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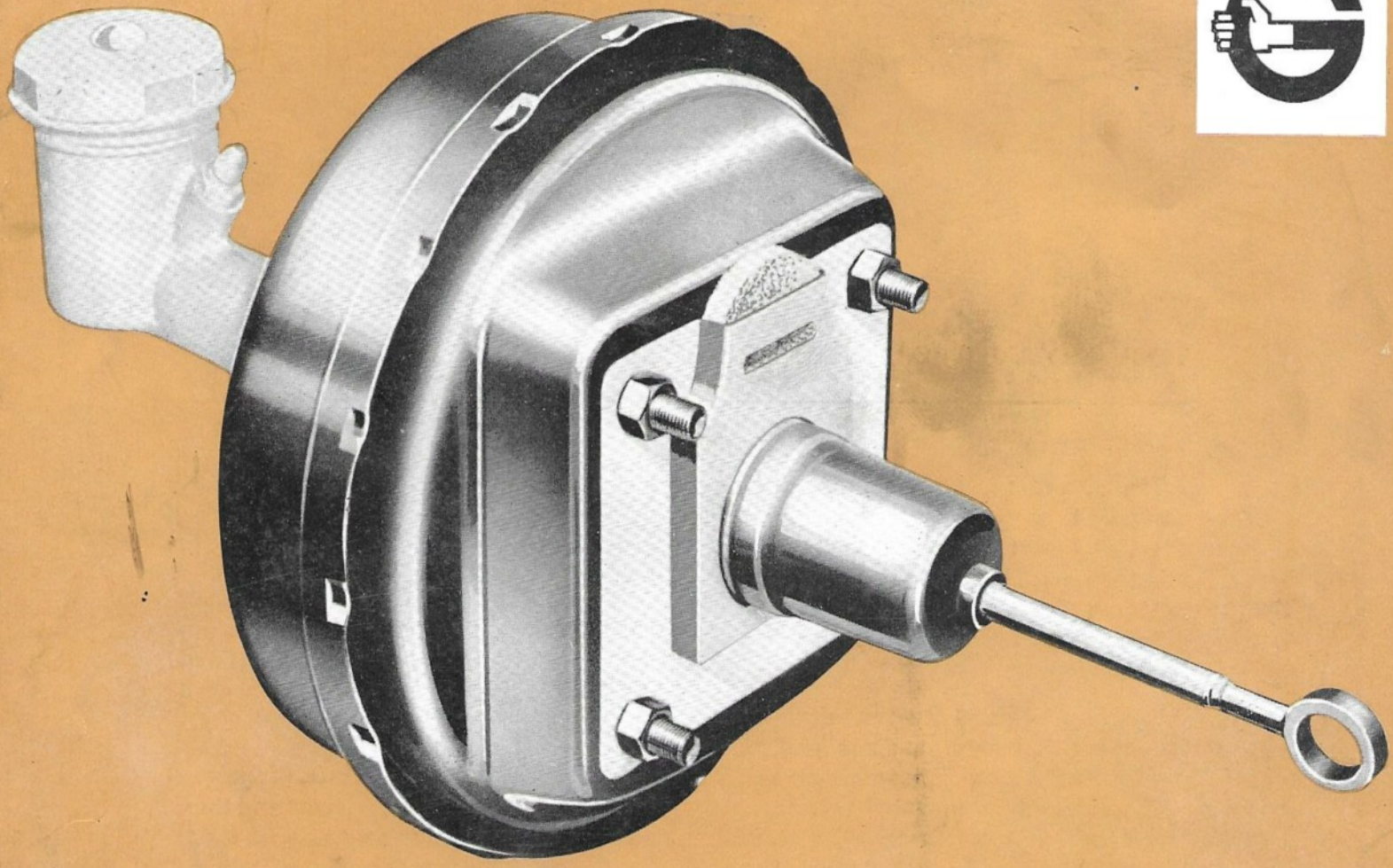
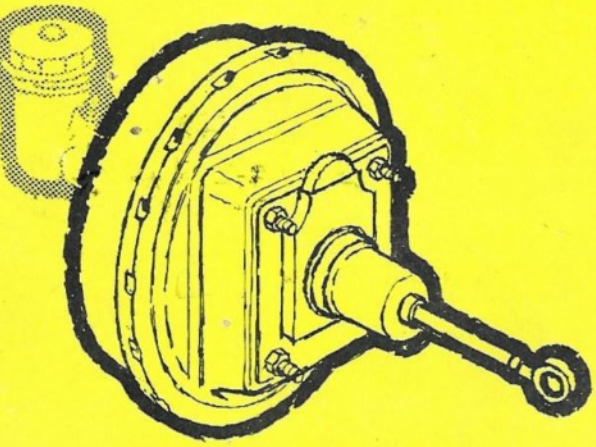




TECHNICAL INFORMATION ON THE SuperVac

for power assistance to hydraulic brakes

A GIRLING PRODUCT

SuperVac

by GIRLING

for power assistance to hydraulic brakes

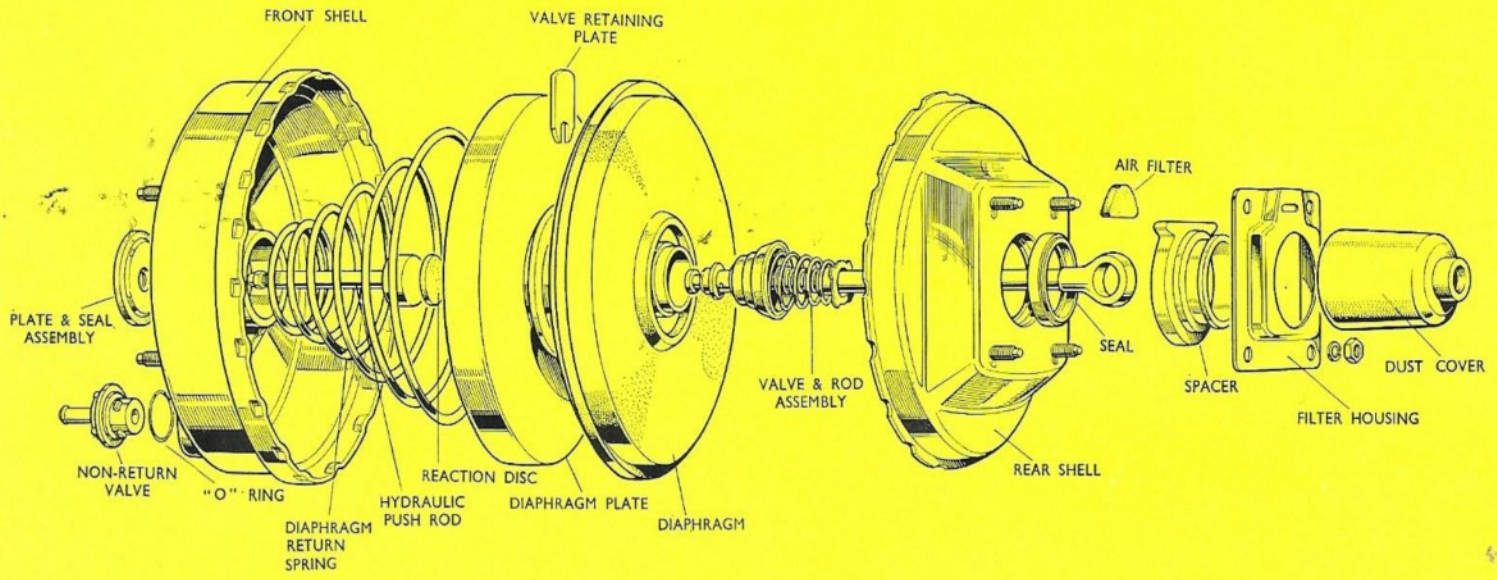
The Supervac is a Vacuum Servo Unit designed to assist the effort applied by the driver's foot on the brake pedal. It uses the vacuum created in the engine inlet manifold to boost force applied at the master cylinder push rod in an exact and controlled manner.

This booklet describes the principle by which the Supervac operates and also provides instructions for servicing the unit.

The assembly is mounted between the brake pedal and the master cylinder, with the push rod from the rear of the unit connected to the brake pedal, and a push rod from the front of the unit connected to the master cylinder.

The force which assists the pedal effort is obtained by admitting atmospheric pressure to one side of a diaphragm suspended in a vacuum. The difference in pressure moves the diaphragm and this movement is used in a controlled manner to augment the driver's pedal effort.

In the case of a vacuum failure, the valve and rod assembly of the Supervac and the hydraulic push rod act as a single push rod. The brakes will, therefore, work in the conventional manner, but more effort will be required on the brake pedal.



(Fig. 1.)

SuperVac

for power assistance to hydraulic brakes

A GIRLING PRODUCT

GIRLING SERVICE DEPARTMENT

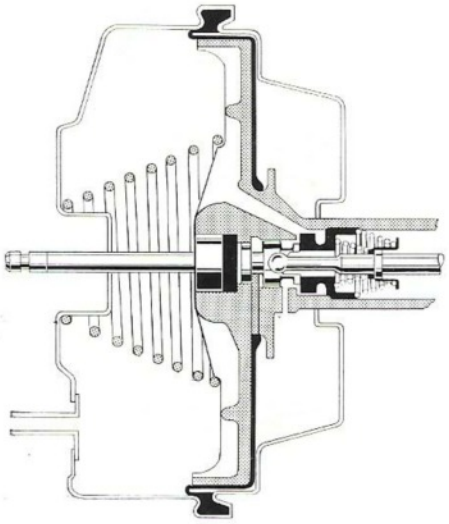
BIRMINGHAM ROAD - WEST BROMWICH

STAFFORDSHIRE

Group member Joseph Lucas (Industries) Limited

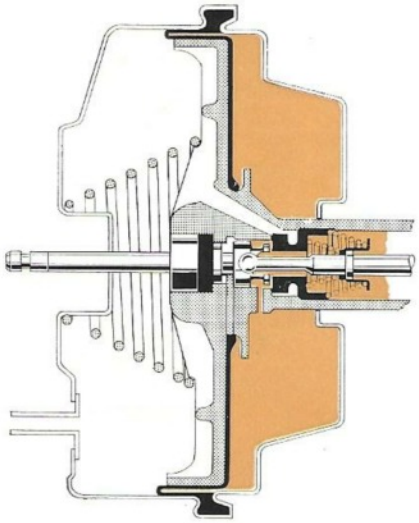
December 1964

method of operation



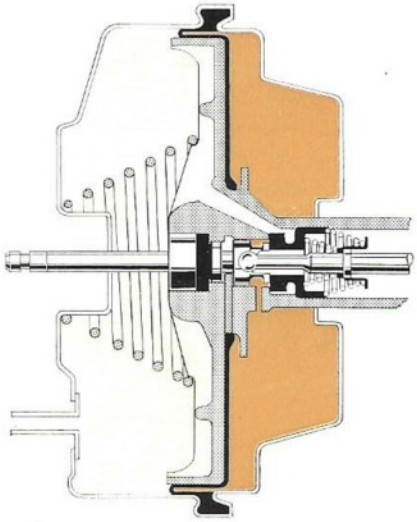
THE "OFF" POSITION (Fig. 2.)

With the brake pedal released, the vacuum port is open, the atmospheric port is closed and the diaphragm suspended in a vacuum. The pressure of the return spring holds the diaphragm in the "off" position.



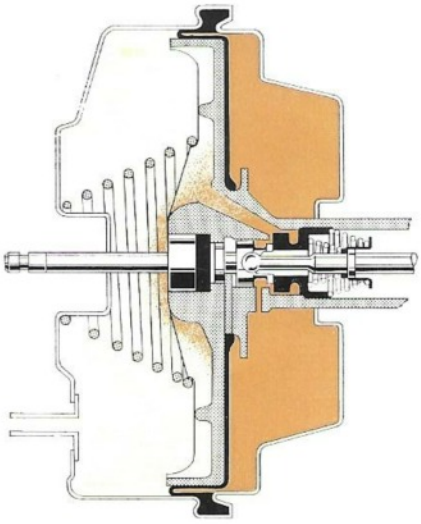
THE "APPLIED" POSITION (Fig. 3.)

When the brake pedal is depressed, the control valve moves forward inside the diaphragm. This movement closes the vacuum port and opens the atmospheric port which admits air to the rear chamber. With a vacuum in the front chamber and atmospheric pressure in the rear, the diaphragm moves forward, operating the push rod to the master cylinder.



THE "HOLDING" OR "HELD ON" POSITION (Fig. 4.)

When the pedal is held on, the reaction disc closes the atmospheric port and the diaphragm ceases to move forward. Any degree of brake application attained will be held until further movement of the brake pedal either opens the vacuum port or the atmospheric port, depending on whether the pedal is returned or depressed. When full power application is attained (emergency stop) the atmospheric port remains open until the pedal pressure is reduced.

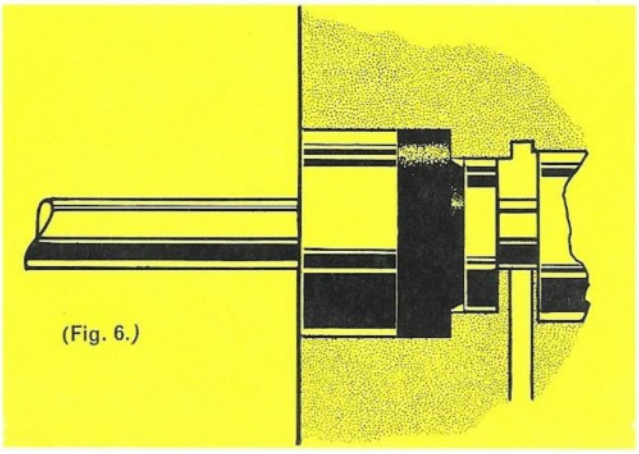


THE "RELEASED" POSITION (Fig. 5.)

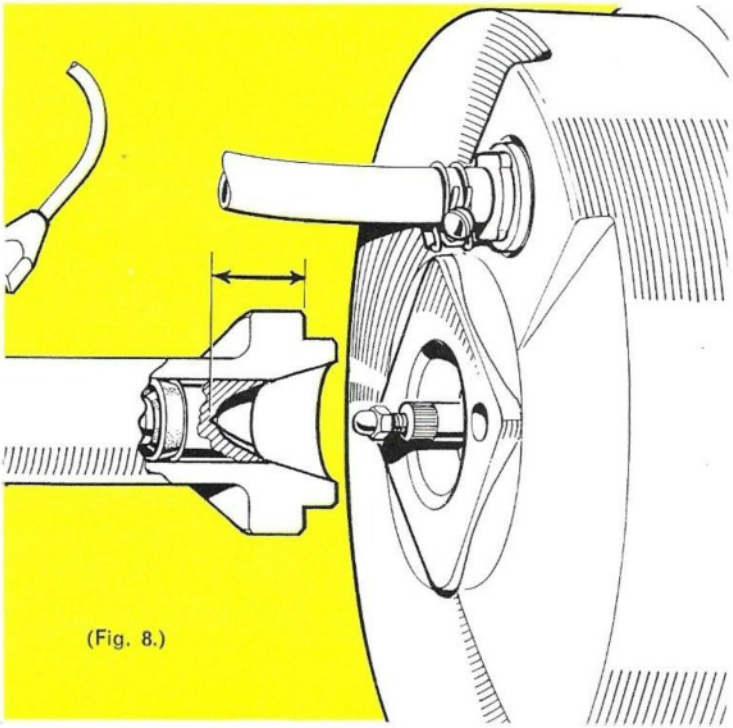
Upon release of the brake pedal, the atmospheric port remains closed and the vacuum port opens ; the valve and the diaphragm return to the "off" position as seen in fig. 2.

The Reaction Disc

This is the rubber disc located between the diaphragm and the master cylinder push rod. Its function is to govern the proportion of assistance provided by the servo unit. This is done by controlling the valve in the holding position (figure 4). When the brake pedal is held on, the diaphragm momentarily continues to move forward, compressing the outer edge of the reaction disc. This movement causes the centre of the disc to extrude (fig. 6), thus closing the atmospheric port.



(Fig. 6.)



(Fig. 8.)

method of adjusting the hydraulic push rod

The push rod must protrude from the front shell the exact distance to operate the master cylinder correctly. To determine this, it is necessary to measure the depth from the master cylinder flange to the recess in the plunger (fig. 8). The push rod must then be set to protrude from the front shell the same distance less $\frac{1}{16}$ in.

Before setting the push rod, vacuum must be introduced into the unit. To do this, connect a length of hose from the inlet manifold on the engine to the non-return valve and start the engine. Then proceed to set the push rod to the length already determined.

After the push rod has been correctly adjusted place two drops of grade ' B ' Loctite on the thread of the bolt to secure the bolt into the push rod.

Refit the master cylinder and tighten the securing nuts to 17 lb./ft.

testing the unit after servicing

1 Check all brakes for locking on by rapidly applying the brake pedal several times and then checking to see if all wheels are free.

2 Check for vacuum hold by starting the engine and allowing it to run for several minutes to build up a working vacuum in the unit.

After 10 minutes apply the brake pedal and the entry of air into the unit should be heard. This means the unit is holding vacuum and is working correctly.

The filter must be replaced every 20,000 miles (37,500 kilometres). This will reduce the risk of foreign matter entering the unit and causing damage or contamination to the rubber components. The rubber dust cover should be examined at this mileage and if any deterioration is apparent, it should be replaced.
The only other serviceable components are the hydraulic push rod, non-return valve, seal and plate (front shell) and the reaction disc. If a failure occurs on a component other than those already described, then a replacement unit must be fitted.
The two halves of the shell are assembled under pressure and should not be disturbed in service.

replacing the seal and the plate (front shell)

Ensure that all vacuum has been exhausted from the unit by depressing the brake pedal three or four times. Remove the master cylinder from the unit then carefully withdraw the push rod. The plate and seal will come away with the push rod and in some cases it will be found that the reaction disc has adhered to the end face of the push rod. If this occurs, remove the reaction disc from the face, clean, re-grease using Girling servo grease part number 64949008 and carefully re-fit into the diaphragm plate. Care must be exercised when carrying out this operation, for if the reaction disc is allowed to fall into the unit it is impossible to retrieve without opening the unit, which will therefore necessitate a replacement unit being fitted.
SHOULD THE REACTION DISC FALL INTO THE UNIT, UNDER NO CIRCUMSTANCES MUST THE UNIT BE USED.

To fit the new seal and plate assembly, lubricate thoroughly with Girling servo grease part number 64949008 and slide it over the hydraulic push rod. Slide the seal down the push rod into the recess in the front shell pressing the edge of the seal to make sure it fits perfectly.

replacement of the non-return valve

Using a $1\frac{1}{8}$ in. A/F Spanner, turn the valve anti-clockwise a quarter of a turn and then withdraw it from the unit. Care should be taken when rotating the valve to ensure that the stop tags in the shell are not sheered off.
To fit the new valve, reverse the above procedure ensuring that the rubber " O " ring is correctly positioned. The " O " ring must not be greased under any circumstances, as difficulty would be experienced locating it when tightening the non-return valve.

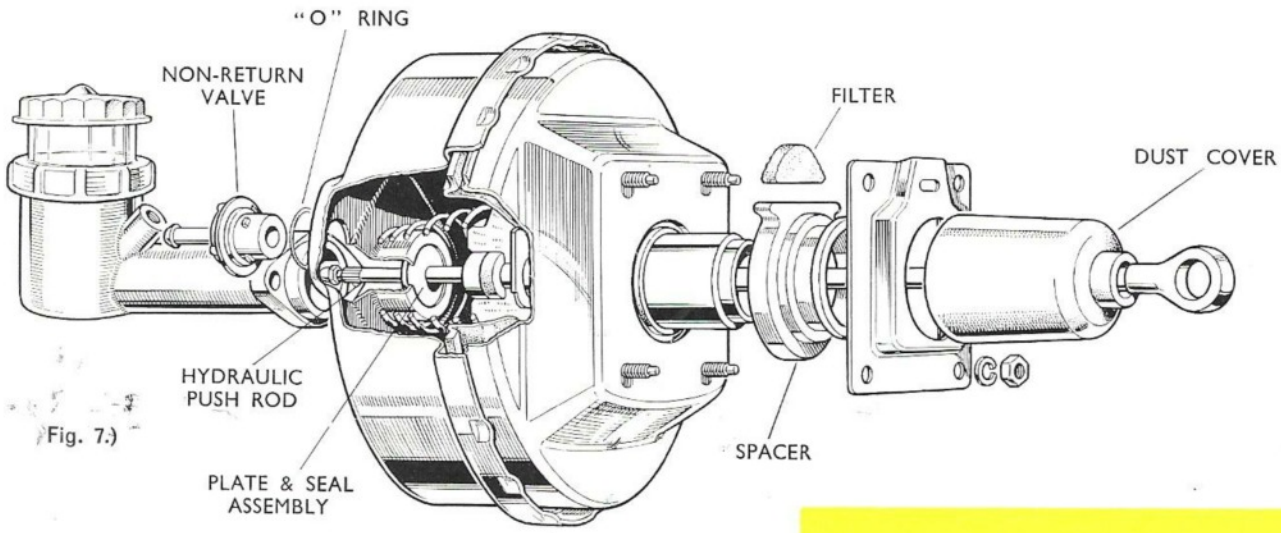


Fig. 7.)

Hydraulic Push Rod

The clearance between the hydraulic push rod and the master cylinder plunger is adjusted by turning the small adjusting bolt at the end of the hydraulic push rod. This adjusting bolt is locked in position by two drops of grade 'B' Loctite placed on the thread after adjustment has been completed.

When a new push rod or a new master cylinder are fitted to the Supervac, the clearance between the push rod and the master cylinder plunger must be checked. This clearance is critical because maladjustment will cause brake bind or excessive pedal travel, and difficulty in bleeding the system.

Girling supervac

1

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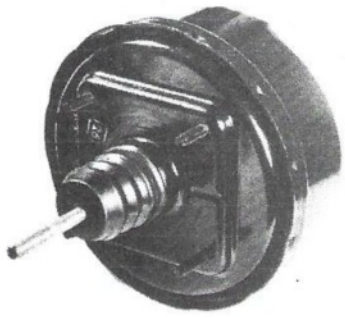


A 0383/4

Introduction

The Girling Supervac is a mechanical servo unit designed to provide controlled power assistance to the effort applied by the driver's foot to the brake pedal.

Power supplied by the unit is obtained from vacuum created in the engine inlet manifold. The vacuum is applied to both sides of a diaphragm and by admitting atmospheric pressure to one side of the diaphragm, the power is obtained.

Mounted between the brake pedal and the master cylinder, the unit is connected to these parts by push rods. Should a vacuum failure occur, the two push rods act as a single rod and the brakes will therefore work in the conventional manner; but more effort will be required on the brake pedal.

There are four basic Supervac units in service. These are the Type 28 (Fig. 1); Type 38 (Fig. 2); Type 50 (Fig. 3) and the Tandem Supervac — which is fully described and illustrated on page 6B3. The major difference between the types 28, 38 and 50 is the size of the vacuum pots. These details and the boost ratio of the units are listed below.

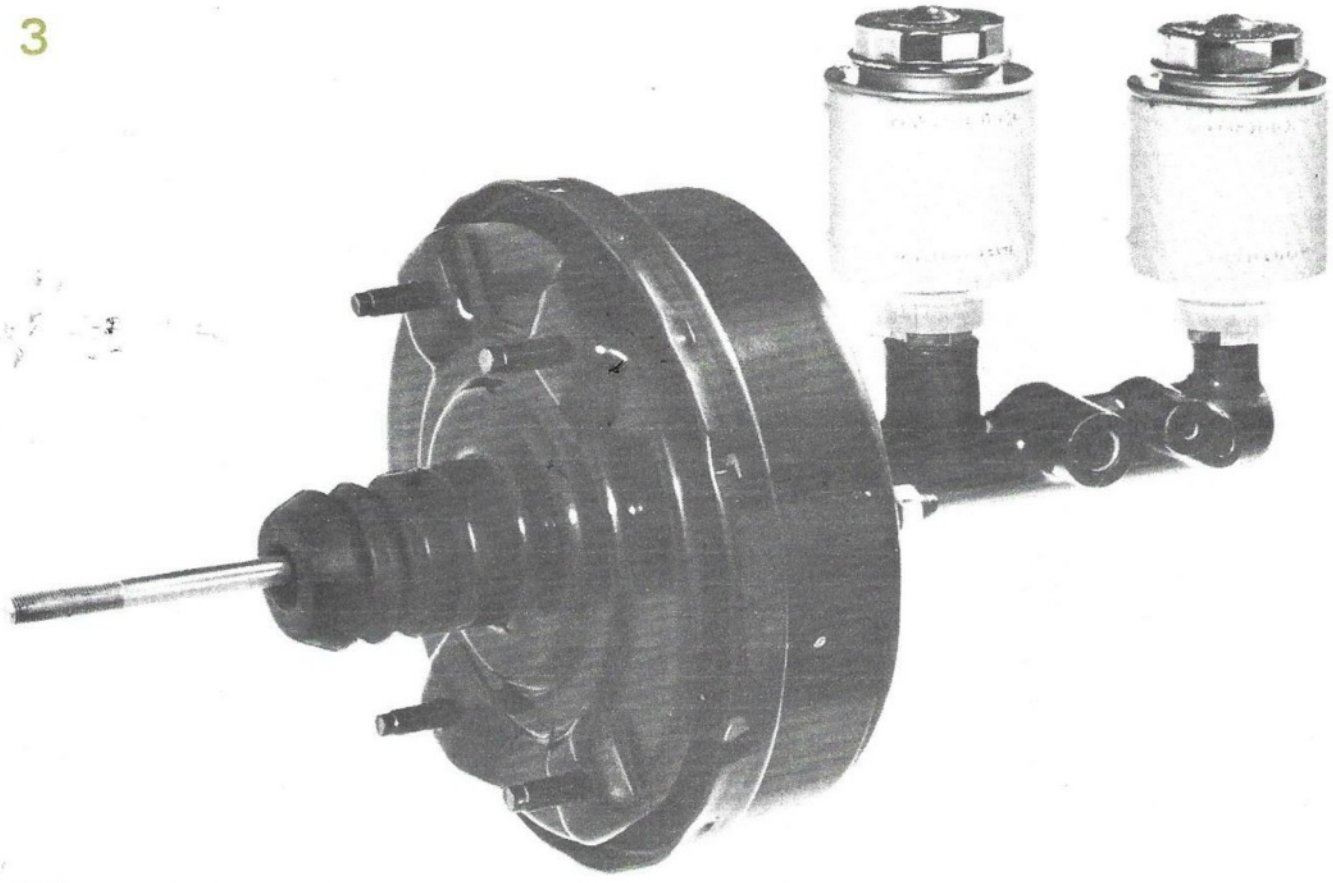
TYPE 28 Boost ratio 2.2:1 Dia. of Vacuum Pot 6½" (165 mm)
TYPE 38 Boost ratio 2.2:1 Dia. of Vacuum Pot 7½" (190 mm)
TYPE 50 Boost ratio 3.02:1* Dia. of Vacuum Pot 8½" (216 mm)

*A few units were manufactured with a boost ratio of 2.2:1

The type 28 and 38 have the same boost ratio of 2.2:1, but the type 38 has a larger vacuum pot so that the unit provides power assistance over a greater range. There are straight and angled non-return valves for all three types and the design of the push rod - which is attached to the brake pedal - is varied to suit the vehicle manufacturer's installation.

The Supervac unit is usually a part of the original brake equipment and each installation is approved by Girling engineers.

3

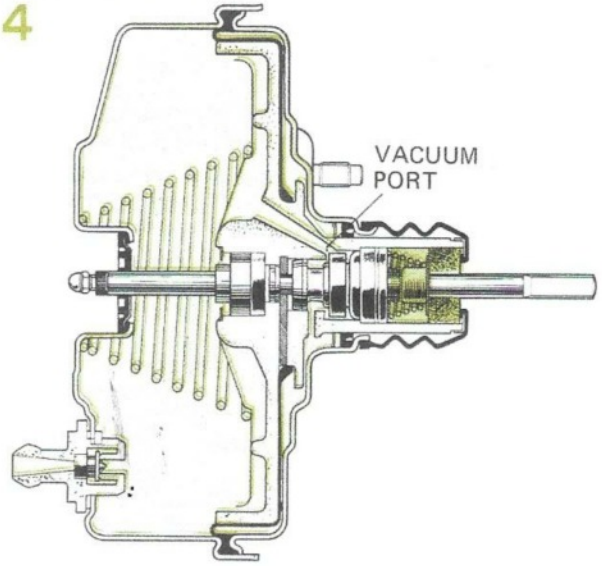


A 0387

Girling supervac

How it works

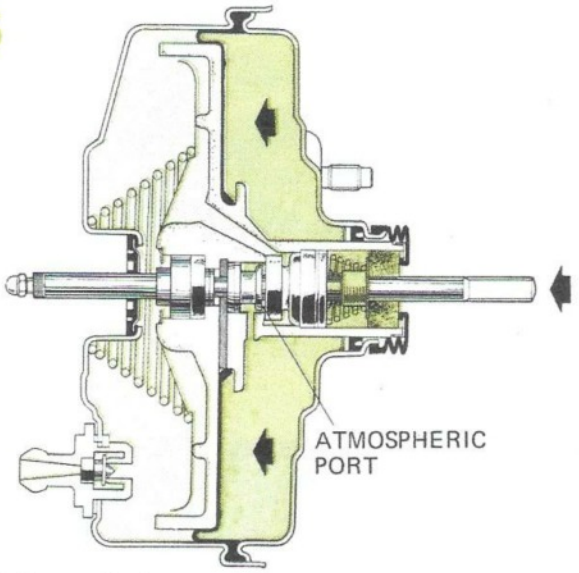
4



Brake off

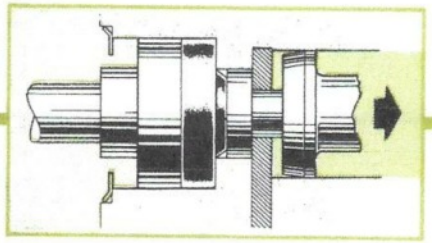
The diaphragm is fully recuperated and is held against the rear shell by the diaphragm return spring. The input rod assembly is also fully recuperated by the brake pedal return spring within the diaphragm plate, as far as the stop key, or valve return plate will allow. With the input rod in this position the vacuum port is open and there is a vacuum each side of the diaphragm.

5



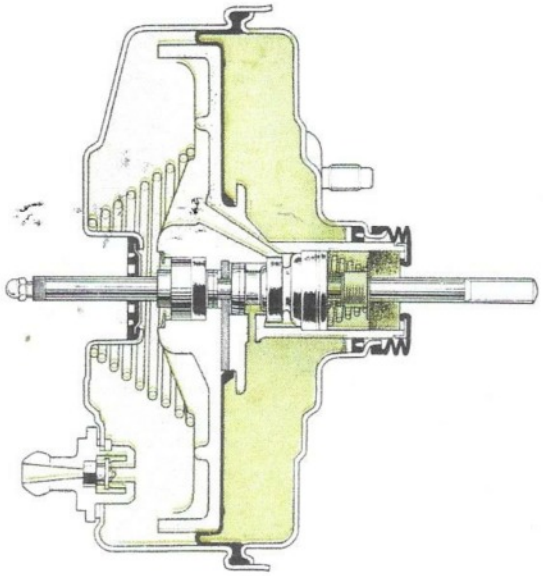
Brake applied

When the brake pedal is depressed, the input rod assembly moves forward inside the diaphragm plate until the control valve closes the vacuum port; at this juncture vacuum is still present on each side of the diaphragm. As the input rod continues to move forward, the control piston moves away from the control valve, opening the atmospheric port which is formed between these two parts. Atmospheric pressure then enters the rear shell behind the diaphragm and assists the input rod in pushing the diaphragm plate forwards and thus the output rod actuates the master cylinder plunger.



VACUUM AIR

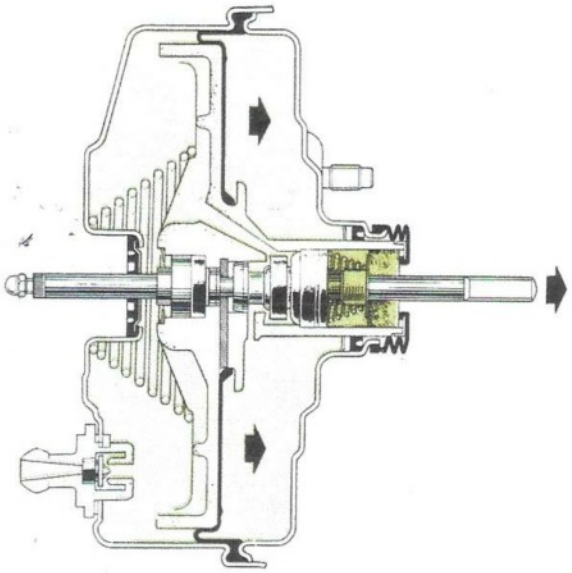
6



Brake held on

When the brake pedal is held on, the diaphragm will momentarily continue to move forward and so compress the outer edges of the reaction disc. This movement causes the centre of the disc to extrude, pressing back the input rod (see inset above) and thus closing the atmospheric port. Further movement of the brake pedal either opens the vacuum port or the atmospheric port, depending on whether the brake pedal is released or depressed.

7



Brake released

Immediately the brake pedal is released, the vacuum port is opened and the atmospheric pressure in the rear chamber is extracted into the front chamber and from there to the inlet manifold via the non-return valve. The atmospheric port remains closed whilst the input rod assembly returns to its original position, as shown on Fig 4, assisted by the diaphragm return spring. The diaphragm is then again 'suspended' in vacuum until the brake pedal is depressed.

Girling supervac

Servicing (Fig. 8)

The parts available to service the unit are; filters, a non-return valve kit and a service kit. Servicing of the internal parts is not recommended and if a major fault is apparent, a new complete guaranteed unit should be fitted.

The air filters should be changed every 40,000 miles (64,000 km) or three years, when the hydraulic cylinders and hoses are replaced. If dusty conditions prevail, the filters should be changed more frequently.

The output rod is now retained internally and cannot be extracted. If the rod or the domed screw on the rod end is damaged the Supervac Unit must be replaced complete.

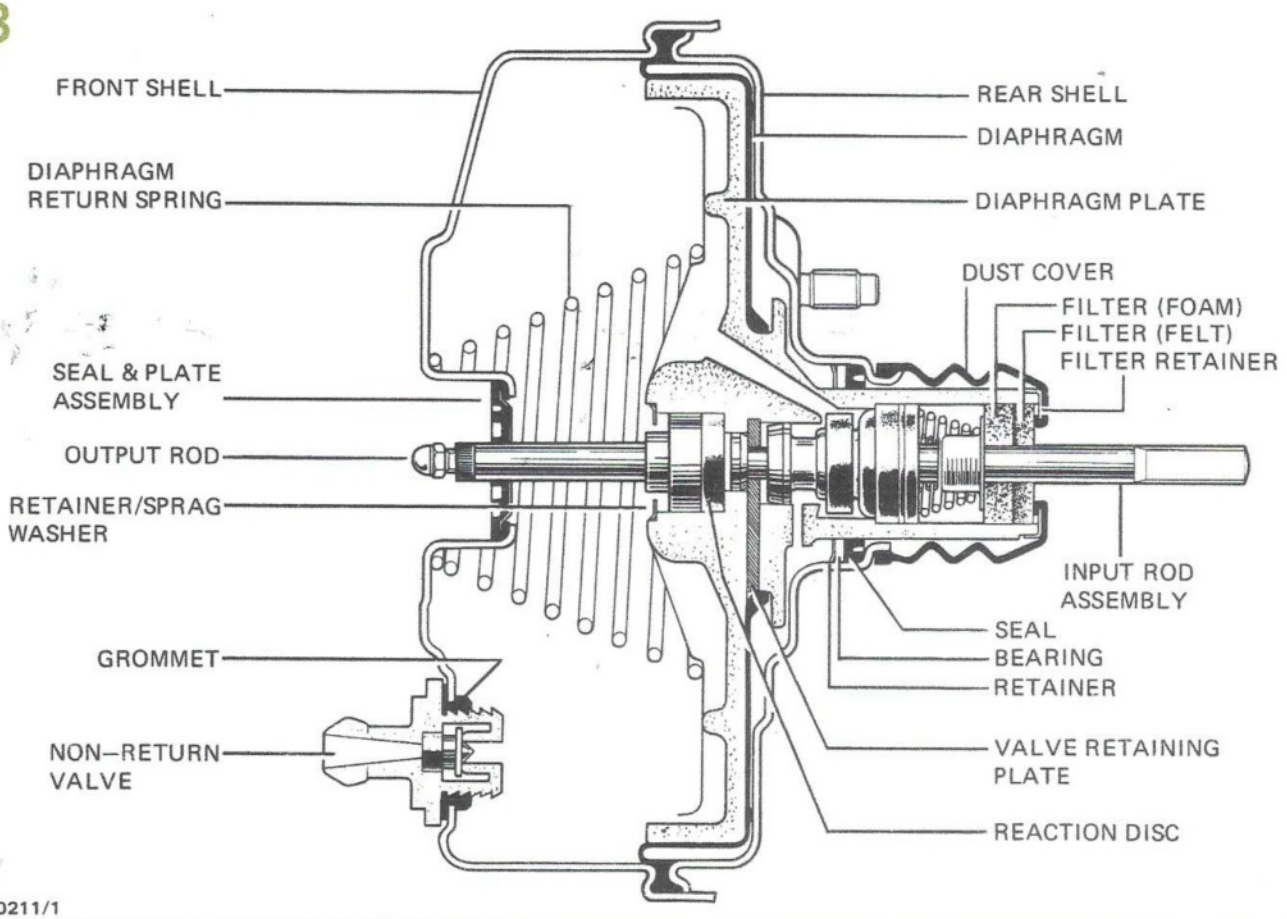
NO ATTEMPT SHOULD BE MADE TO ADJUST THE DOMED SCREW, THIS IS CORRECTLY SET AT THE PRODUCTION FACTORY AND SHOULD NEVER BE DISTURBED.

The contents of the kits are as follows:

SERVICE KIT	NON-RETURN VALVE KIT
Dust Cover	Non-Return Valve
Filter Retainer	Grommet
Filter (Foam)	BMS Grease No. 64949086*
Filter (Felt)	
Seal & Plate Assembly	
or 'O' ring	
Master Cylinder Seal	
(some Ford installations)	
BMS Grease No. 64949086	

*Not included with bayonet type non-return valves as the 'O' ring must not be lubricated.

8



A 0211/1

Replacing the Filter (Fig. 9)

Pull back the dust cover and filter retainer, hook out the filters and cut as shown on the illustration to remove from the input rod.

Cut the new filters, press into the neck of the valve body as shown and refit the filter retainer and dust cover.

If the dust cover is damaged, fit a new one from a Service Kit.

Replacing the Non-Return Valve (Fig. 10)

NOTE: Two different methods of fitting the valve have been used. The earlier one with a bayonet type fixing is not interchangeable with the later valve which is pushed into position.

Straight and angled nozzles are used on both types of valves. The angled valves are 'handed', therefore, note the angle of the valve nozzle in relation to the front shell so that the new valve can be fitted in the same position.

With the bayonet type a suitable spanner is required and the valve must be pressed down as shown whilst the valve is turned one third of a turn to release the fixing lugs. Fit the new 'O' ring to the new non-return valve but do not lubricate

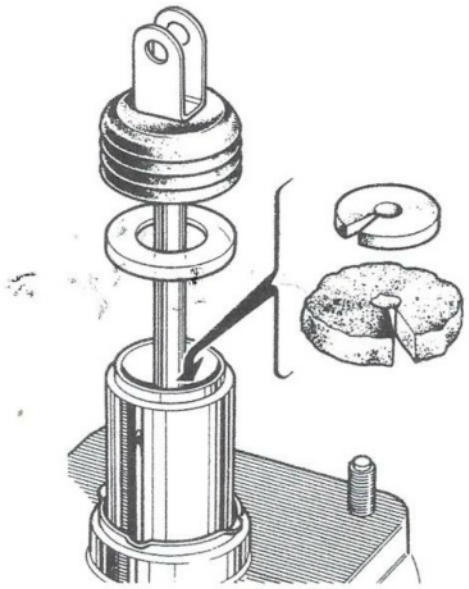
Place the valve in position on the front shell and press on the valve to compress the 'O' ring, then with the spanner turn the valve one third of a turn to engage the fixing lugs.

With the push-in type, remove the valve by pulling on the nozzle whilst exerting a side load. If the nozzle is straight it is easier to remove the valve if the hose is left clipped on. Alternatively, insert a flat bladed screwdriver (as shown) between the rubber grommet and the valve flange and (taking care not to damage the unit) lever the valve from the front shell. When removing the grommet ensure it does not drop into the vacuum chamber.

Fit the new grommet.

Lubricate the ribs of the new non-return valve with BMS Grease Number 64949086 and push fully into the grommet.

9



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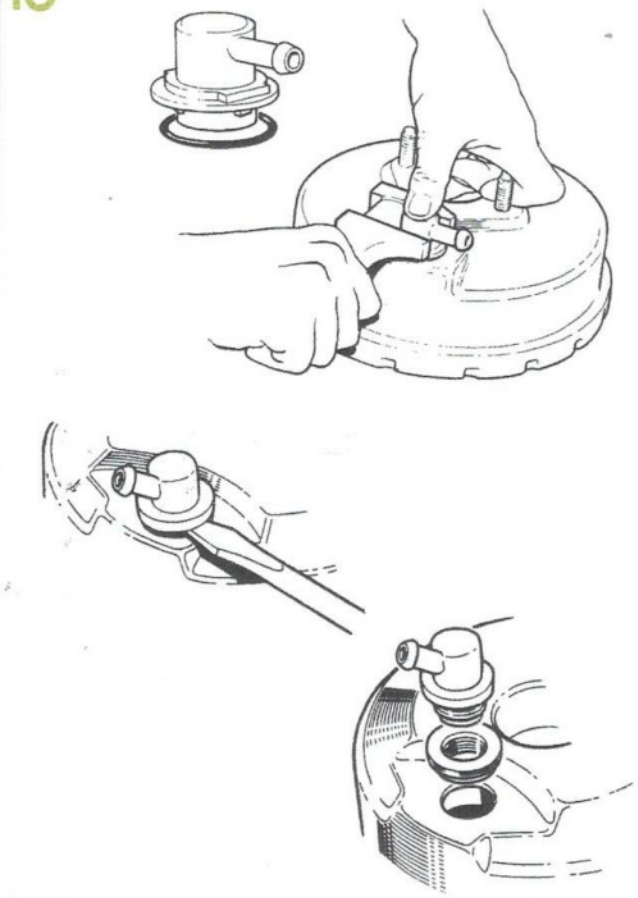


A 0205

Fitting the parts from a Service Kit (Fig. 11)

To fit the new dust cover it is necessary to remove the unit from the vehicle and this should be done in accordance with the vehicle manufacturer's instructions.

Remove the dust cover and hook out the filters; cut the filters as shown to remove from the input rod. Cut the new filters and press into the valve body in the order shown on the illustration. Ensure the exterior of the valve body neck is clean and lubricate with BMS Grease Number 64949086. Fit the new dust cover.

Figs. 11a, 11b and 12 show the three methods of sealing the front shell.

Fig. 11a: Remove the seal and plate assembly from the front shell recess by gripping the centre rib with a pair of pointed nosed pliers. Wipe clean the output rod and recess wall and lubricate them and the new seal and plate assembly with BMS Grease Number 64949086. With plate side leading, fit the new seal and plate assembly over the rod and into the recess.

Fig. 11b: If in addition to the seal and plate assembly, a square section seal is fitted between the master cylinder and the Supervac, use the replacement seal provided in the relevant Girling Service Kit. DO NOT FIT THE SEAL UNLESS THE MASTER CYLINDER FLANGE INCORPORATES THE SEAL GROOVE AS SHOWN ON THE ILLUSTRATION BELOW.

Fig. 12: If the master cylinder is the 'OVERHUNG' A.S.A.S. TYPE, wipe clean the front mating face of the Supervac, but before fitting the master cylinder, examine the breather hole and the exposed section of the plunger. The breather hole must be kept clear, if allowed to become blocked by dirt or grease etc., this could affect the master cylinder and the Supervac.

A BRAKE FAILURE CAN RESULT FROM ANY ATTEMPT TO CLEAN THE BORE WITH WIRE OR COMPRESSED AIR.

Where necessary, remove the internal parts (refer to Section 5, Page 5A6) clean out the breather hole and wash the cylinder thoroughly with Girling Cleaning Fluid or unused Castrol-Girling Brake Fluid.

NOTE: Every 40,000 miles (64,000 km) or a period of three years, whichever occurs first, master cylinders fitted to Private Cars and Light Commercial Vehicles should be replaced by new guaranteed units. However, the cylinder can be overhauled at this juncture and new seals fitted from the appropriate Girling Service Kit, but only if the cylinder bore is in perfect condition.

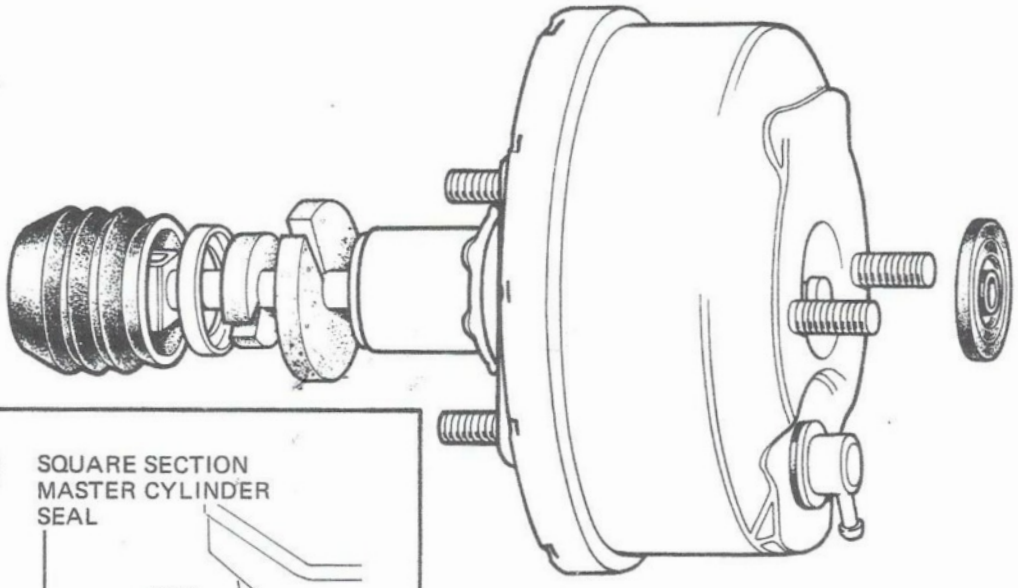
Examine the cylinder bore and the plungers for visible score marks, ridges and corrosion. Check the plunger seals for swelling, hardness or damage to the sealing edges.

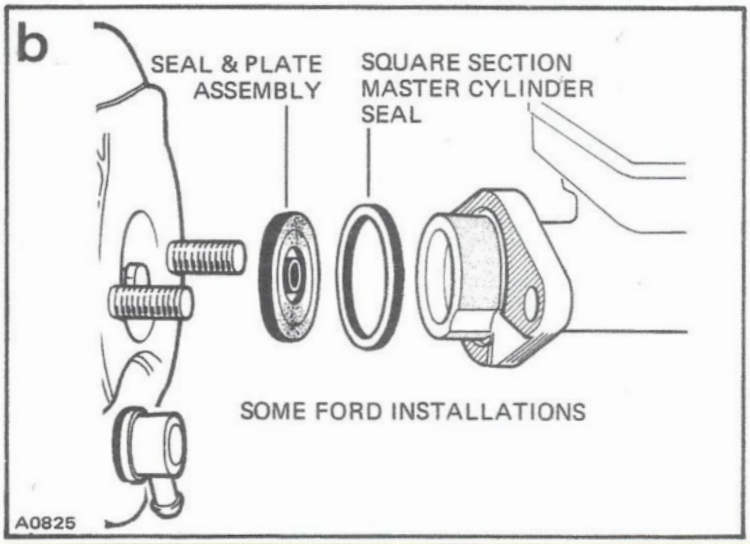
Provided the parts are in perfect condition the master cylinder can be reassembled, but where doubt exists, fit a new guaranteed master cylinder.

The exposed part of the primary plunger must be lubricated, but use only the special BMS Grease Number 64949086. Depress the plunger by hand several times and lubricate again if necessary.

Finally, position the 'O' ring on the master cylinder and bolt the cylinder onto the Supervac.

11a





A 0388

Girling supervac

Testing

The use of these tests will assist in diagnosis and provide assurance after servicing, but they cannot equal the quality of testing done at the Production Factory on specially designed equipment. If a unit gives cause for doubt, it is always best to replace it by a factory tested unit whenever possible.

It is assumed that any faults connected with the braking system such as contamination, lack of adjustment, air in the system or fluid leaks etc., have been recognised and eliminated.

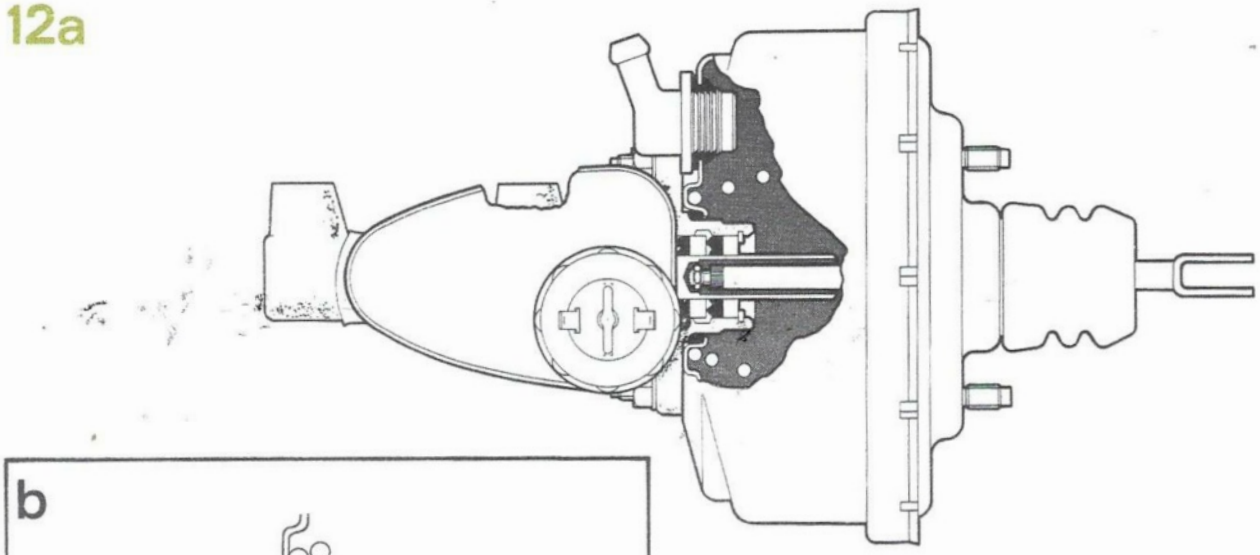
1. With the front of the car jacked-up, confirm one of the front wheels turns easily. Start the engine, allow vacuum to build up in the unit, and apply the brake pedal several times. It should be possible to turn the wheel amost immediately the pedal is released. If the brakes bind, suspect a major fault in the unit.
2. With engine running apply the brake pedal several times and check the operation of the pedal. If the response is sluggish, the vacuum hose may be faulty or the air filter may require changing.
3. Allow vacuum to build up in unit, stop engine and try brake action. Two or more applications should be power assisted as indicated by the effort required on the pedal. If the pedal action is not power assisted, the non-return valve may be faulty or there is a leak in the vacuum system.
4. Stop engine and press brake pedal several times to deplete all vacuum reserve in the system. Press brake and hold light foot pressure on pedal and start car engine. If the unit is working the pedal will fall away under foot pressure and less pressure is required to hold pedal in applied position.
5. Road test vehicle.

Fault Finding

Listed below are some possible causes of hard pedal or apparent lack of power assistance.

CAUSE	ACTION
Restricted air filter	Fit new filters.
Faulty vacuum hose	Check for kinking, loose connections or faulty hose. Fit new hose.
Faulty non-return valve	Fit new valve and grommet.
Vacuum leak from unit	Check for obvious leaks, fit new parts from Service kit or fit new unit.
Major fault in unit, refer to testing.	Fit new unit.
Brake Fluid in unit.	Fit new unit and a new 'Overhung' A.S.A.S. master cylinder.

12a



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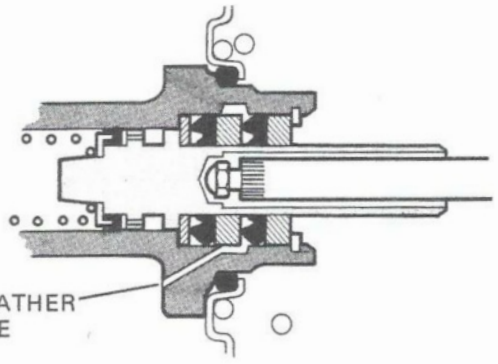

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A0824

Girling F.D. servo (flexing diaphragm)

Introduction

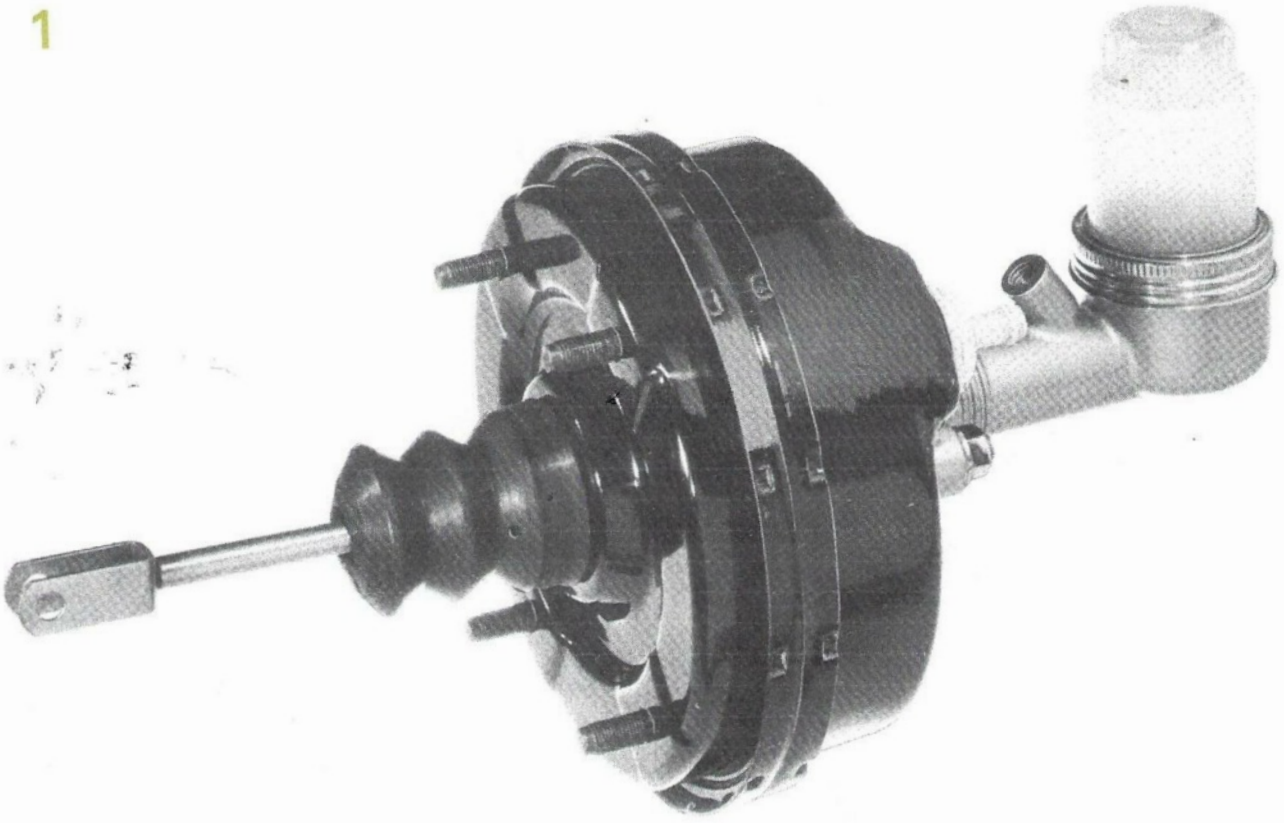
The Girling F.D. Servo (Fig. 1) is a mechanical servo unit designed to provide controlled power assistance to the effort applied by the driver's foot to the brake pedal.

Power supplied by the unit is obtained from vacuum created in the engine inlet manifold. The vacuum is applied to both sides of a diaphragm and by admitting atmospheric pressure to one side of the diaphragm, the power is obtained.

Mounted between the brake pedal and the master cylinder, the unit is connected to these parts by push rods. Should a vacuum failure occur, the two push rods act as a single rod and the brakes will therefore work in the conventional manner; but more effort will be required on the brake pedal.

The F.D. Servo unit is usually a part of the original brake equipment and each installation is approved by Girling engineers.

1



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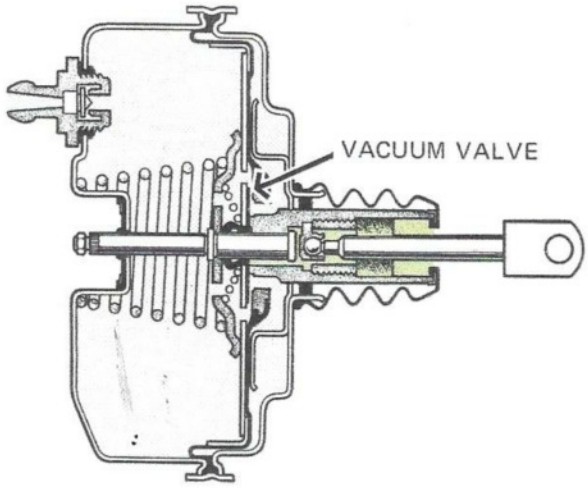
Girling F.D. servo (flexing diaphragm)

How it works

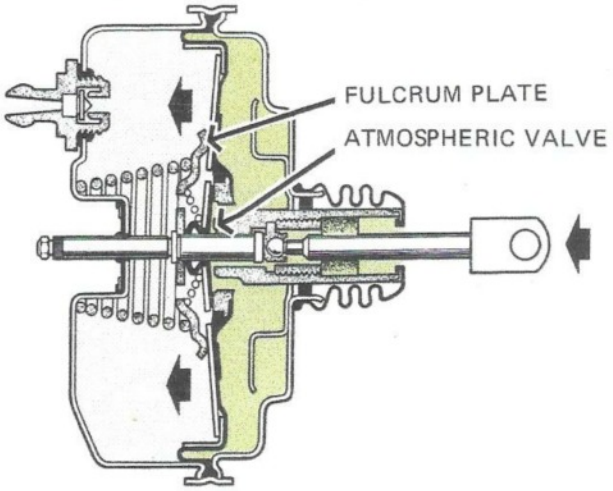
2



Brake off

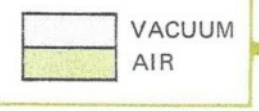
The diaphragm is fully recuperated and held against the rear shell by the diaphragm return spring. The input rod is also fully recuperated by the brake pedal return spring and with the rod in this position the vacuum valve is open and there is vacuum each side of the diaphragm.

3



Brake applied

When the brake pedal is depressed the input rod and valve body move forward, the diaphragm fingers pivot on the fulcrum plate, closing the vacuum valve and opening the air valve. Atmospheric pressure then enters the rear shell behind the diaphragm and assists the input rod in pushing the diaphragm and output rod forward, thereby actuating the master cylinder plunger.



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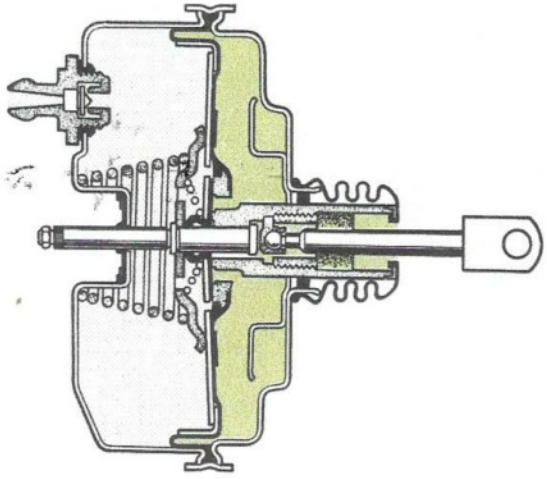
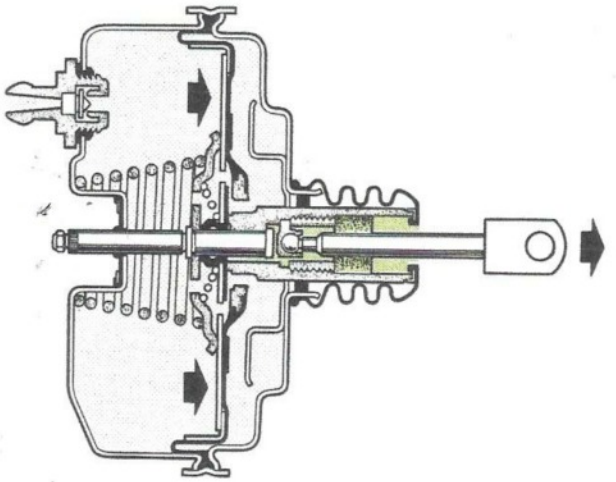


Brake held on

When the brake pedal is held on, the diaphragm will momentary continue to move forward and this movement causes the valve fingers to pivot on the fulcrum plate and close the atmospheric valve. Further movement of the brake pedal either opens the vacuum valve or the atmospheric valve, depending on whether the brake pedal is released or depressed.

5



Brake released

Immediately the brake pedal is released, the vacuum valve is opened and the atmospheric pressure in the rear chamber is extracted into the front chamber and from there to the inlet manifold, via the non-return valve. The atmospheric port remains closed whilst the valve body and input rod return to their original position (as shown on Fig. 2) assisted by the diaphragm return spring. The diaphragm is then again suspended in vacuum until the brake pedal is depressed.

Girling F.D. servo (flexing diaphragm)

6B 2c

Servicing (Fig.6)

The parts available to service the unit are; filters, a non-return valve kit and a service kit. Servicing of the internal parts is not recommended and if a major fault is apparent, a new complete guaranteed unit should be fitted.

The air filters should be changed every 40,000 miles (64,000 km) or three years, when the hydraulic cylinders and hoses are replaced. If dusty conditions prevail, the filters should be changed more frequently.

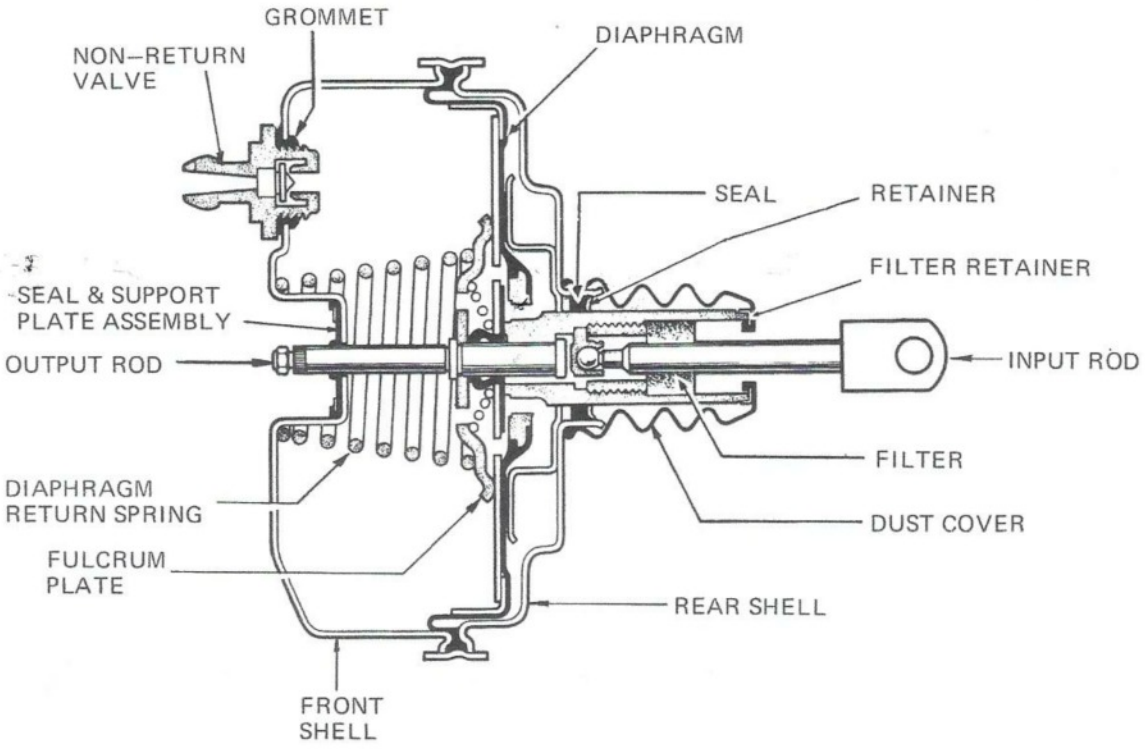
The output rod which operates the master cylinder plunger is retained internally and cannot be extracted. If the rod or the domed screw on the rod end is damaged, the Servo Unit must be replaced complete.

NO ATTEMPT SHOULD BE MADE TO ADJUST THE DOMED SCREW, THIS IS CORRECTLY SET AT THE PRODUCTION FACTORY AND SHOULD NEVER BE DISTURBED.

The contents of the kits are as follows:

SERVICE KIT	NON-RETURN VALVE KIT
Seal & Support Plate Assy	Non-Return Valve
Seal (Rear Shell)	Grommet
Retainer (Rear Shell)	Grease No. 64949009
Dust Cover	
Filter	
Filter Retainer	
Grease No. 64949008	

6



A 0204

Girling F.D. servo (flexing diaphragm)

Replacing the Filter (Fig. 7)

Pull back the dust cover, lift the filter retainer off the valve body and hook out the filter; cut the filter as shown on the illustration to remove from the input rod.

Cut new filter, press into neck of valve body and refit filter retainer and dust cover. If the dust cover is damaged, fit a new one from a Service Kit.

Replacing the Non-Return Valve (Fig. 8)

Some valves have angled nozzles which are 'handed', therefore if fitted, note the angle of the valve nozzle in relation to the front shell so that the new valve can be fitted in the same position.

Remove the valve by pulling on the nozzle whilst exerting a side load. If the nozzle is straight it is easier to remove the valve if the hose is left clipped on. Alternatively, insert a flat bladed screwdriver (as shown Fig. 8) between the rubber grommet and the valve flange and (taking care not to damage the unit) lever the valve from the front shell.

When removing the grommet ensure it does not drop into the vacuum chamber.

Fit the new grommet.

Lubricate the ribs of the new non-return valve with grease number 64949009 and push fully into the grommet.

Fitting the Parts from a Service Kit (Fig. 9)

To fit the new dust cover it is necessary to remove the unit from the vehicle and this should be done in accordance with the vehicle manufacturer's instructions.

Remove the seal and support plate assembly from the front shell recess by inserting a screwdriver under the metal part and levering the assembly from the recess.

Wipe clean the output rod and recess wall and lubricate them and the new seal assembly with grease number 64949008. With rubber side leading, fit the new seal assembly over the rod and into the recess.

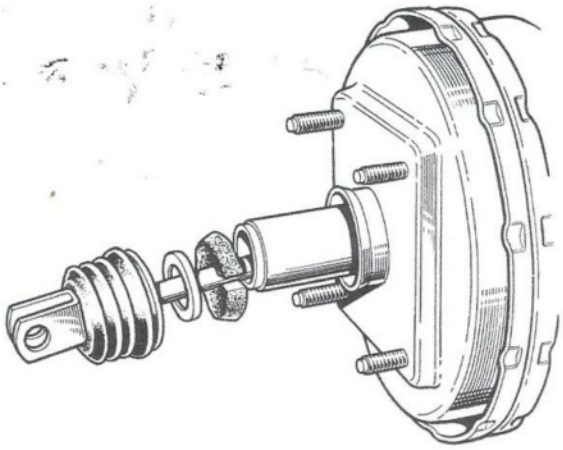
Remove the dust cover, lift the filter retainer off the valve body neck and hook out the filter; cut filter as shown to remove from the input rod. Cut the new filter, press into the valve body and refit the filter retainer.

Lever out the retainer from the rear shell and remove the seal; TAKE CARE NOT TO SCRATCH OR DAMAGE THE VALVE BODY NECK.

Lubricate the new seal, valve body neck and sealing areas of the new dust cover with grease number 64949008.

Fit the new seal, flat back leading, and new retainer, press retainer firmly into position. Fit the new dust cover.

7



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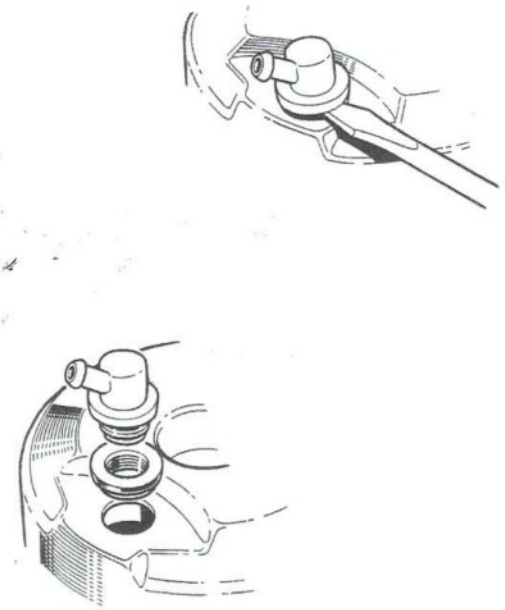


Girling F.D. servo (flexing diaphragm)

Testing

The use of these tests will assist in diagnosis and provide assurance after servicing, but they cannot equal the quality of testing done at the Production Factory on specially designed equipment. If a unit gives cause for doubt, it is always best to replace it by a factory tested unit whenever possible.

It is assumed that any faults connected with the braking system such as contamination, lack of adjustment, air in the system or fluid leaks etc, have been recognised and eliminated.

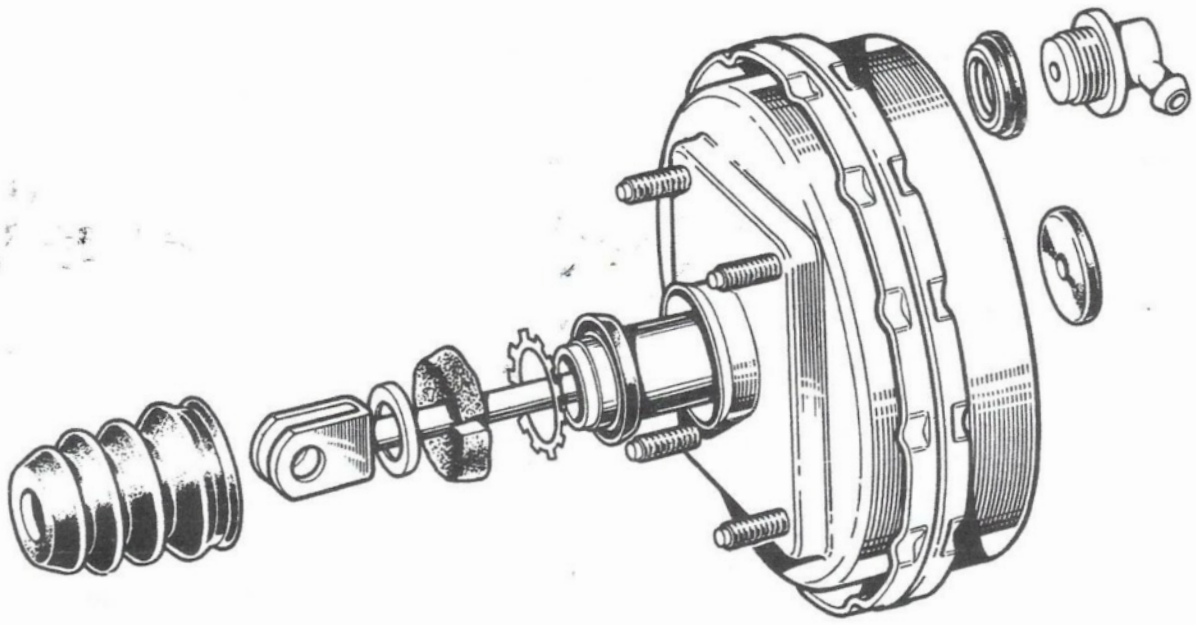
1. With the front of the car jacked up, confirm one of the front wheels turns easily. Start the engine, allow vacuum to build up in the unit, and apply the brake pedal several times. It should be possible to turn the wheel almost immediately the pedal is released. If the brakes bind, suspect a major fault in the unit.
2. With engine running apply the brake pedal several times and check the operation of the pedal. If the response is sluggish, the vacuum hose may be faulty or the air filter may require changing.
3. Allow vacuum to build up in unit, stop engine and try brake action. Two or more applications should be power assisted as indicated by the effort required on the pedal. If the pedal action is not power assisted, the non-return valve may be faulty or there is a leak in the vacuum system.
4. Stop engine and press brake pedal several times to deplete all vacuum reserve in the system. Press brake and hold light foot pressure on pedal and start car engine. If the unit is working the pedal will fall away under foot pressure and less pressure is required to hold pedal in applied position.
5. Road test vehicle.

Fault Finding

Listed below are some possible causes of hard pedal or apparent lack of power assistance.

CAUSE	ACTION
Restricted air filter	Fit new filters
Faulty vacuum hose	Check for kinking, loose connections or faulty hose. Fit new hose.
Faulty non-return valve	Fit new valve and grommet.
Vacuum leak from unit	Check for obvious leaks, fit new parts from Service Kit or fit new unit.
Major fault in unit, refer to testing.	Fit new unit.

9



Girling tandem supervac (type 100)

6B 3a

Introduction

The Tandem Supervac (Fig. 1) is a mechanical servo unit designed to provide adequate controlled assistance to the brake systems of the larger and more powerful vehicles.

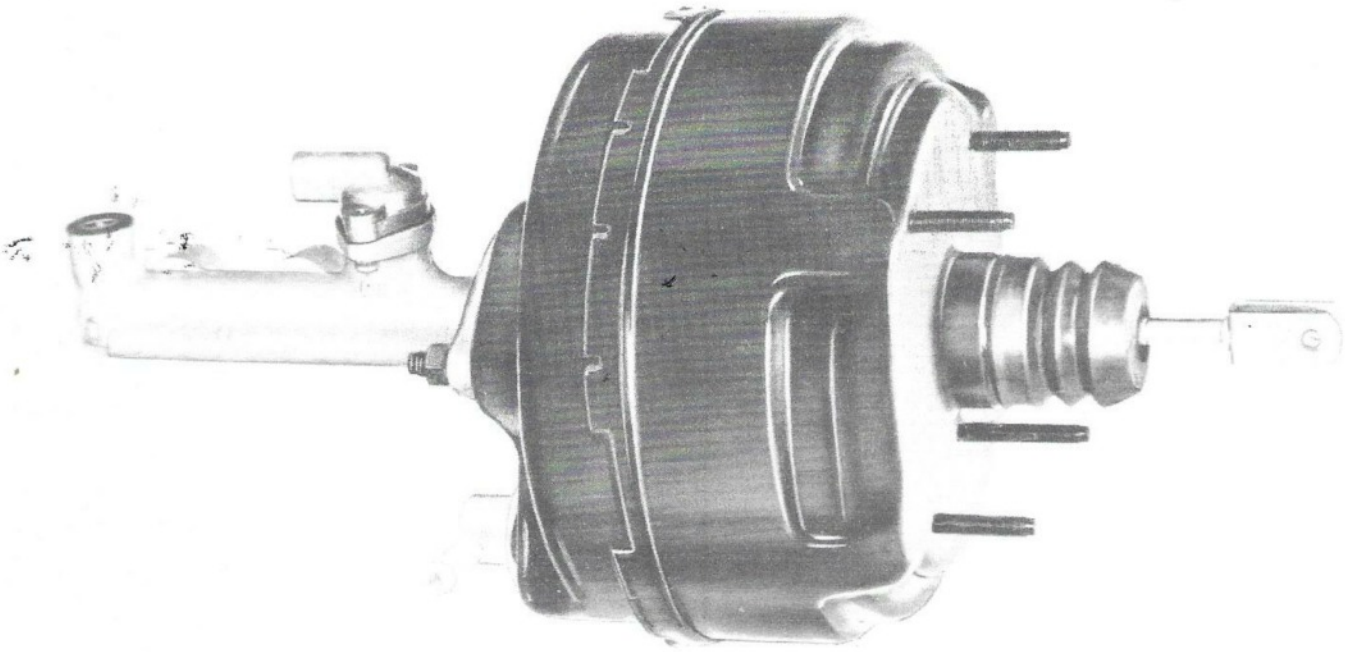
Power supplied by the unit is obtained from vacuum created in the engine inlet manifold. The vacuum is applied to both sides of twin diaphragms and by admitting atmospheric pressure to one side of the diaphragms, the power is obtained.

Mounted between the brake pedal and the master cylinder, the unit is connected to these parts by push rods. Should a vacuum failure occur, the two push rods act as a single rod and the brakes will therefore work in the conventional manner; but more effort will be required on the brake pedal.

There are straight and angled non-return valves and the design of the push rod – which is attached to the brake pedal – is varied to suit the vehicle manufacturer's installation.

The Tandem Supervac unit is usually a part of the original brake equipment and each installation is approved by Girling engineers.

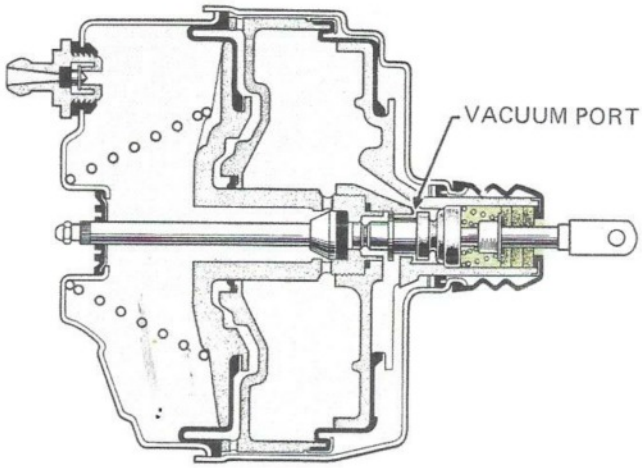
1



Girling tandem supervac (type 100)

How it works

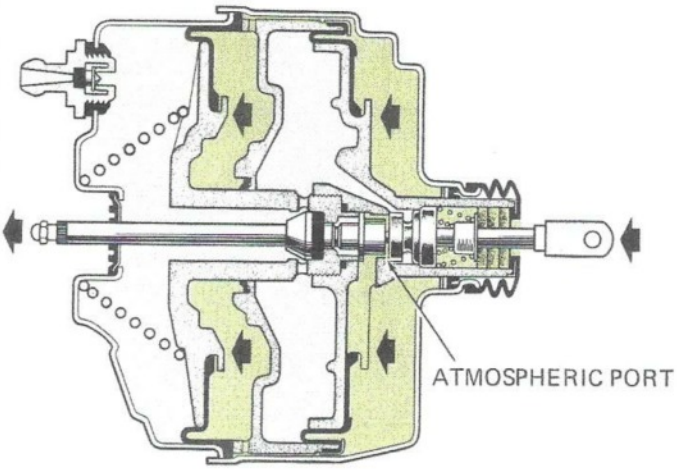
2



Brake off

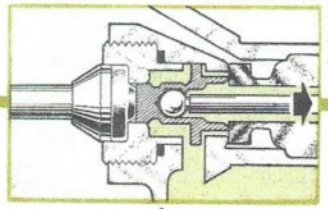
The twin diaphragms are fully recuperated and held against the stop faces by the diaphragm return spring. The input rod assembly is also fully retracted by the brake pedal return spring, within the diaphragm plate, as far as the valve control piston will allow. With the input rod in this position the vacuum port is open and there is a vacuum each side of both diaphragms.

3



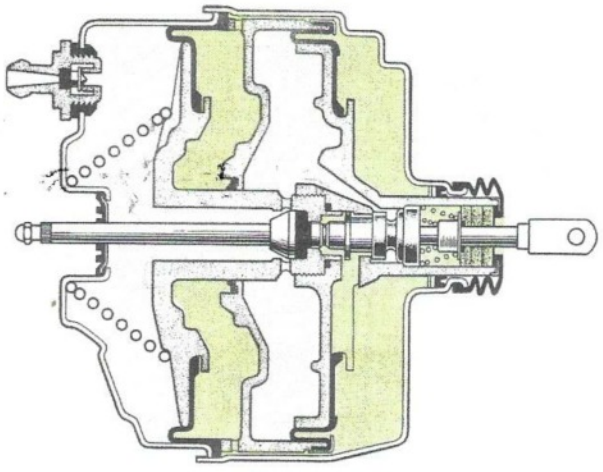
Brake being applied

When the brake pedal is depressed, the input rod moves forward and the rubber valve seal closes the vacuum port, isolating the chambers behind the diaphragms from the vacuum source. The input rod continues to move forward through the now stationary valve seal opening the air valve. This allows air to pass through the centre of the seal into the chambers behind the two diaphragms. The driving force provided by the air acting on the diaphragms and the drivers foot on the brake pedal moves the output rod forward, operating the master cylinder.



VACUUM AIR

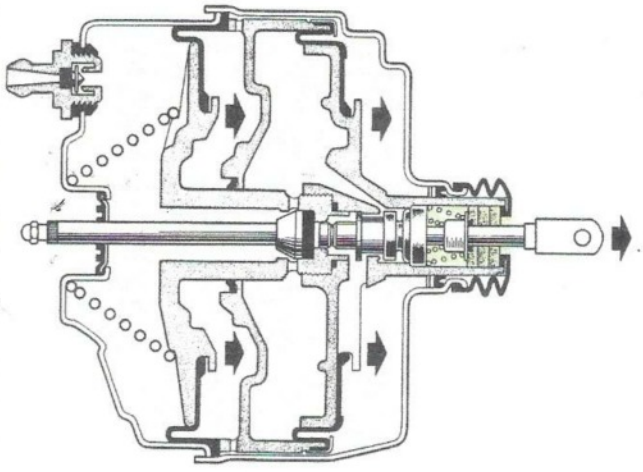
4



Brake held on

When the brake pedal is held on, the front and rear diaphragms will momentarily continue to move forward and so compress the outer edges of the reaction disc. This compression causes the centre of the disc to extrude, pressing back the input rod (see inset above) and thus closing the atmospheric port. Further movement of the brake pedal either opens the vacuum or atmospheric port, depending on whether the brake pedal is released or depressed.

5



Brake released

Immediately the brake pedal is released, the vacuum port is opened and the atmospheric pressure in the unit is extracted to the inlet manifold via the non-return valve. The atmospheric port remains closed whilst the input rod assembly returns to its original position (as shown on Fig. 2) assisted by the diaphragm return spring. The twin diaphragms are then suspended in vacuum until the brake pedal is depressed.

Girling tandem supervac (type 100)

Replacing the Filters (Fig. 7)

The filters cannot be replaced on some installations unless the pedal box is removed from the vehicle and this should be done in accordance with the vehicle manufacturer's instructions Provided the unit is accessible therefore, proceed as follows:—
Pull back the dust cover and filter retainer; hook out the filters and cut to remove from the input rod. If damaged, the dust cover should be replaced.
Cut the new filters and press into the neck of the diaphragm plate as indicated on the illustration.
Refit the filter retainer and dust cover.

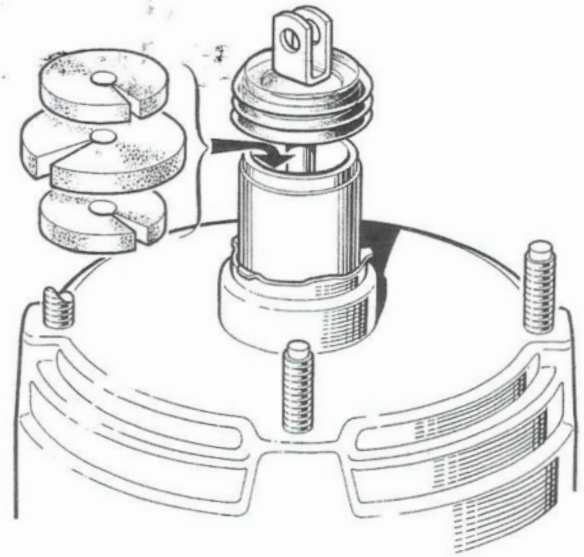
Replacing the Non-Return Valve (Fig. 8)

Some valves have angled nozzles which are 'handed', therefore if fitted, note the angle of the valve nozzle in relation to the front shell so that the new valve can be fitted in the same position.
Remove the valve by pulling on the nozzle whilst exerting a side load. If the nozzle is straight it is easier to remove the valve if the hose is left clipped on. Alternatively, insert a flat bladed screwdriver (as shown) between the rubber grommet and the valve flange and (taking care not to damage the unit) lever the valve from the front shell.
When removing the grommet ensure it does not drop into the vacuum chamber.
Fit the new grommet.
Lubricate the ribs of the new non-return valve with grease number 64949009 and push fully into the grommet.

Fitting the Parts from a Service Kit (Fig. 9)

To fit the new dust cover it is necessary to remove the unit from the vehicle and this should be done in accordance with the vehicle manufacturer's instructions.
Remove the seal and plate assembly from the front shell recess by gripping the centre rib with a pair of pointed nosed pliers.
Wipe clean the recess and the output rod and lubricate them and the new seal assembly with grease number 64949008.
With plate side leading, fit the new seal assembly over the output rod and into the recess.
Remove the dust cover, filter retainer and filters. Wipe clean the exterior of the diaphragm plate neck and lubricate with grease number 64949008. Also lubricate the sealing areas of the new dust cover with this grease.
Cut the new filters and press into the neck of the diaphragm plate as indicated on the illustration. Refit the filter retainer and fit the new dust cover. Refit unit to vehicle in accordance with the vehicle manufacturer's instructions.

7



A 0196

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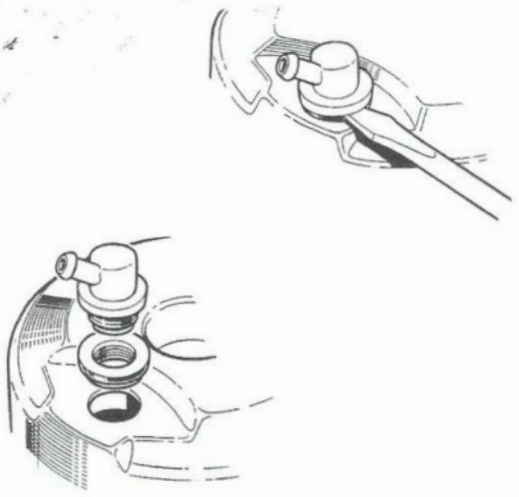

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Girling tandem supervac (type 100) 6B 3e

Testing

The use of these tests will assist in diagnosis and provide assurance after servicing, but they cannot equal the quality of testing done at the Production Factory on specially designed equipment. If a unit gives cause for doubt, it is always best to replace it by a factory tested unit whenever possible.

It is assumed that any faults connected with the braking system such as contamination, lack of adjustment, air in the system or fluid leaks etc, have been recognised and eliminated.

1. With the front of the car jacked up, confirm one of the front wheels turns easily. Start the engine, allow vacuum to build up in the unit, and apply the brake pedal several times. It should be possible to turn the wheel almost immediately the pedal is released. If the brakes bind, suspect a major fault in the unit.
2. With engine running apply the brake pedal several times and check the operation of the pedal. If the response is sluggish, the vacuum hose may be faulty or the air filter may require changing.
3. Allow vacuum to build up in unit, stop engine and try brake action. Two or more applications should be power assisted as indicated by the effort required on the pedal. If the pedal action is not power assisted, the non-return valve may be faulty or there is a leak in the vacuum system.
4. Stop engine and press brake pedal several times to deplete all vacuum reserve in the system. Press brake and hold light foot pressure on pedal and start car engine. If the unit is working the pedal will fall away under foot pressure and less pressure is required to hold pedal in applied position.
5. Road test vehicle.

Fault Finding

Listed below are some possible causes of hard pedal or apparent lack of power assistance.

CAUSE	ACTION
Restricted air filter	Fit new filters.
Faulty vacuum hose	Check for kinking, loose connections or faulty hose. Fit new hose.
Faulty non-return valve	Fit new valve and grommet.
Vacuum leak from unit	Check for obvious leaks, fit new parts from Service Kit or fit new unit.
Major fault in unit, refer to testing.	Fit new unit.

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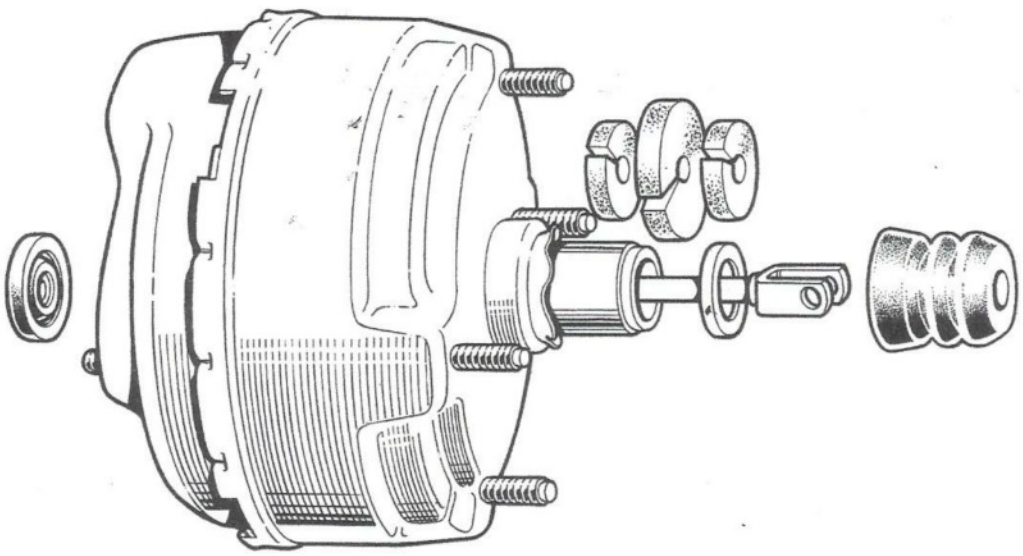


A 0196/1

Servicing (Fig.6)

The parts available to service the unit are; filters, a non-return valve kit and a service kit. Servicing of the internal parts is not recommended and if a major fault is apparent, a new complete guaranteed unit should be fitted.

The air filters should be changed every 40,000 miles (64,000km) or three years, when the hydraulic cylinders and hoses are replaced. If dusty conditions prevail, the filters should be changed more frequently.

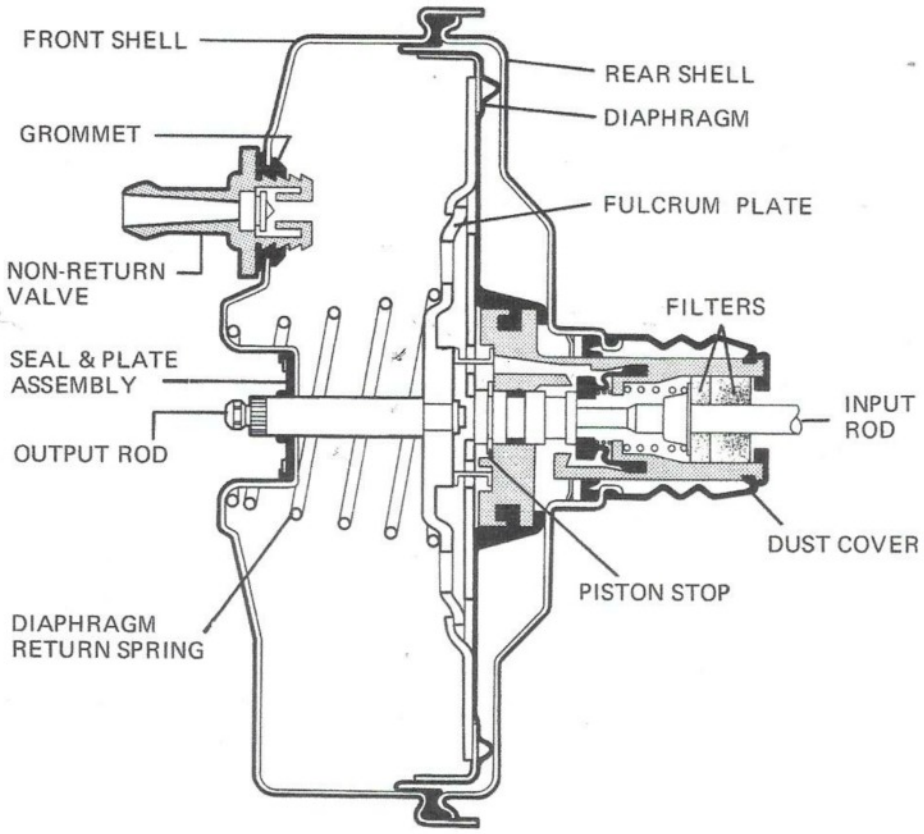
The output rod which actuates the master cylinder is retained internally and cannot be extracted. If the rod or the domed screw on the rod end is damaged, the servo unit must be replaced complete.

NO ATTEMPT SHOULD BE MADE TO ADJUST THE DOMED SCREW, THIS IS CORRECTLY SET AT THE PRODUCTION FACTORY AND SHOULD NEVER BE DISTURBED.

The contents of the kits are as follows:-

SERVICE KIT	NON-RETURN VALVE KIT
Dust Cover	Non-Return Valve
Filter (Foam)	Grommet
Seal & Plate Assembly or '0' ring	BMS Grease No. 64949086
BMS Grease No. 64949086	

6



A0643

Servicing (Fig.6)

The parts available to service the unit are; filters, a non-return valve kit and a service kit. Servicing of the internal parts is not recommended and if a major fault is apparent, a new complete guaranteed unit should be fitted.

The air filters should be changed every 40,000 miles (64,000km) or three years, when the hydraulic cylinders and hoses are replaced. If dusty conditions prevail, the filters should be changed more frequently.

The output rod which actuates the master cylinder is retained internally and cannot be extracted. If the rod or the domed screw on the rod end is damaged, the servo unit must be replaced complete.

NO ATTEMPT SHOULD BE MADE TO ADJUST THE DOMED SCREW, THIS IS CORRECTLY SET AT THE PRODUCTION FACTORY AND SHOULD NEVER BE DISTURBED.

The contents of the kits are as follows:-

SERVICE KIT	NON-RETURN VALVE KIT
Dust Cover Filter (Foam) Seal & Plate Assembly or '0' ring BMS Grease No. 64949086	Non-Return Valve Grommet BMS Grease No. 64949086

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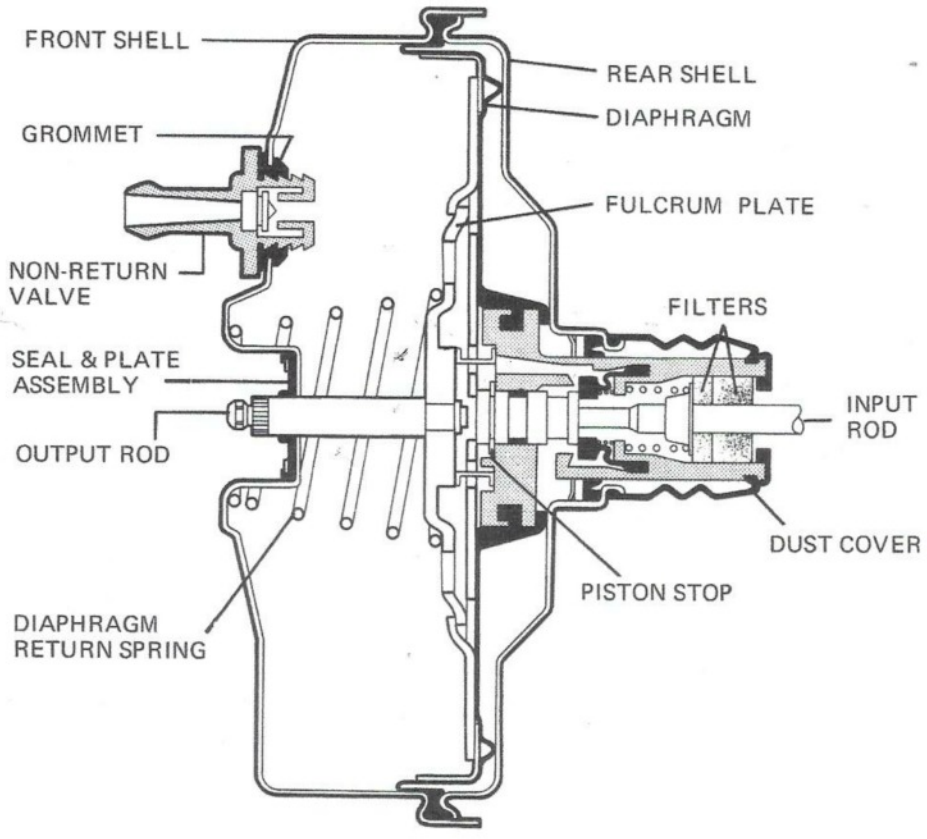

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