

1966-72 ROVER – GIRLING

ROVER (WITH GIRLING)

Rover 2000 SC (1966-70)
 Rover 2000 TC (1966-70)
 Rover 3500S (1971-72)

DESCRIPTION

2000 Series – All service brakes are disc type and hydraulically operated by pressure developed in master cylinder. Front calipers are Girling type with two pistons and friction pads. Rear calipers are designed so one pad is in a fixed position and other is actuated. Structure is such that either hydraulic pressure or parking brake tappet can activate single piston. The single piston caliper incorporates a self-adjusting device to compensate wear. All models utilize a vacuum servo (power assist unit). If servo should malfunction, brake system would still function, however pedal pressure requirement would increase. A lever operated parking brake is mounted to floor and when applied locks rear drums. Locking is achieved when piston, activated via cables and levers, forces pads against rotor. Master cylinder is mounted to firewall and is originator of all brake circuit hydraulic pressure. Cylinders are either single piston type (up to 1968) or dual piston (tandem) type after 1968. Later model tandem master cylinders are fitted with a brake warning switch and indicator light that functions when one circuit loses pressure, fluid, or when parking brake is left on.

3500S Series – All service brakes are hydraulically operated and servo assisted. Vehicles are fitted with disc brakes in front and inboard disc on rear. Front brake calipers consist of three pistons, one on inner half of caliper and two on outer half. Rear calipers utilize one piston and two friction pads. One pad is directly acted on by piston, other is stationary. Single rear

piston is designed with an automatic wear compensator and a parking brake tappet. Rear piston can be actuated by hydraulic piston or parking brake tappet. Parking brake is situated in passenger compartment and is lever operated. When actuated, brake locks rear drums. A vacuum servo (power assist unit) is installed on all models to provide more efficient braking. If servo malfunctions, wheel cylinders (pistons) will still receive hydraulic pressure if enough foot force is applied. Vehicles are fitted with a dual circuit braking system which requires a tandem master cylinder. Cylinder works as a fail-safe feature when either circuit develops a pressure loss. A warning light is mounted to instrument panel to indicate pressure loss, excessive pad wear, and parking brake being engaged.

ADJUSTMENT

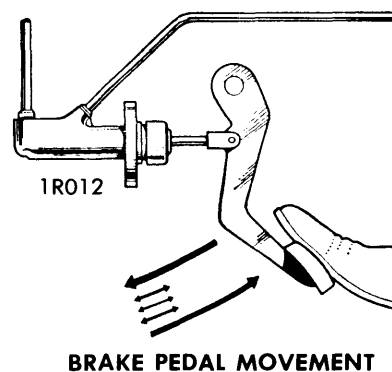
Disc Brakes – No adjustment required.

Parking Brake – No adjustment required.

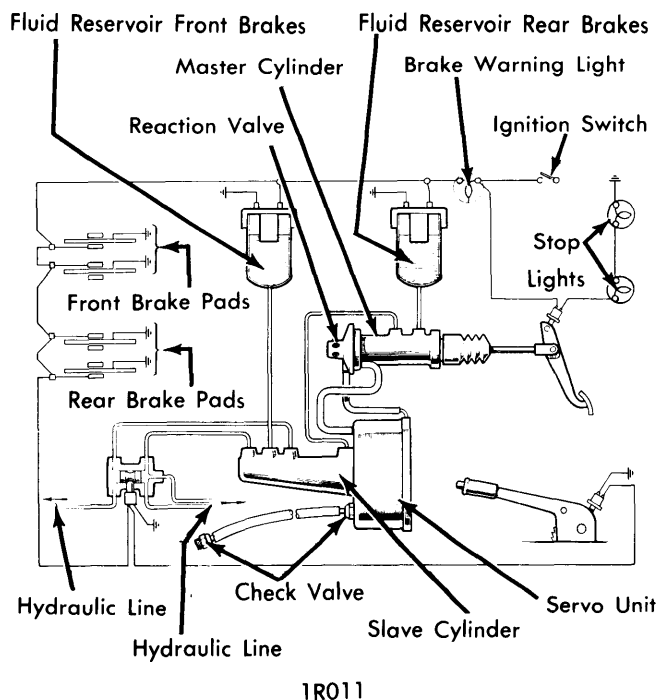
SERVICING

BLEEDING SYSTEM

Fill master cylinder and keep it at least half-full throughout entire operation. On 2000 models, begin bleeding with left rear caliper and end with one closest to master cylinder. Place a bleed tube over bleed screw and submerge free end into a half-full container of brake fluid. Open bleed screw and with a succession of rapid long and short strokes as shown in illustration, expel air from hydraulic system. Tighten bleed screw on last downward stroke when all air bubbles have ceased.



NOTE – Because of the dual circuit system used on 3500S models, only time both front and rear circuits must be bled is when lines to servo slave cylinder and/or pressure failure switch have been disconnected.



3500S HYDRAULIC SYSTEM

LINING REPLACEMENT (DISC BRAKES)

Removal (Front) – Raise front of vehicle and support on safety stands at jacking points; remove wheels. On 3500S models, disconnect pad wear warning light lead. Remove retaining clip and withdraw pad retaining pins. Extract friction pads complete with damper springs and shims. Pliers may be necessary to pull out pads. Mark each pad for reinstallation in original position.

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Inspecting & Cleaning – Check friction pads and if lining has worn down .125" (3 mm), they must be replaced. Ensure caliper cavity and piston have been completely cleaned.

Installation – Push piston to bottom of cylinder bore applying even pressure. Slide pads into position with damper shims. On 3500S models, shim with larger surface and pad with electrical lead fit on single piston side. Ensure arrow cut-out in shim points in direction of forward rotation. Refit damper springs on each pad and reposition pad retaining pins ensuring springs are clipped under pins. On 3500S models, reconnect electrical lead. Pump pedal a few times to align pads with rotor.

Removal (Rear) – Using suitable hoist, raise vehicle. Withdraw lock bolt and remove retainer plate and damper spring. On 3500S models, disconnect electrical lead. Swing top of inner pad forward and extract pad toward rear of vehicle. Bend back tabs on lock bolt at rear position and loosen to release spring. Pull caliper outward and remove pad.

Inspecting – Examine removed friction pads and replace if they have been worn .063" (1.5 mm).

Installation – 1) To achieve enough clearance for piston setting tool, proceed as follows: Disconnect caliper parking brake lever at link and link plates. Remove bolts mounting bracket for bellcrank lever. Allow parking brake to hang clear of calipers.

2) Push caliper toward center and install suitable piston tool (60192). Lock tool on piston and maneuver tool by pressing handle inward engaging serrations. Turn piston counterclockwise one turn and remove tool.

3) Smear piston with brake fluid and refit tool. Turn piston clockwise until clicking of ratchet can be heard. Before pulling out tool, ensure lever on piston is upright. To refit pads and parking brake lever, reverse removal procedures.

REMOVAL & INSTALLATION

BRAKE CALIPER

Removal (Front) – Raise vehicle and support with safety stands; remove tire and wheel. Disconnect fluid inlet line and secure out of way. On 3500S models, disconnect electrical lead. Plug all open hydraulic lines to prevent any dirt from entering line. Depress brake pedal and secure in position. Remove brake friction pads as previously outlined. Withdraw two bolts, spring washer and plain washer securing brake shield to caliper. Extract bolts and locking plate then lift caliper assembly from vehicle.

Installation – To install brake caliper, reverse removal procedure and tighten mounting bolts to specifications.

Removal (Rear) – Raise and support with safety stands under frame. Remove wheels and friction pads as previously outlined. Disconnect all parking brake linkage and support out of way. On right-hand caliper, disconnect fluid feed line and caliper crossover line. Remove stop pin for parking brake lever. Rotate lever inward and secure in place. If parking brake is pulled, tappet may drop down causing incorrect positioning. Using suitable tool, remove spring loaded plug and spring. Using Allen key, rotate pivot pin until it is unscrewed from bearing. Remove bearing from rear caliper and push pivot pin out toward front of vehicle. Caliper is now released and can be withdrawn.

Installation – To install brake caliper, reverse removal procedure, noting the following: Fit new "O" rings to bearing before pulling into place. Tighten spring loaded plug to 28-35 ft. lbs. Bleed hydraulic system.

BRAKE ROTOR (DISC)

Removal (Front) – Raise vehicle and suitably support with safety stands. Remove front caliper assembly as previously described. From the stub axle; remove the dust cover cap, cotter key and slotted nut. On some later model vehicles there is an additional lock nut. Remove plain washer and hub assembly complete. Extract the five bolts securing hub and rotor assembly. If necessary, a soft mallet can be used to separate hub and rotor. It is now possible to remove wheel bearings and seal. Carefully inspect all components and replace as necessary.

Inspecting – Using suitable dial gauge, inspect rotor runout. Runout should not exceed .003-.005" (.07-.12 mm). If specification is exceeded, reposition rotor on hub. Severely damaged rotors must be replaced.

Installation – After reassembling hub and rotor, reverse removal procedure for remaining components.

Removal (Rear) – Raise vehicle and suitably support vehicle at frame; remove wheels. Remove rear friction pads as previously described. Remove four bolts and lock plates securing drive shaft flange to final drive output flange. Carefully expand de Dion tube and allow the shaft to fall clear. Rotate disc until the dowel holes are parallel with caliper and ease disc off dowels.

Inspecting – Using suitable dial indicator, check rotor runout. Runout should not exceed .007" (.178 mm); replace as necessary.

Installation – To install rear rotor, reverse removal procedure and tighten all bolts to specifications.

MASTER CYLINDER

Removal (Single Piston Type) – Disconnect fluid feed line from master cylinder reservoir and plug opening. Remove vacuum line banjo bolt and remove pipe out of way. Remove hydraulic line from master cylinder and servo unit and plug opening. Remove nuts mounting master cylinder to firewall but do not lift off cylinder. Disconnect return spring from foot pedal. Release lock nut from push rod and screw rod through trunnion at same time as withdrawing master cylinder.

Installation – Set master cylinder on locating studs ensuring push rod correctly enters threaded trunnion in foot pedal assembly. This procedure may be facilitated by using a thin screwdriver. Screw push rod through trunnion until approximately 1" protrudes. After ensuring pedal and rod have free movement, tighten mounting nuts. Reinstall return spring and set pedal height to 6.5".

Removal (Dual Piston Type) – Before removing master cylinder, clean outside of housing, particularly the hydraulic fittings. Remove dipstick from engine sump and left-hand side elbow from air cleaner. Disconnect reservoir and move to one side. Disconnect fluid servo feed line at master cylinder. Disconnect air and vacuum lines from air control valve on

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master cylinder. Remove bolts securing master cylinder to sleeve and lift off leaving push rod in place.

Installation – To install master cylinder, reverse removal procedures, noting the following: Readjust brake pedal and bleed hydraulic system.

VACUUM SERVO UNIT

Removal – Disconnect and remove battery. Disconnect servo feed pipe and plug openings. Disconnect vacuum line at servo and hydraulic line from master cylinder. Separate servo from front bracket. Remove two nuts and spring washers mounting rear bracket to inner fender panel and bracket to servo pinch bolt. If necessary, remove nut securing brake fluid reservoir bracket. Remove servo and disengage bracket from servo.

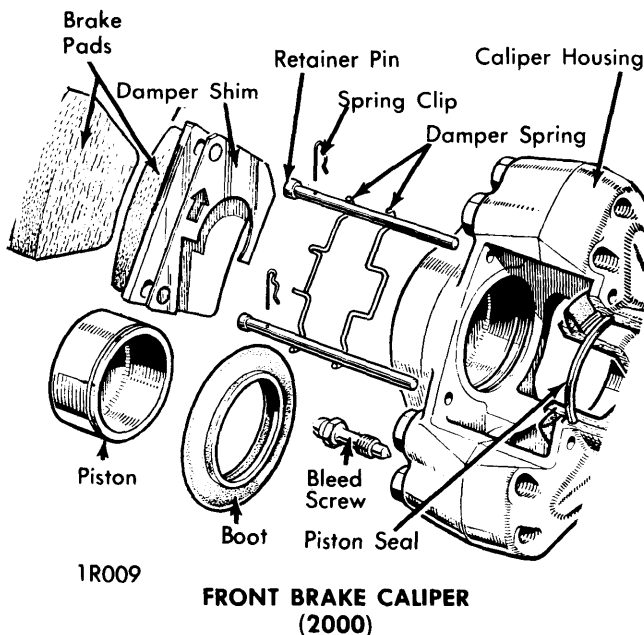
Installation – To install vacuum servo unit, reverse removal procedures and tighten all bolts. Bleed hydraulic system.

OVERHAUL

BRAKE CALIPER

NOTE – Do not separate brake caliper halves.

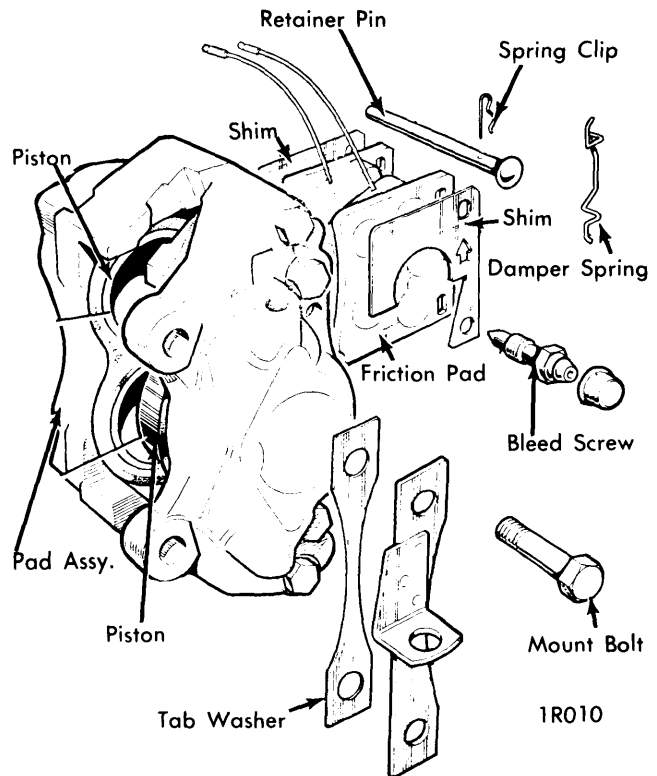
Disassembly, 2000 (Front) – Remove bleed screw and rubber boot from piston and caliper housing. Place a clean rag between the pistons. Apply air pressure to bleed screw hole and force out the outer piston. Using compressed air blown through feed line, force inner piston from its position. Remove inner sealing rings ensuring damage to bores and locating grooves is prevented.



Cleaning – Clean all components in approved grade brake fluid and inspect each one for damage or wear. Replace any parts found defective.

Reassembly – After cleaning all grooves in caliper bore, fit new sealing rings to large groove. Lightly coat piston and cylinder bore with brake fluid and fit rubber boot to housing ensuring that lip of boot is seated in small groove. Insert and seat piston in cylinder bore. Excessive pressure should not be required to complete this operation. Ensure sealing lip is located in piston groove. Replace bleed screw.

Disassembly, 3500S (Front) – Remove bleed screw and rubber boots from inner and outer pistons and caliper housing. Place a clean rag between the pistons and force compressed air into feed line to expel inner piston. Withdraw the two outer pistons after inner piston has been removed. Carefully extract inner sealing rings, taking care not to damage cylinder bores or locating grooves.



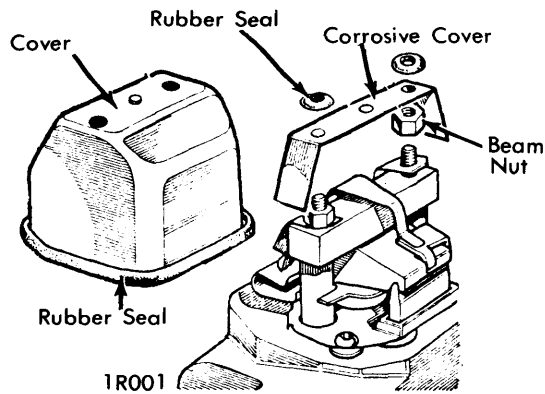
FRONT BRAKE CALIPER (3500S)

Cleaning – Clean all components in approved grade brake fluid and inspect each part for damage or wear. Replace any components found defective.

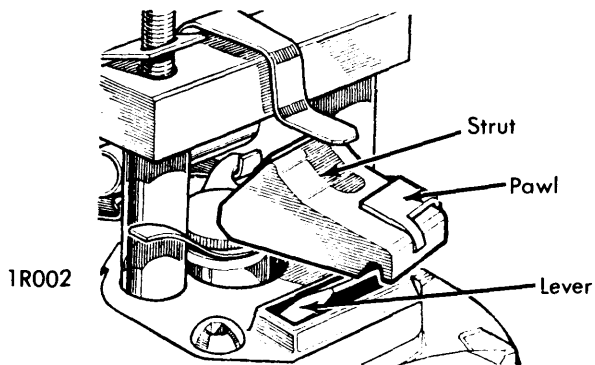
Reassembly – After cleaning all grooves in caliper bore, fit new sealing rings to large groove. Lightly coat piston with brake fluid and fit rubber boot to housing, ensuring that lip of boot is seated in small groove. Insert piston into bore, seating it into position. Excessive pressure should not be required to complete this procedure. Ensure sealing lip is located in piston groove. Replace bleed screw.

Disassembly (All Models) – 1) Remove mounting nuts and retaining cover. Lift off cover including rubber seals. Withdraw nuts mounting beam.

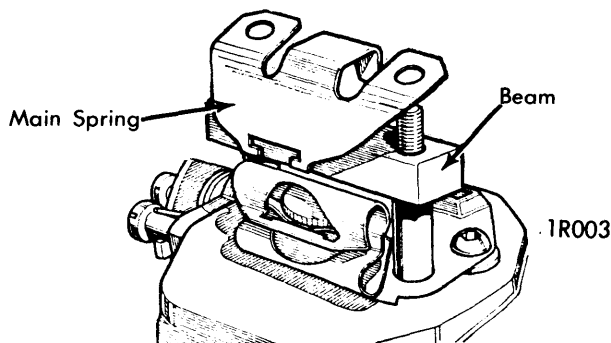
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1R001
CALIPER COVER

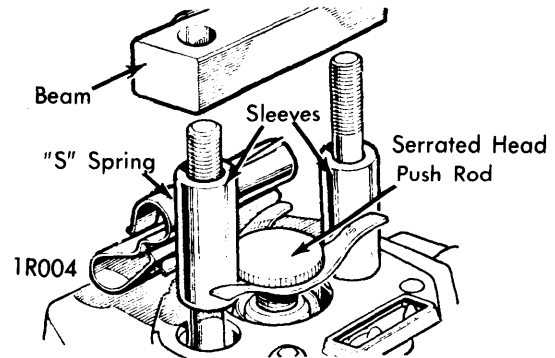
2) Mark strut to ensure reassembly in original position. To remove strut, lift lever and pull forward.

1R002
STRUT & LEVER REMOVAL

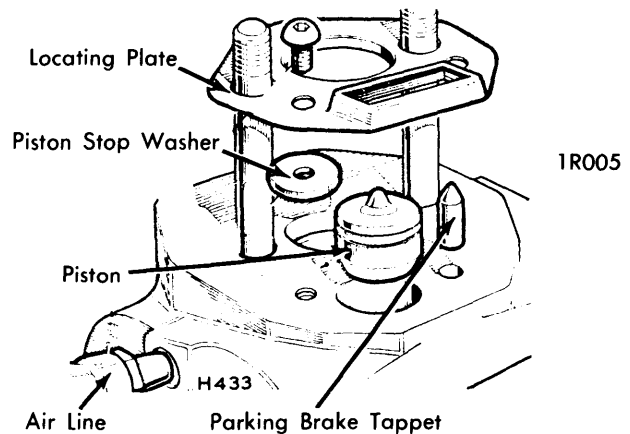
3) Push up piston from below and ease main spring over studs; beam can now be removed. Mark one sleeve and stud, then remove both sleeves. Detach "S" spring.

1R003
MAIN SPRING REMOVAL

4) Unscrew serrated head push rod and withdraw piston from bottom. Remove Allen screw, locating plate, and stop washer. Rotate parking brake lever ejecting tappet. Place a clean rag in cavity and apply air pressure to force piston from bore.

1R004
SLEEVE & SPRING REMOVAL

5) Unscrew stop pin and withdraw parking brake lever and shaft. Remove remaining retainers, seals, and drag pins.

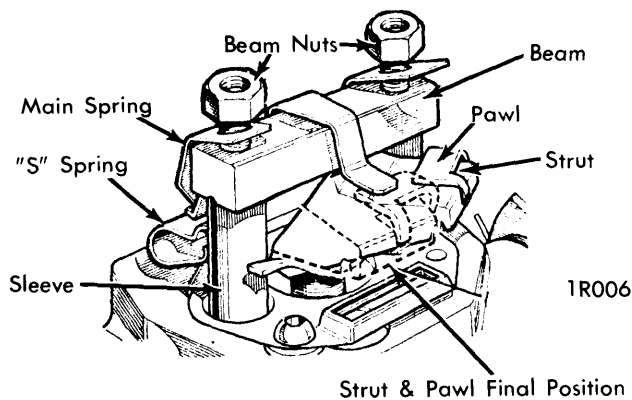
1R005
REMOVING INTERNAL COMPONENTS

Inspecting – Discard all rubber components, drag pins, and cover nuts. Clean all remaining parts in approved grade brake fluid and inspect for damage or wear; replace as necessary.

Reassembly – Fit new seal to hydraulic piston, so smaller diameter of seal is nearer pointed end of piston. Insert parking brake tappet: pointed end first. Screw in serrated head push rod three complete turns and install beam. Install pawl to lever and insert assembly, maneuvering as necessary to fit. When fitting pawl and lever assembly, it may be necessary to pull piston downward to gain easy entry. Tighten main spring

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mounting bolts to 28 ft. lbs. Check operation of parking brake; pawl should click as lever moves and serrated head of push rod should rotate one tooth on return. Seat piston and align lever so arm faces upward.



REASSEMBLY OF CALIPER

MASTER CYLINDER

Disassembly (2000) – Remove dust boot. Disengage circlip and withdraw push rod and dished washer. Forcing compressed air into inlet port, expel piston and valve assembly from cylinder. Carefully pry valve tangs of spring retainer clear of piston shoulder and withdraw piston. Compress retainer spring and position valve stem to align with larger hole in spring retainer; extract spring and retainer. Slide valve spacer over valve stem. Remove spring washer and valve seal from stem. Pull piston seal from piston.

Cleaning & Inspecting – Clean all components in approved grade brake fluid and inspect individual parts for excessive wear or damage. Replace any components found defective.

Reassembly – Reverse disassembly procedures, noting the following: Ensure seals are correctly installed, spring retainer prong is locked in position and dust boot is filled with suitable rubber grease.

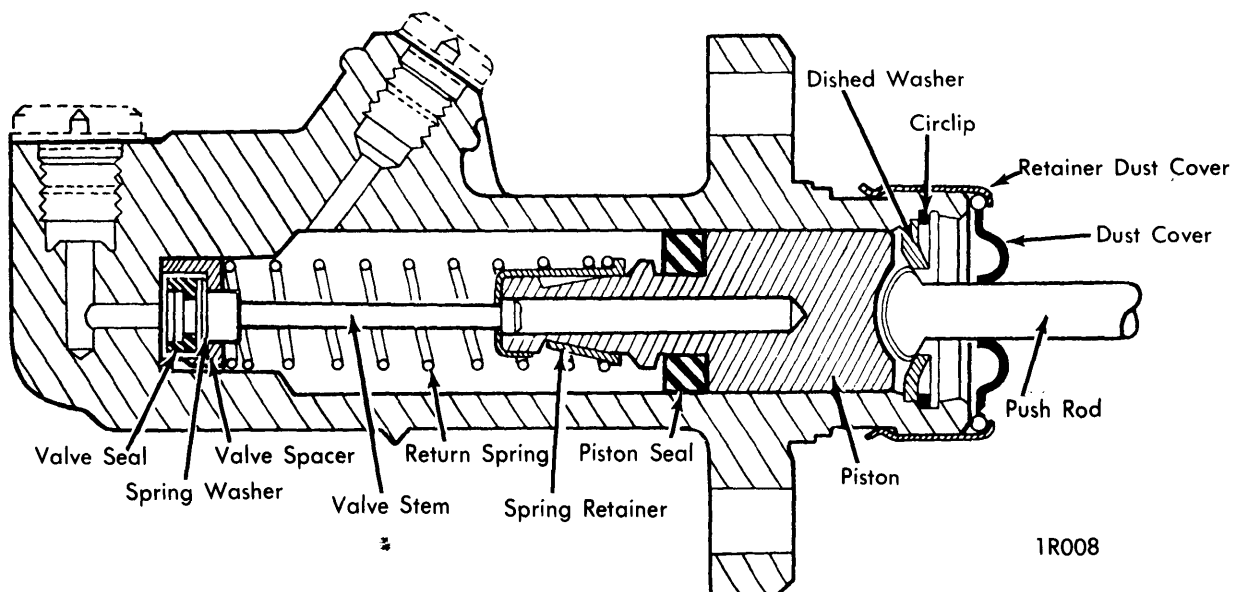
Disassembly (3500S) – 1) Mount master cylinder in soft jawed vise. Remove air valve assembly. *NOTE* – Air filter can be changed but air valve assembly must not be overhauled; it must be replaced.

2) Remove rubber diaphragm and plastic support to avail bolt attaching valve housing to mounting flange on master cylinder. Extract bolts and take off housing and gasket.

3) Remove boot, push rod, spring and retainer. Press piston down bore and remove circlip retaining plastic bearings. Withdraw piston assembly complete.

4) Remove inlet and outlet adaptors, copper washers, and trap valve with spring. Using a suitable blunt instrument inserted through outlet port, ease piston along bore until it can be removed by hand. *NOTE* – Do not attempt to remove valve piston from bore using pliers. Once out of cylinder, piston can be further disassembled.

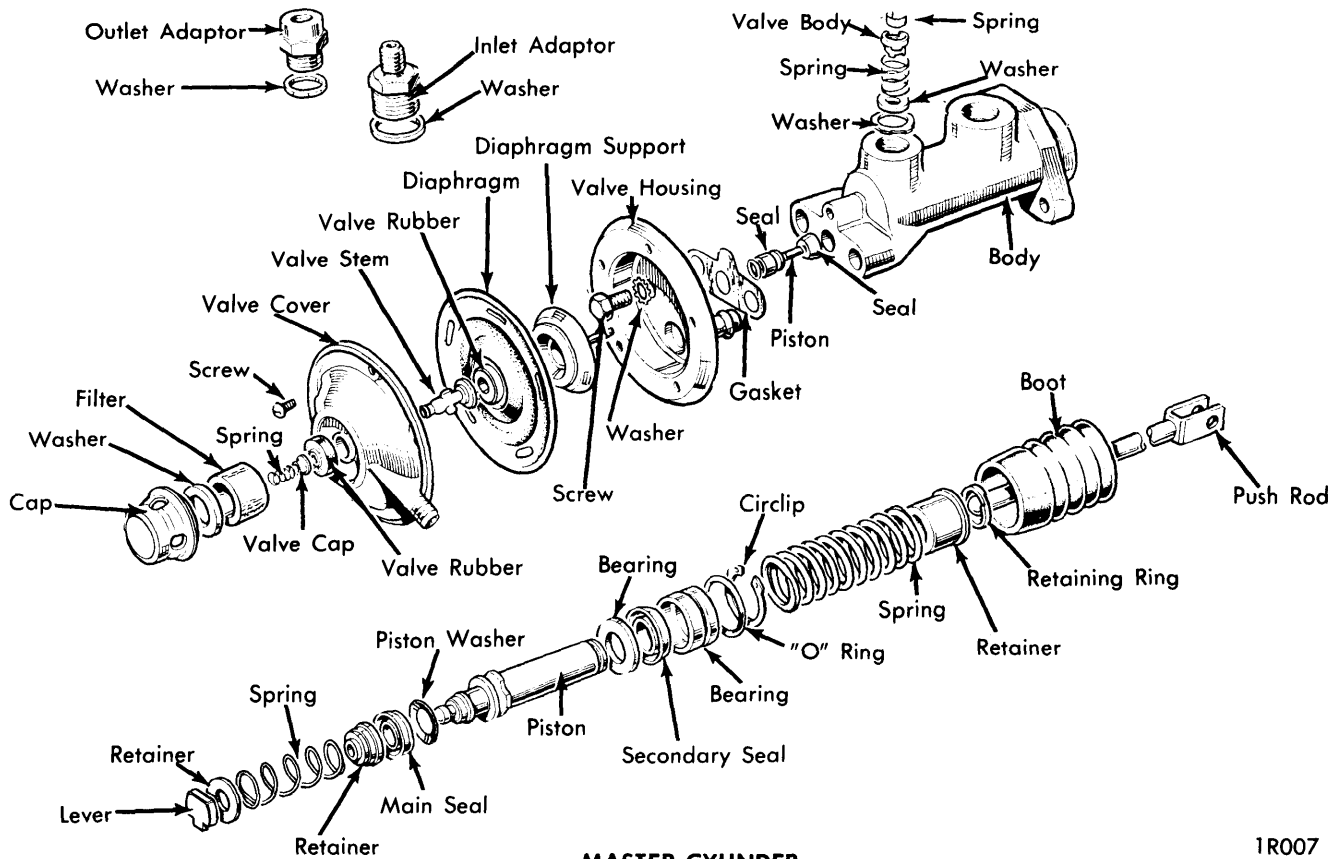
Cleaning & Inspecting – Soak all components in approved grade brake fluid. Carefully inspect each part and replace those found defective. If cylinder bore exhibits slightest imperfection, it must be replaced. Clean all passages in master cylinder ensuring none are obstructed.



MASTER CYLINDER (2000)

Brakes

1966-72 ROVER – GIRLING (Cont.)



**MASTER CYLINDER
(3500S)**

1R007

Reassembly – 1) Begin by inserting valve piston lever into bore with tab downward; ensure that tab drops into recess. Reassemble main piston and coat seals and bearings with brake fluid. Carefully insert piston assembly into cylinder bore. Install circlip.

2) Position return spring and retainer over piston and compress spring to uncover groove for "Sprilox" retaining ring. Slide push rod into boot, insert push rod and locate edge of boot into groove on end of cylinder.

3) Place trap valve body and spring into outlet port: spring first. Fit new copper washers to inlet and outlet ports. Install new seal on air valve piston with cup facing away from head. Install air valve and tighten nuts.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Caliper Mounting Bolts.....	60
Front Rotor Mounting Bolts (2000 Series).....	44
Pad Retaining Bolts	9
Drive Shaft Flange Bolts (2000 Series).....	85
Master Cylinder Outlets (3500S Series).....	33
Bearing Housing-to-Pinion Housing	30
Brake Caliper-to-Final Drive Bearing Housing	60
Disc-to-Front Hub.....	44
Rear Hub-to-de Dion Tube	20

BRAKE SPECIFICATIONS

Application	Measurement
2000 Series	
Brake Rotor Diameter	
(Front)	10.312"
(Rear)	10.690"
Std. Rotor Thickness	
(Front)505"
(Rear)380"
Caliper Cylinder I.D.	
(Front)	2.142"
(Rear)	0.75"
3500S Series	
Brake Rotor Diameter	
(Front)	10.82"
(Rear)	10.690"
Std. Rotor Thickness	
(Front)505"
(Rear)380"
Caliper Cylinder I.D.	
(Front)	⊙2.25"
(Rear)	0.75"

⊙ – Second piston 1.59".