a lowering of the boiling point of the fluid, and corrosion of the hydraulic system. For optimum safety and brake performance, the brake fluid should be renewed every twelve months.

The fluid may be changed and bled of air using pressure or vacuum assisted equipment, or standard manual techniques. Each brake caliper is provided with a bleed nipple for this purpose. The clutch release system hydraulic fluid should be changed at the same time.

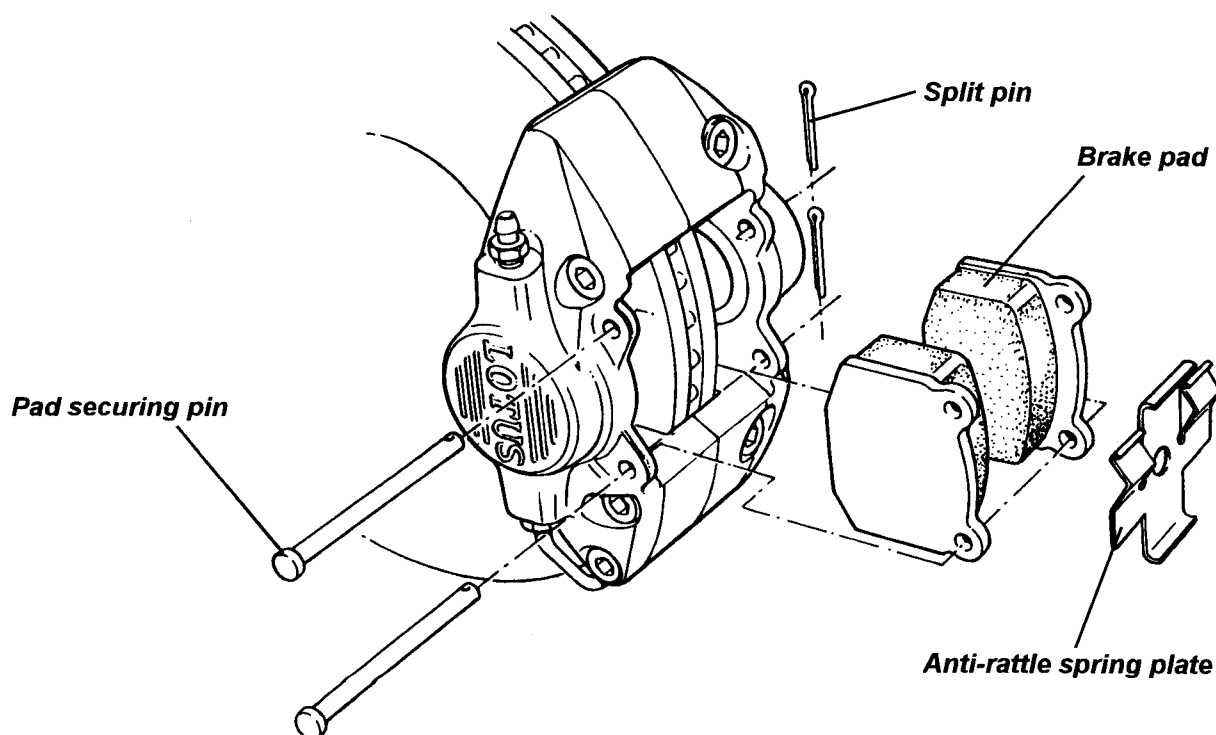
**Jl.3 - FRONT BRAKE PAD REPLACEMENT**

Pad thickness may be checked with the wheel removed without disturbing the caliper.

Standard pad thickness (excluding backplate);	9.0 mm
Minimum pad thickness (excluding backplate);	2.5 mm

If the thickness of any pad is below the specified minimum, the axle set of pads should be renewed. Note that the pads are identified with T 4097 FF on the backplate. The pad backplates are factory fitted with anti-squeal overlays marked GM 027216.

1. To remove the brake pads; Remove the securing split pin and withdraw the lower of the two pad retaining pins, taking precautions to restrain the anti-rattle spring. Remove the second retaining pin and the anti-rattle spring plate. Withdraw the pads from the caliper. Measure the lining thickness and renew the axle set of pads if any lining is below 2.5 mm.



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2. Before replacing the pads, inspect the caliper for any signs of fluid leakage from a piston seal or joint, and replace the caliper if any such signs are evident. Clean the pad recess in the caliper taking suitable precautions to protect from dust inhalation.
3. If refitting the existing brake pads, refit each pad in the same position as originally fitted.
4. If fitting new pads, the pistons must be pushed back into the caliper to provide the necessary clearance. This action will return fluid to the master cylinder such that some fluid may need to be removed in order to prevent overflowing. Take care to avoid damaging the brake disc surface, or distorting the disc.
5. Position the pads in the caliper, and insert the upper pad retaining pin from the outboard side. Secure with the split pin.
6. Fit the anti-rattle spring into position with the side tangs pressing against the top end of the pad backplates, and the centre tang beneath the retaining pin. Insert the second pad retaining pin into the caliper, passing over the lower central anti-rattle spring tongue.
7. Before driving the car, press the brake pedal several times to bring the pads to their correct running position. Top up the master cylinder reservoir if necessary to bring the level to the 'MAX' mark.
8. Ensure the customer is made aware that maximum braking efficiency will be achieved if, for the first few hundred miles, needless heavy braking is avoided, and the brake pads are allowed to 'bed in' fully before being used to their full potential.

#### J1.4 - REAR BRAKE PAD REPLACEMENT

Pad thickness may be checked after removing the road wheel, without disturbing the caliper.

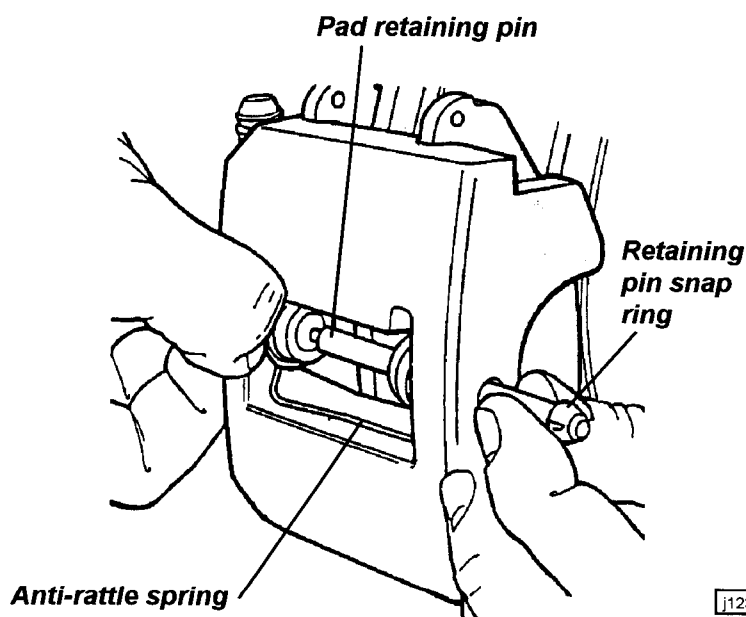
Standard pad thickness (excluding backplate);	6.5 mm
Minimum pad thickness (excluding backplate);	2.5 mm

If the thickness of any pad is below the specified minimum, the axle set of pads should be renewed. Note that the pad backplates are marked T 4097 FF and are factory fitted with anti-squeal overlays marked 07.5899.41 Brembo.

##### *Tools Required:*

Piston Retraction Tool T000T1242

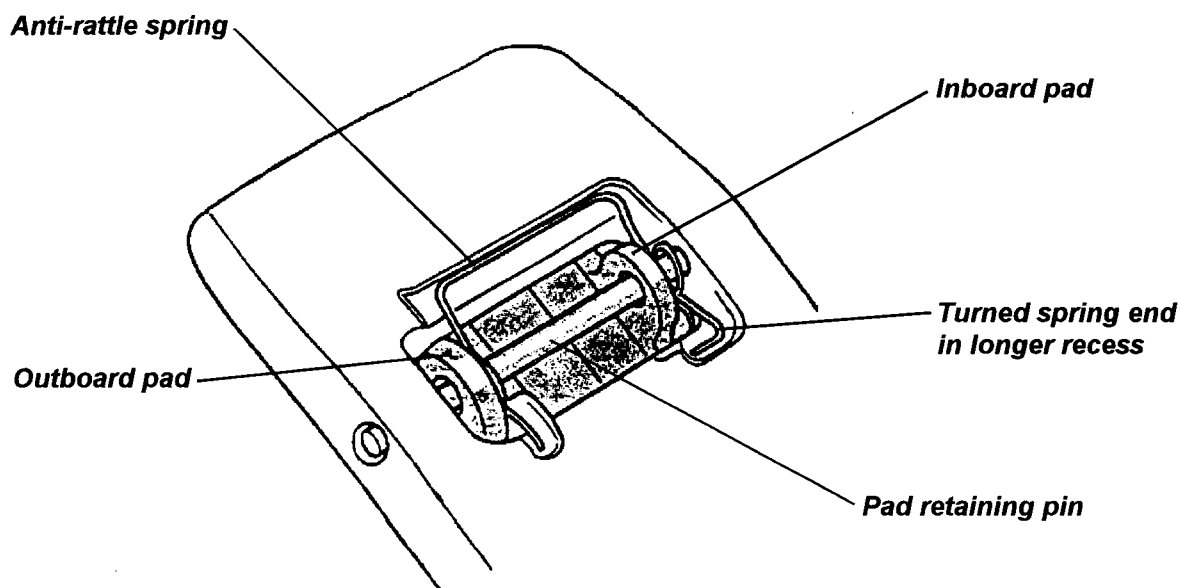
1. Remove the rear road wheels.
2. At each rear corner: using a suitable pin punch, knock the pad retaining pin out of the caliper towards the outside, taking precautions as necessary to restrain the anti-rattle spring from flying off as the pin is withdrawn.
3. Remove the anti-rattle spring, and withdraw both brake pads from the caliper. Measure the thickness of the lining material, and renew the axle set of pads if any are below 2.5 mm.



j123



4. Before refitting the pads, inspect the piston boot for splits, cracks or other damage, and for any signs of fluid leakage or wetness. If any such signs are apparent, the complete caliper should be replaced as Brembo do not recommend that this caliper be dismantled.
5. If refitting the existing brake pads, refit each pad in the same position as originally fitted.
6. Before fitting new rear pads, the caliper piston must be screwed back into the caliper down the parking brake actuation mechanism. This operation requires the use of special tool T000T1242 and the removal of the brake disc:
  - Remove the single socket head screw retaining the brake disc, and remove the disc.
  - Fit special tool T000T1242 into the holes in the caliper piston, and screw the piston back down the parking brake mechanism screwthread until fully bottomed.
  - Refit the brake disc, and tighten the countersunk retaining screw to 12 Nm.
7. Slide the brake pads into the caliper. Position the pad anti-rattle spring in the caliper aperture, with the spring ends located in the recesses provided. Ensure that the spring is fitted the correct way up, with the turned spring end in the longer recess. Press the spring eyes into alignment whilst the pad retaining pin is inserted through the caliper from the outside. Ensure that the pin passes through both eyes of the anti-rattle spring, and both brake pads, and that the pin is fully installed with the snap ring seated in the outboard side of the caliper.



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8. Refit the roadwheels and press the brake pedal several times to set the brake pad position. Before switching on the ignition, check the fluid level in the reservoir and top up if necessary.
9. Ensure the customer is made aware that maximum braking efficiency will be achieved if, for the first few hundred miles, needless heavy braking is avoided, and the brake pads are allowed to 'bed in' fully before being used to their full potential.

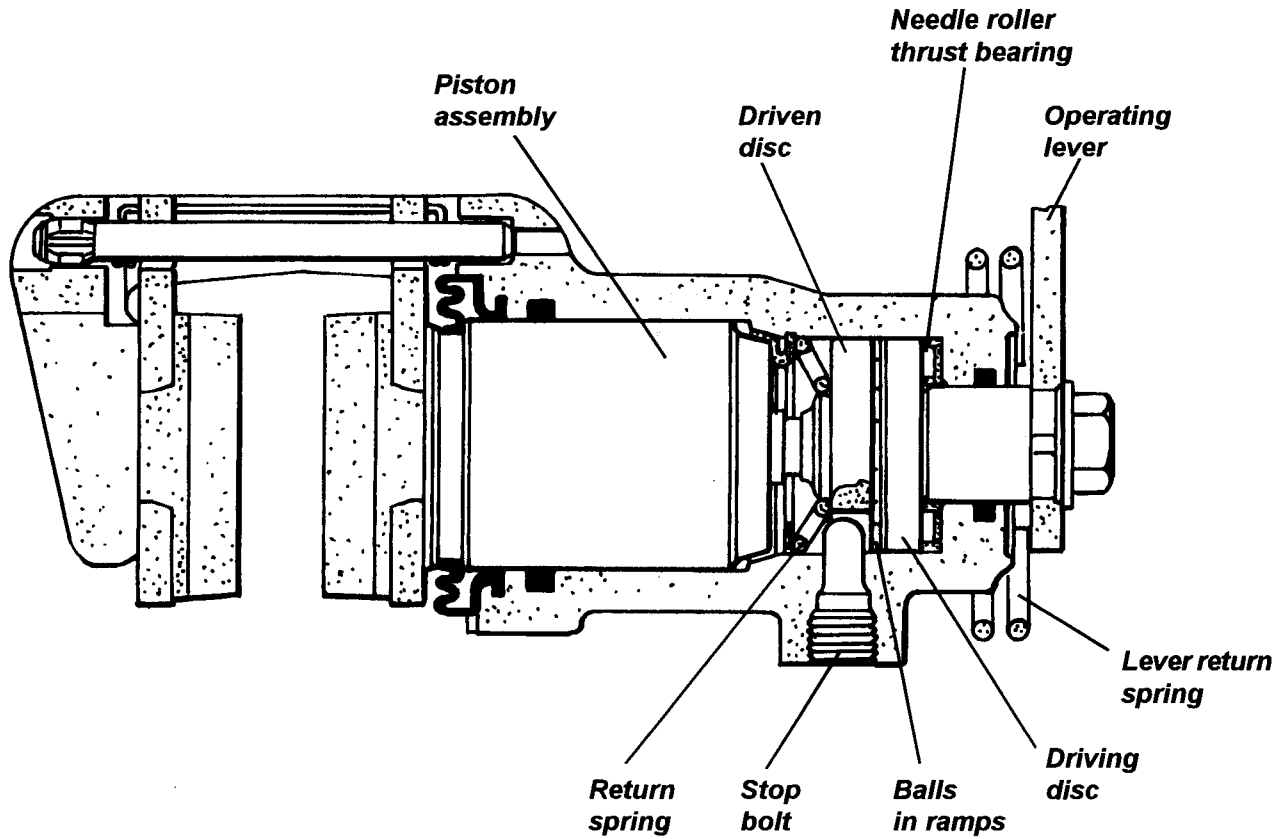
#### JI.5 - PARKING BRAKE MECHANISM

Operation of the parking brake lever applies a pull to a short link cable which connects via a horseshoe compensator to the centre of a single cable linking the two rear calipers. At each caliper, the cable connects to a lever which operates the hydraulic piston by mechanical means:

Movement of the caliper lever causes rotation of one of a pair of steel discs, rotation of the other being restrained by a stop bolt in the cylinder. Hardened balls housed in ramps machined in the discs, force the discs

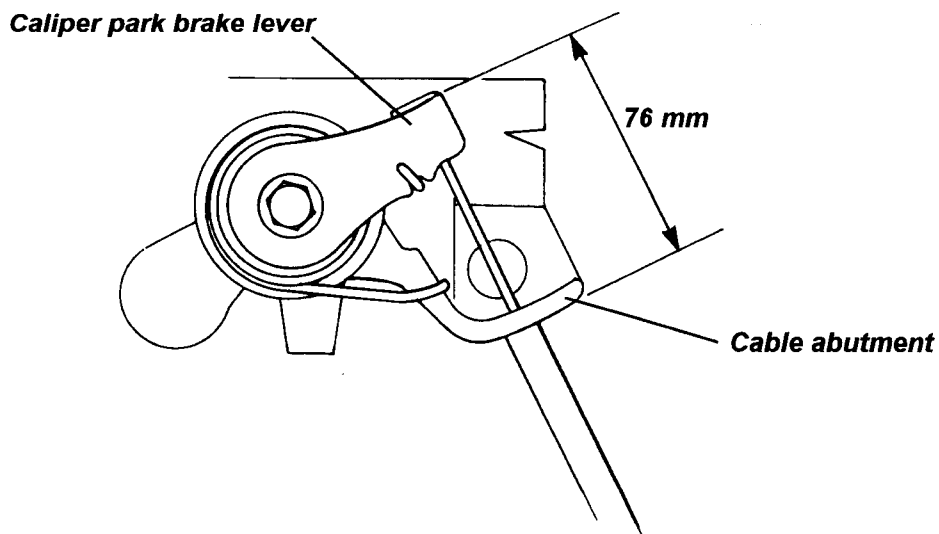


apart, and in so doing, apply an axial force to the piston via a screwthread and nut. The nut is restrained in the piston by a one way clutch which grips the nut when the parking brake is applied, but allows it to turn when the mechanism relaxes, or when the piston is operated hydraulically by the footbrake. In this way, the mechanical mechanism is adjusted automatically to compensate for pad wear.



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For the auto adjustment system to function correctly, it is essential that each caliper parking brake lever is allowed to return fully when the brake is released, and is not prevented from doing so by maladjustment of the parking brake cable. To check that the caliper levers are fully returned; with the parking brake 'off', measure the distance between the cable abutment and caliper lever as shown.

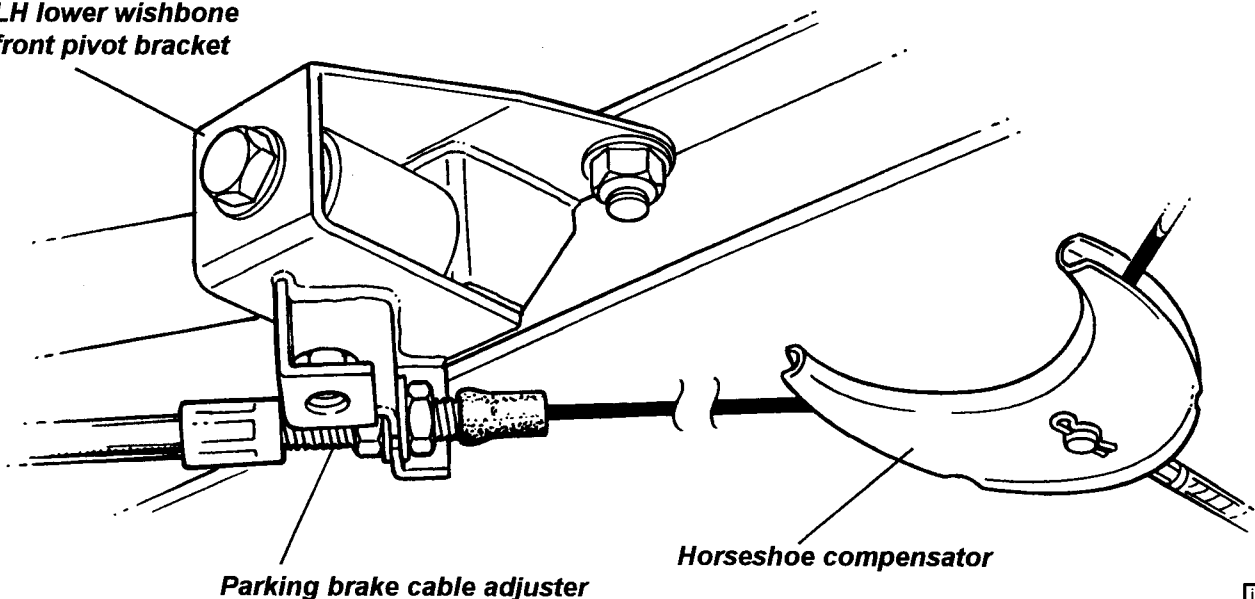


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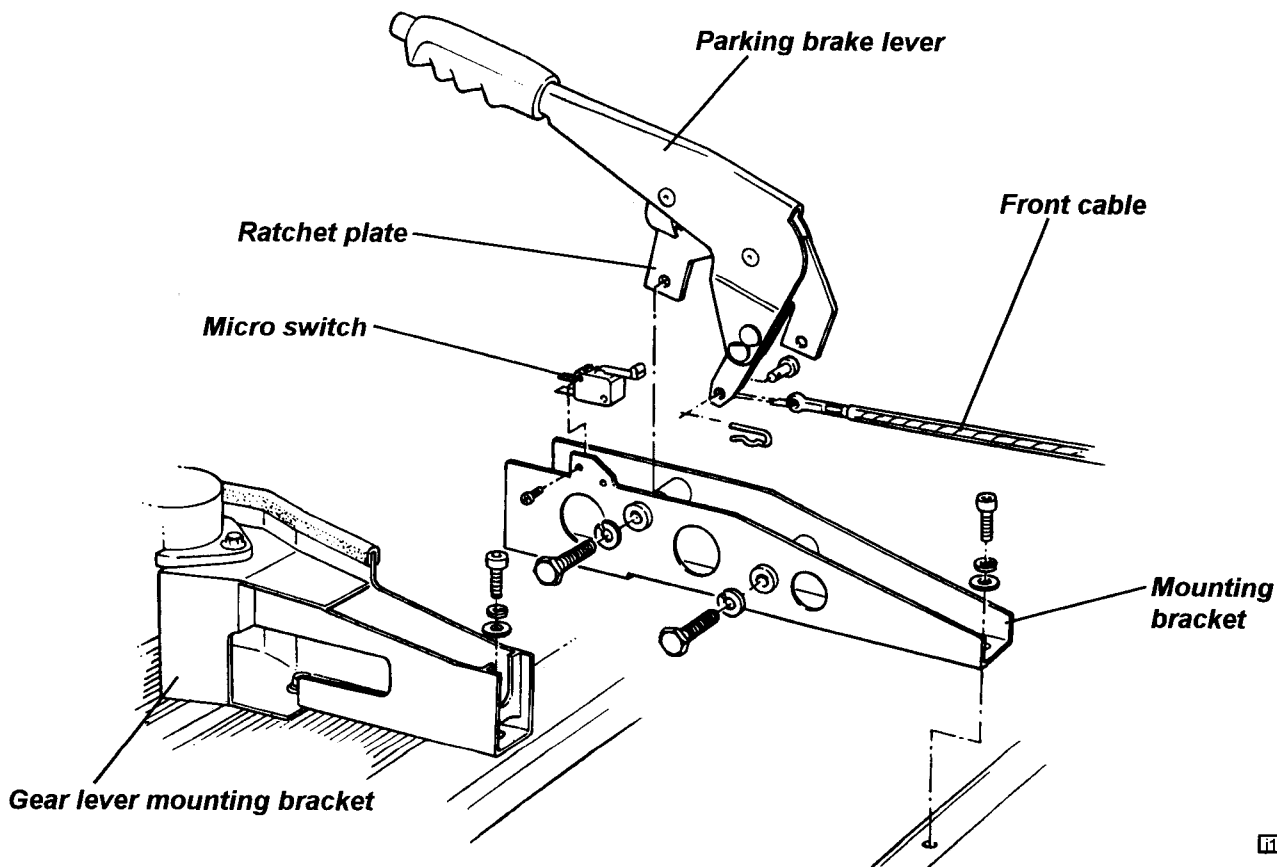


After verifying this dimension, any slack in the rear cable may be adjusted out at the left hand outer cable abutment, which is integral with the pivot bracket for the front leg of the lower wishbone. Remove the engine bay undertray for access. After adjustment, re-check the caliper lever 'off' dimension.

**LH lower wishbone  
front pivot bracket**



The parking brake lever is sandwiched into a mounting bracket by two flat head bolts securing the ratchet plate. The mounting bracket (in conjunction with the gearchange lever bracket) is not drive handed, but is offset, via alternative fixing holes in the chassis, *towards the passenger side*. The ratchet pawl operates a micro switch to light the 'brakes' tell tale lamp in the instrument panel whenever the ignition is switched on and the parking brake is applied. The short front cable is secured to both the lever assembly and the compensator horseshoe by clevis pins with retaining 'R' pins.





**JI.6 - BRAKE DISCS**

All four wheel brakes use a brake disc which is sandwiched between the wheel and its hub flange, being centralised by the hub spigot, and transmitting torque via the clamping force of the road wheel bolts. A countersunk screw is used to retain the discs for convenience when servicing.

The same disc is used at each corner of the car, and features cast iron construction with internal curved vane cooling. The opposite direction of rotation of the curved vanes on each side of the car does not significantly affect the cooling performance of the disc. The condition of the brake disc friction surface is a major factor in brake performance and feel, with a good surface quality and minimal run-out and thickness variation being required. After an extended lay up, some surface corrosion may develop on the discs which will cause a degradation in braking quality until the surfaces are cleaned up by normal brake action. Excessive run-out or thickness variation as a result of overheating or extended wear, may cause brake judder and/or extended pedal travel due to pad 'knock off'. Scoring and ridging of the braking surfaces will be exacerbated by operation in dusty or unmetalled road environments, and will reduce braking performance.

No skimming or re-surfacing of the brake discs is permitted. If the disc becomes badly scored, or is out of specification in any way, it should be renewed. NOTE: Ensure that there is no discernible free play in the wheel bearings before attempting to measure brake disc run-out.

**Brake disc thickness**

New	26.0 mm (1.02 in)
Service minimum	24.9 mm (0.98 in)

**Runout**

New maximum	0.03 mm (0.001 in)
Service maximum	0.10 mm (0.004 in)

**Front Disc Replacement**

1. Remove the road wheel.
2. Remove the two bolts securing the brake caliper to the hub carrier, and withdraw the caliper from the disc. Secure clear without straining the flexible hose.
3. Remove the single countersunk screw, and withdraw the disc from the hub.
4. Before re-fitting a disc, ensure that the mating face between disc and hub is scrupulously clean. Mount the disc onto the hub and align the wheel bolt holes.
5. Apply PermaBond A130 (A912E7033) to the threads of the caliper fixing bolts. Fit the caliper over the disc and secure to the hub carrier with the two bolts. Tighten to 45 Nm (33 lbf.ft).
6. Refit the road wheel and operate the brakes before driving the car to set the brake pad position.

**Rear Disc Replacement**

Replacement of the rear discs is similar to that for the front discs, except that if the brake pads are removed, it is not necessary to remove the brake caliper to enable the disc to be withdrawn from the hub.



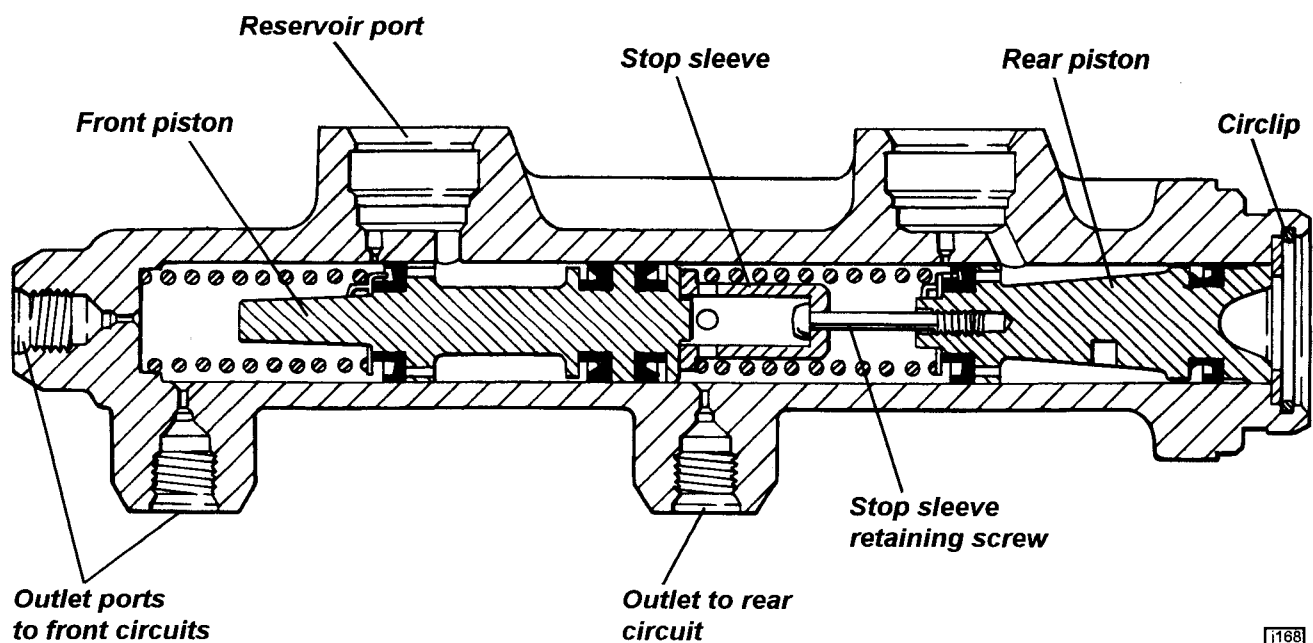
JI.7 - BRAKE MASTER CYLINDER

The tandem brake master cylinder is mounted in the front compartment and is secured to the pedal box by two M8 bolts. To remove the unit, proceed as follows:

1. Syphon fluid from the reservoir to reduce spillage.
2. Disconnect the clutch master cylinder supply hose from the reservoir and plug the hose.
3. Release the three brake pipes from the master cylinder, and plug the pipes and ports.
4. Release the master cylinder from the pedal box:
  - The top fixing bolt uses a Nyloc nut and flat washer on the inside of the box.
  - The lower fixing bolt uses a captive nut plate within the pedal box.

To Replace Seals

1. Thoroughly clean the exterior of the master cylinder assembly before commencing, in a clean environment, any dismantling operation.
2. Carefully withdraw the fluid reservoir spigots from the master cylinder grommets.
3. Remove the pushrod boot and the front piston stop bolt and washer.
4. Using a rounded end mandrel, press the rear piston into the cylinder sufficiently to relieve load on the cylinder end circlip. Remove the circlip and stop washer, and carefully remove the pistons and springs from the cylinder. If necessary, knock the cylinder against a wood or plastic surface to extract the front piston assembly.

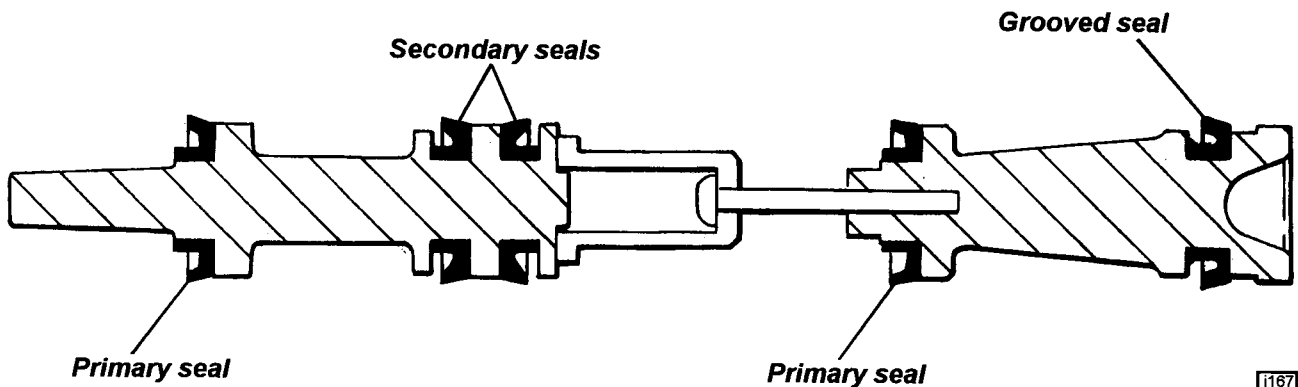


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5. Press the stop sleeve against the rear piston and release the screw retaining the sleeve. Remove the stop sleeve, screw, spring and spring seat washer. Carefully remove the primary seal and grooved seal from the rear piston.
6. From the front piston, remove the primary seal and the two secondary seals.
7. Thoroughly clean the cylinder bore, inlet and outlet ports, and all component parts using brake cleaning fluid or alcohol and blow dry with compressed air. Carefully inspect the master cylinder bore for scoring and corrosion. Any more than the slightest signs of either of these effects indicates that the unit should be renewed.
8. Thinly coat the cylinder bore with ATE Brake Cylinder Paste or ATE Brake Assembly Spray or a similar product, to facilitate assembly and prevent corrosion.
9. Before assembling the seals onto the pistons, note that three different seals are used, with the part number printed on the lip of each seal.

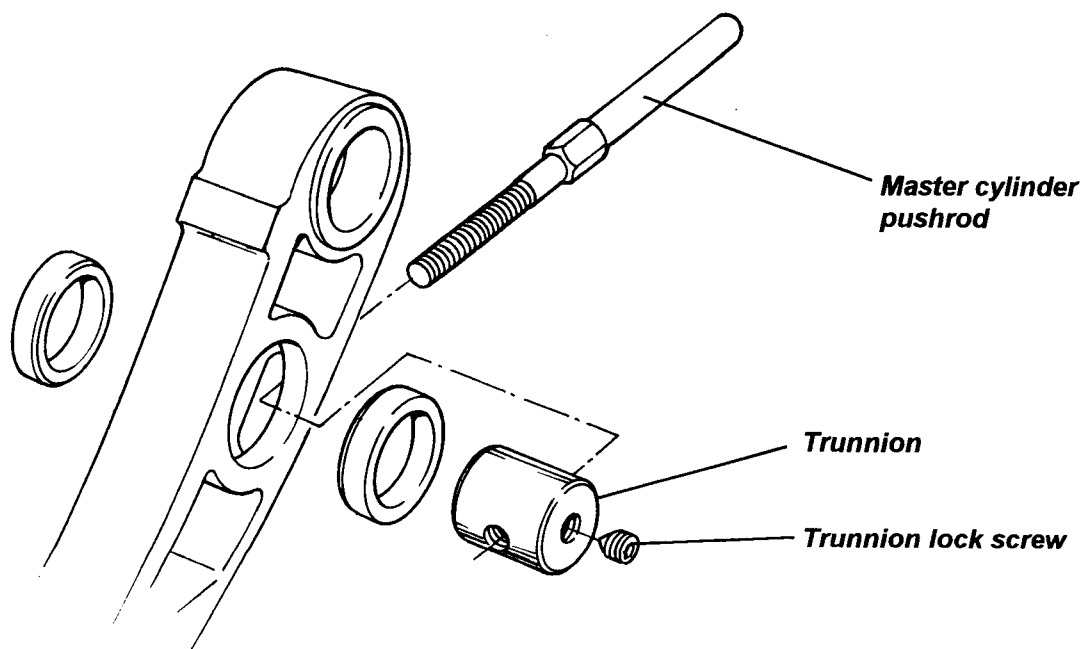
Primary seal	03.3301-1933.1
Secondary seal	03.3301-1934.1
Grooved seal	03.3402-1901.1



10. Assemble the front piston:
  - Fit a primary seal (03.3301-1933.1) into the front groove of the piston with the lip facing forwards.
  - Fit the support ring onto the piston nose to retain the seal and form a seat for the cylinder front spring.
  - Fit a pair of secondary seals (03.3301-1934.1) into the two grooves at the rear end of the piston, with the lip of the front seal facing forwards, and the lip of the rear seal facing rearwards.
11. Assemble the rear piston:
  - Fit a grooved seal (03.3402-1901.1) into the rear groove with the lip facing forwards.
  - Fit a primary seal (03.3301-1933.1) onto the front of the piston with the lip facing forwards.
  - Fit the spring support ring onto the piston spigot, spring and stop sleeve, and compress the spring to enable the retaining screw to be fitted and tightened.
12. Thinly coat all piston seals and the piston shoulders with ATE Brake Cylinder Paste or ATE Brake Assembly Spray or similar.
13. Fit the front piston return spring onto its seat on the front piston, and carefully insert the front piston assembly into the cylinder taking great care not to damage the lips of the forward facing seals.
14. Fit the rear piston assembly into the cylinder, again taking great care not to damage the lips of the forward facing seals. Using a rounded end drift, press the piston against its spring to enable the stop washer and retaining circlip to be fitted into the end of the cylinder.



15. Thinly coat the two reservoir spigots and sealing grommets with ATE Brake Cylinder Paste or ATE Brake Assembly Spray or similar, and insert the grommets into their locations in the master cylinder body. Fit the reservoir to the master cylinder with the two spigots fully inserted into their grommets. Ensure that the cap is positioned towards the rear with the clutch fluid take off on the left.
16. Lubricate the pushrod boot with rubber grease before fitting onto the end of the master cylinder, with its lip correctly located in the groove.
17. Fit the master cylinder assembly to the pedal box, inserting the brake pedal pushrod through the master cylinder boot to engage into the hollow of the rear piston. Retain with the two M8 bolts and tighten to 28 Nm (21 lbf.ft).
18. Check the pushrod length:  
The pushrod length must be adjusted to apply a slight preload to the master cylinder with the pedal released. Too much preload will not allow the reservoir port to open. Too little preload will allow free play and a rattle from the pedal:
  - Remove the locking grub screw (3 mm key) in the end of the pedal trunnion, apply PermaBond A131 threadlock, and refit loosley;
  - Screw the pushrod into or out of the trunnion until the pedal just contacts the pedal box flange (upstop).
  - Apply ½ turn of preload to the pushrod, and tighten the trunnion lock screw to 5 Nm.



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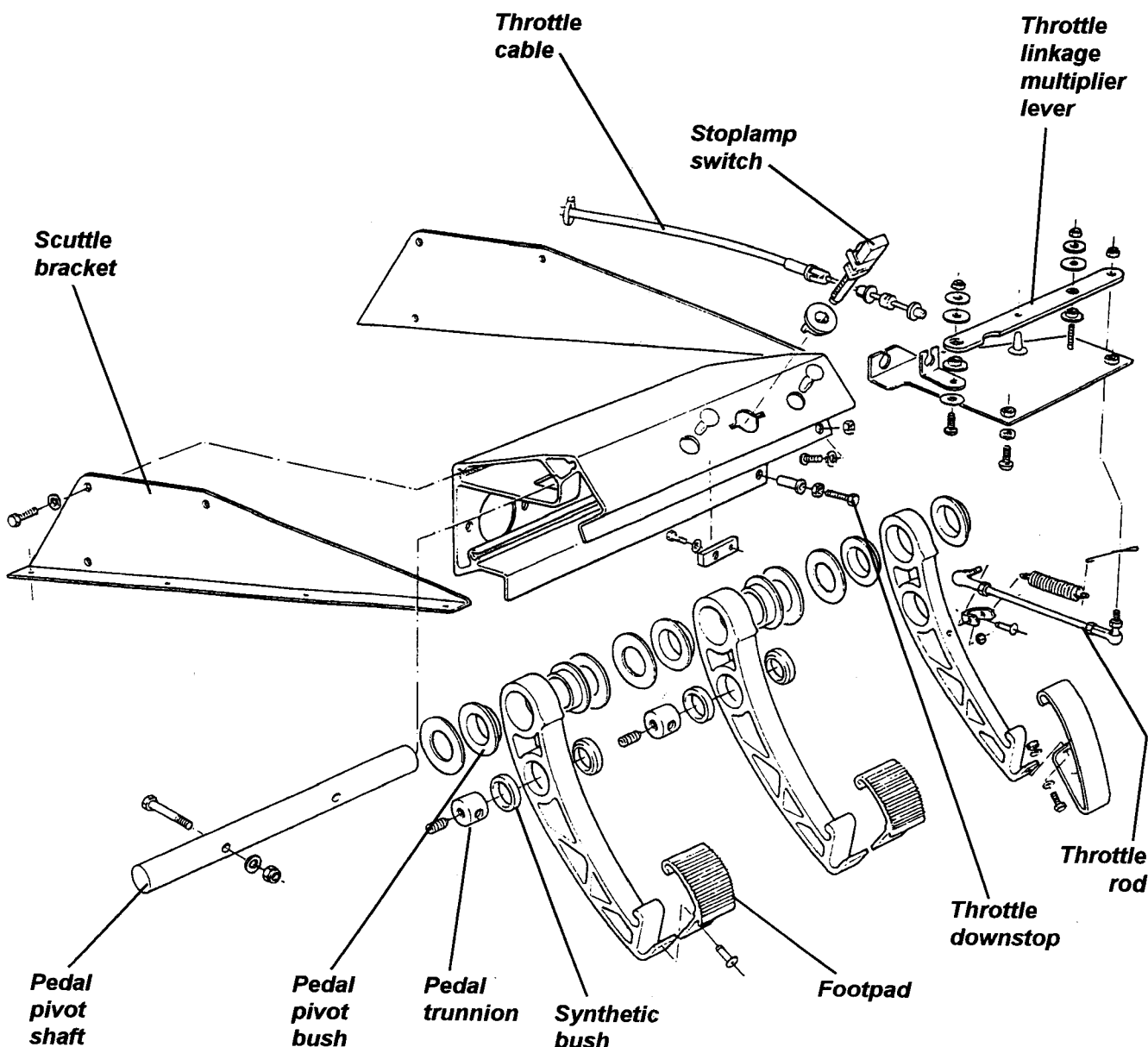
19. Check the stop light switch adjustment: With the pedal released, check that the switch plunger is depressed, with about 1 mm of the white plunger visible - or check the operation of the brake lamps. If necessary, twist the switch body 90° counterclockwise to release from the quickthread, and reset its position to achieve the desired result.
20. Connect the brake pipes to the cylinder; rear circuit to the rear port, front circuits to the two front ports. Fit the clutch fluid supply hose to the reservoir spigot.
21. Fill the reservoir with DOT 4 non-mineral type brake fluid, and bleed the complete brake system of air using standard vacuum assisted, pressure assisted or manual techniques.



J1.8 - PEDAL BOX

The extruded aluminium alloy pedal box is secured to the chassis scuttle via six horizontally disposed M6 screws, three fixing each side of the box to a vertical bracket, itself bonded and rivetted to the chassis. A steel pivot shaft is clamped into the pedal box, and serves all three pedals, which are themselves common alloy extrusions, with the throttle pedal being a narrower section than that used for the brake and clutch. An extruded footpad is keyed and bolted or rivetted to the bottom of each pedal. The brake and clutch pedals use cylindrical trunnions to actuate their master cylinder pushrods, with the bore for the brake pedal trunnion being machined nearer to the pedal pivot than that for the clutch pedal. Two synthetic bush rings are pressed into the pedal bores to provide a maintenance free pivot for the steel trunnions.

The throttle pedal uses a ball jointed rod, and multiplier lever to operate a throttle control cable which is routed along the cockpit centre, beneath the gear lever and parking brake lever trim panels.

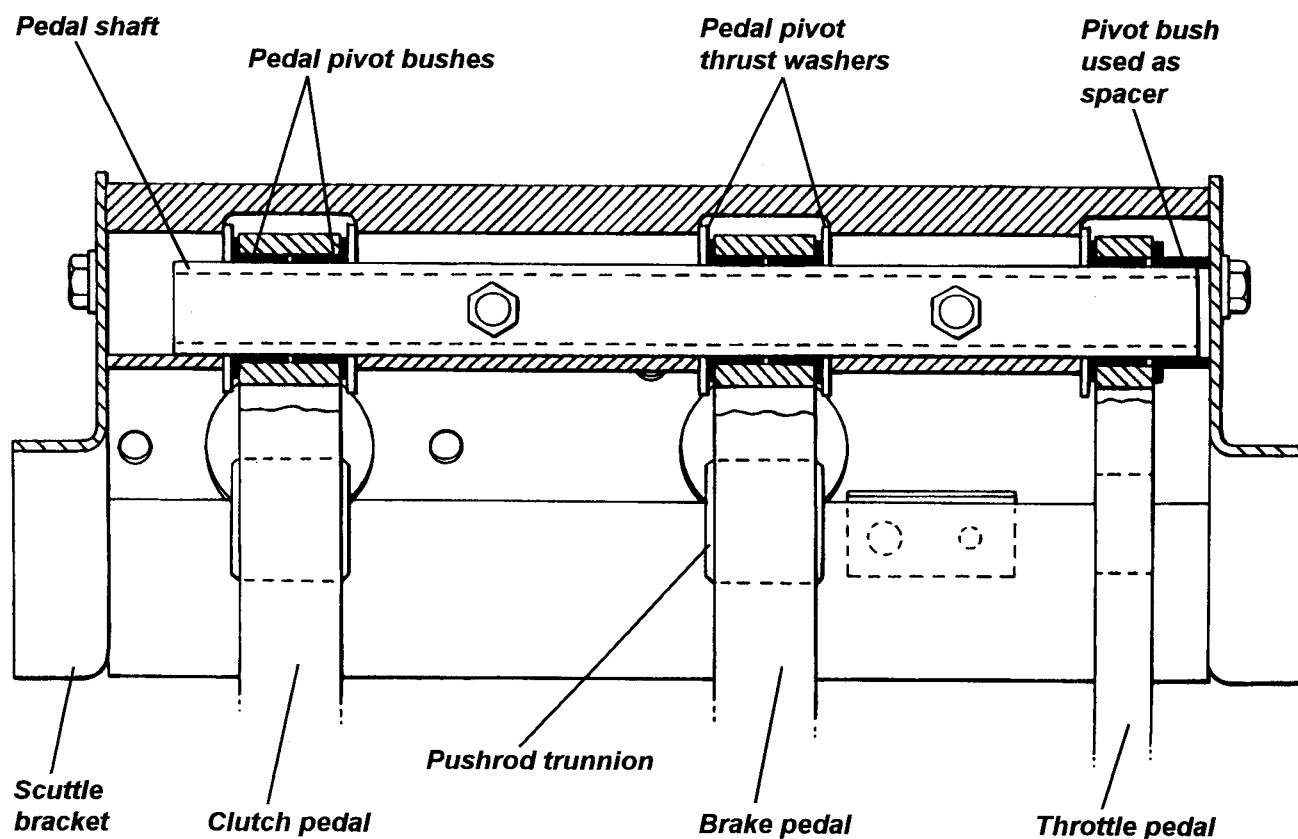


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The pedal box may be removed from the car complete with pedals, but to avoid hydraulic fluid loss and the necessity for subsequent bleeding, the brake and clutch master cylinders should be released from the pedal box before removal:

1. Release brake master cylinder from the pedal box (see sub-section JI.7) and ease the cylinder clear of the pedal box to disengage the pushrod, without straining the hydraulic pipes.
2. Release the clutch master cylinder from the pedal box: Remove the two Nyloc nuts and flat washers from inside the pedal box, and ease the cylinder clear of the pedal box to disengage the pushrod.
3. From within the footwell, release the ball jointed rod from the throttle pedal.
4. Twist and withdraw the brake light switch from the top rear of the pedal box.
5. Remove the upper and intermediate steering columns (see sub-sections HF.3 & HF.4).
6. Remove the three M6 screws securing each end of the pedal box to the scuttle beam brackets, and withdraw the complete pedal box downwards into the footwell. For access to the inboard fixings, it may be necessary to release, or modify, the climate distribution chamber
7. With the pedal box removed, the space bush and throttle pedal may be slid off the end of the pivot shaft. The shaft may be withdrawn after removal of its two retaining bolts, freeing the brake and clutch pedals and their thrust washers. Note that brake and clutch pedals are fitted with two 'top hat' section plastic pivot bushes, with a plastic thrust washer fitted each side of both pedals. The throttle pedal uses a single bush fitted from the inboard side, with a thrust washer on the inboard side and a pivot bush used as a spacer between the pedal and the scuttle bracket.

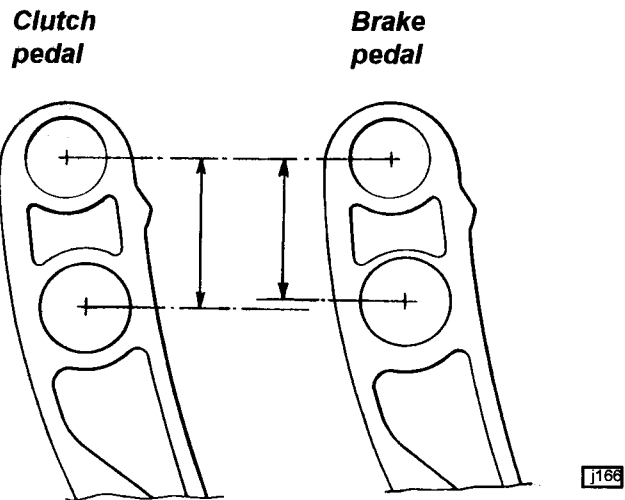


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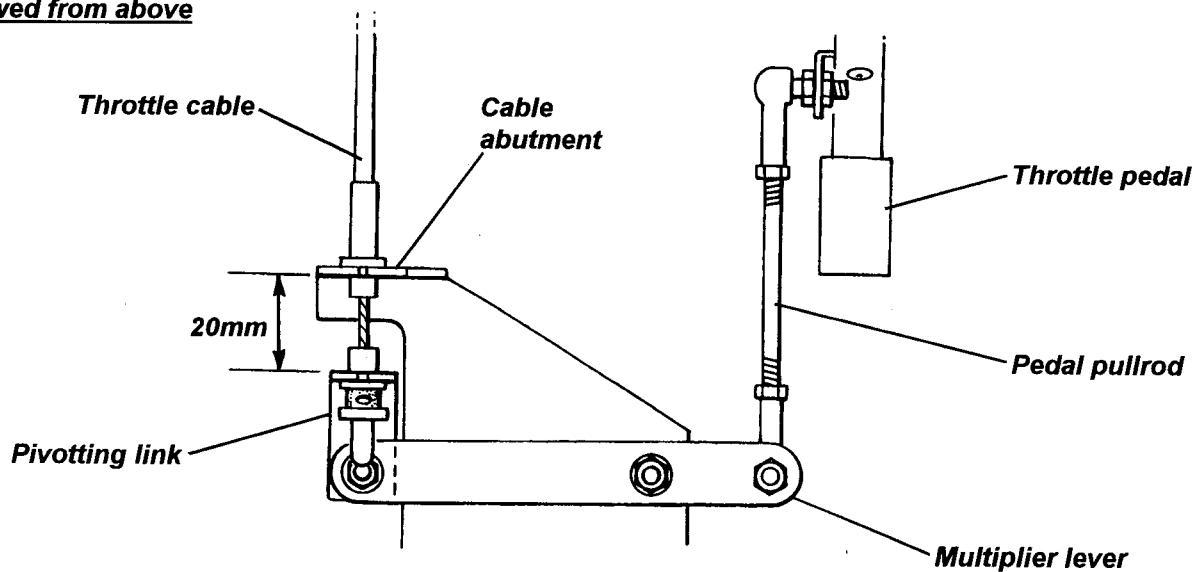
- 8. On re-assembly, note that no lubricants are used in conjunction with plastic bushes.

Take care to correctly identify the brake and clutch pedals: The bore for the pushrod trunnion is offset on the brake pedal towards the pivot.



- 7. Refit in reverse order to removal, adjusting the brake pedal pushrod as detailed in sub-section J1.7 and the clutch pedal in a similar manner. The throttle pedal upstop should be adjusted as follows:
  - Adjust the pedal upstop for a throttle pedal height approximately 30mm lower than the clutch and brake pedals.
  - Adjust the length of the ball jointed pull rod to achieve a gap of 20mm between the outer cable abutment and the inner cable pivoting link on the multiplier lever.
  - Adjust the cable slack at the engine end abutment as detailed in section EMN (or 'Lotus Check' operating instructions).
  - Adjust the pedal downstop so that full travel of the throttle butterfly can just be achieved without allowing the cable to be strained. Check that at full throttle, there is adequate clearance between throttle body quadrant and cable adjuster.

Viewed from above



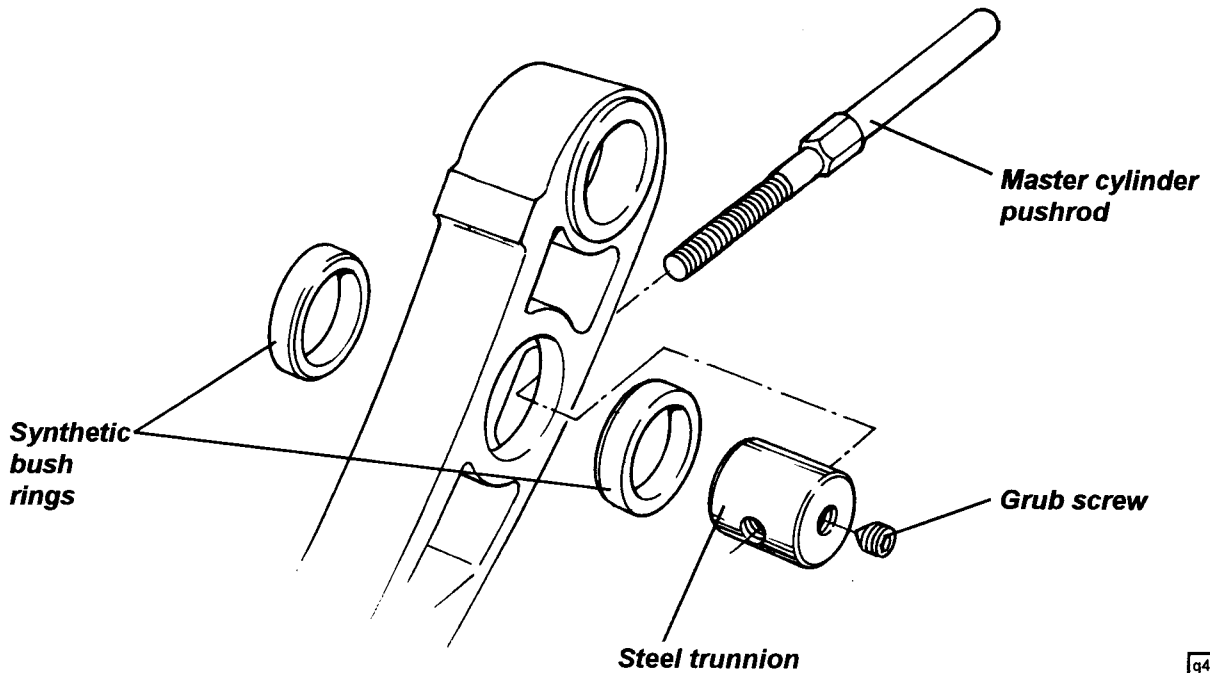
Torque Settings

	Nm
Pedal box to chassis	9
Brake master cylinder to pedal box	28
Clutch master cylinder to pedal box	28
Brake pipes to master cylinder	15



Pedal Trunnion Bushes

The brake and clutch pedals each use cylindrical steel trunnion to actuate the master cylinder pushrod, with the trunnion supported by two synthetic bush rings pressed into the pedal bore. The bush rings may be replaced with the pedal 'in-situ', by using a suitable bolt with clamp washers to press the rings into position, noting that each bush has an outer diameter chamfer at one end to aid insertion.

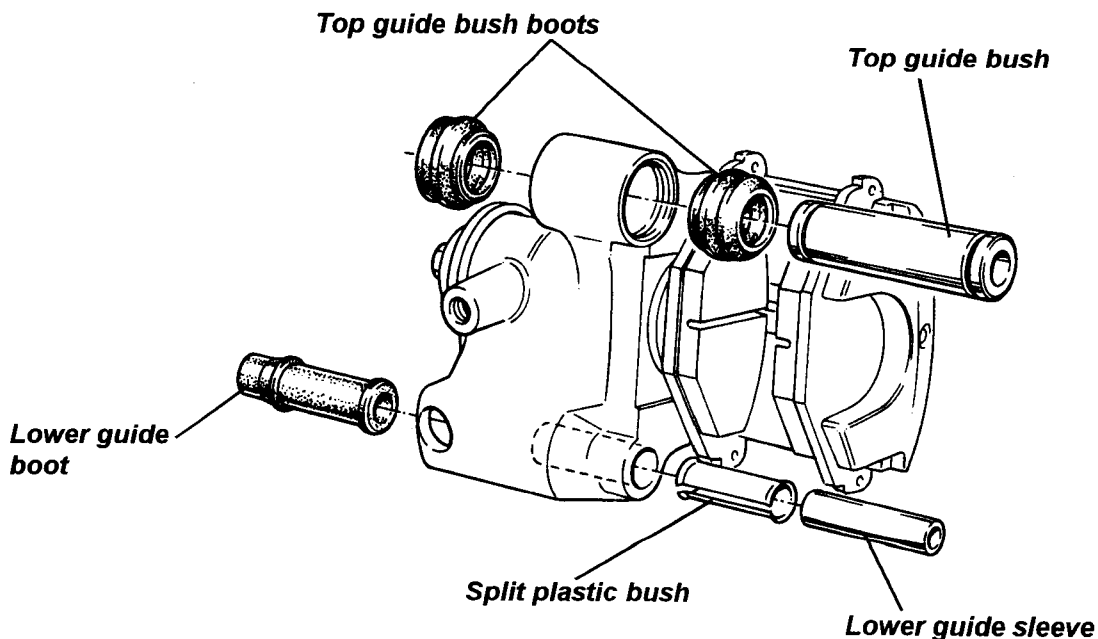


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J1.9 - CALIPER OVERHAUL

The front brake calipers are manufactured by A.P. Racing, and are to be dismantled or overhauled only by their factory at Wheeler Road, Seven Stars Industrial Estate, Coventry, CV3 4LB.

The Brembo rear brake calipers may have the sliding pins overhauled as detailed below, but any signs of hydraulic leakage from the cylinder indicate that the unit should be replaced.



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**Rear Caliper Sliding Pins**

The sliding bushes and sleeves of the Brembo rear calipers may be replaced without disturbing the hydraulic connection:

- a) Disconnect the parking brake cable from the caliper.
- b) Remove the cap head bolt securing the bottom guide bush to the hub carrier.
- c) Remove the hex. head bolt securing the top guide bush to the hub carrier, and withdraw the caliper from the car with the brake hose still connected.
- d) Slide out the lower steel guide sleeve and withdraw the bush/boot from the caliper. Pull the boots off the top steel guide bush and slide out the bush from the caliper.
- e) Clean the guide bores in the caliper body with brake cleaner. Lubricate the new bushes and boots with silicone grease provided in the repair kit, and reassemble into the caliper in reverse order to disassembly.
- f) Refit the caliper to the hub carrier using PermaBond A134 on the threads of both bolts, torque tightening the two fixings to:  
Upper M10 bolt;           45 - 50 Nm (33 - 37 lbf.ft)  
Lower M8 caphead;       26 - 30 Nm (19 - 22 lbf.ft)
- g) Reconnect the parking brake cable and operate the footbrake to reposition the pads before driving the car.

**Rear Caliper Sliding Pins**

The sliding bushes and sleeves of the Brembo rear calipers may be replaced without disturbing the hydraulic connection:

- a) Disconnect the parking brake cable from the caliper.
- b) Remove the cap head bolt securing the bottom guide bush to the hub carrier.
- c) Remove the hex. head bolt securing the top guide bush to the hub carrier, and withdraw the caliper from the car with the brake hose still connected.
- d) Slide out the lower steel guide sleeve and withdraw the bush/boot from the caliper. Pull the boots off the top steel guide bush and slide out the bush from the caliper.
- e) Clean the guide bores in the caliper body with brake cleaner. Lubricate the new bushes and boots with silicone grease provided in the repair kit, and reassemble into the caliper in reverse order to disassembly.
- f) Refit the caliper to the hub carrier using PermaBond A134 on the threads of both bolts, torque tightening the two fixings to:  
Upper M10 bolt;                    45 - 50 Nm (33 - 37 lbf.ft)  
Lower M8 caphead;                26 - 30 Nm (19 - 22 lbf.ft)
- g) Reconnect the parking brake cable and operate the footbrake to reposition the pads before driving the car.