

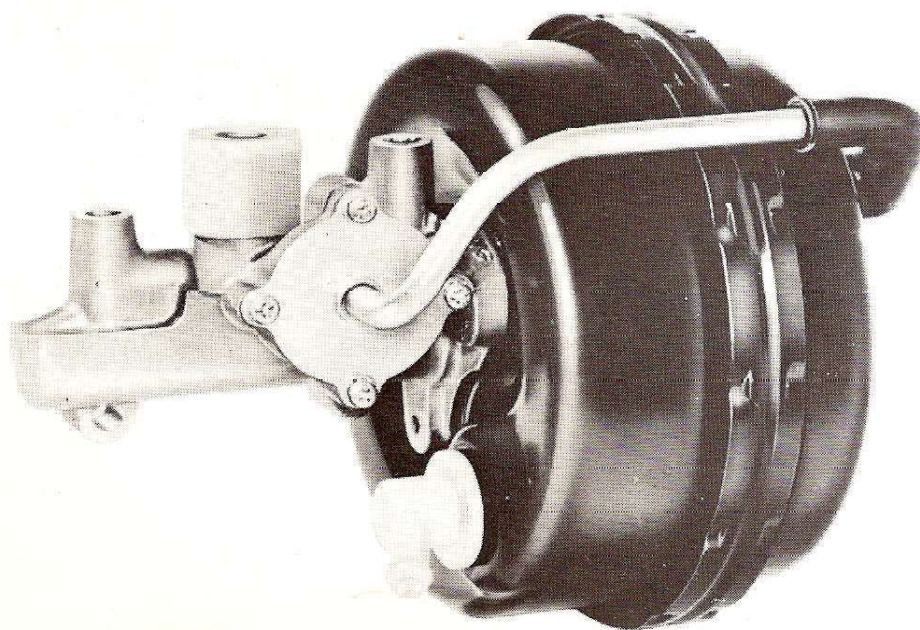
## hydraulic servo units

**Introduction**

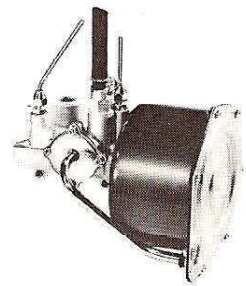
The Girling Hydraulic Servo Unit takes wasted power from the engine and uses it to boost the hydraulic pressure in the brake system. On many vehicles the unit is fitted as original equipment, but not all cars have power assisted brakes and a unit called the Powerstop was therefore introduced by Girling to offer any car owner the luxury of ample power at the brake pedal. Obviously, the same boost ratio would not suit all vehicles, and both the Hydraulic Servo Unit and the Powerstop are available with boost ratios to accommodate the various installations. The Hydraulic Servo Unit and Powerstop have been established now for many years and sold world-wide by Girling.

This manual page deals with the Mk 11B Hydraulic Servo Unit and Powerstop, which superseded the Mk 11A. The external differences between the two units can be seen from the illustration (Fig. 1). Internally the basic design is unchanged but small improvements have been made and these are (1) operational 'clonk' has been eliminated by the anti-knock output piston, (2) the vacuum piston has been replaced by a diaphragm and; (3) the vacuum connection is now in the vacuum chamber and not the hydraulic body. The design of the vacuum chamber and the retaining band, which holds the two halves of the shell together, makes the outside shape slightly different but, with few exceptions it is expected the Mk 11B unit will eventually replace the Mk 11A in service.

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MK IIA SERVO UNIT





## hydraulic servo units

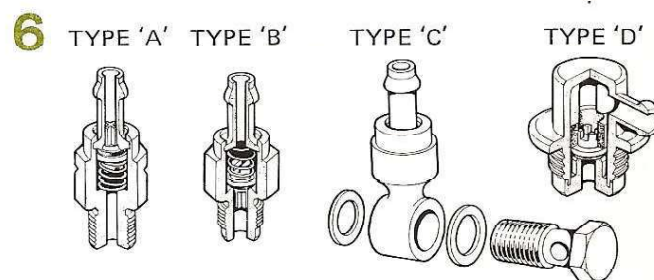
returns and with it the output piston, relieving the pressure to the wheel cylinders as shown on Fig. 5. The piston sleeve lifts the ball and allows the fluid to move unrestricted between the supply tank and wheel cylinders.

If the force on the pedal is increased after arriving at the position shown on Fig. 4, the valve gear operates to give additional assistance from the diaphragm until the thrust on each end of the control piston is balanced or until the limit of available vacuum is reached. Conversely, if the foot pedal force is reduced the valve gear operates to reduce the pressure at the brake cylinders until again, a state of balance of the control piston is reached. The difference in area between the two opposed ends of the control piston determines the proportion of assistance provided by the unit. If, for example, the large end is twice the area of the small end, the hydraulic pressure output is built up to twice that of the input from the master cylinder before the control piston moves back to close the air valve. Such a unit therefore would have an output of twice the pressure of the input, throughout the range of the unit.

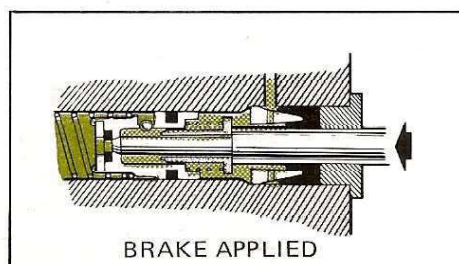
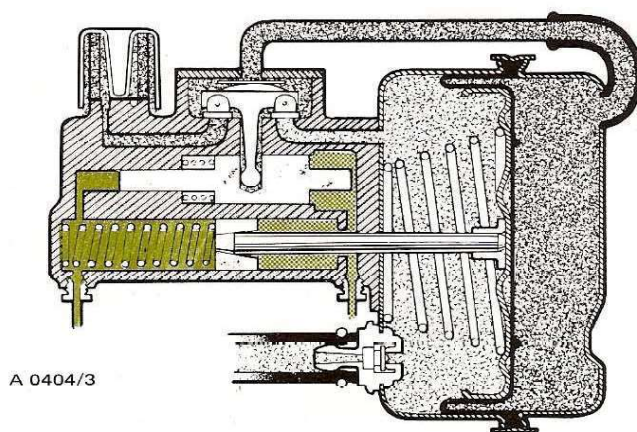
In this way, the pressure in the wheel cylinders varies in proportion to the effort at the pedal, and full and precise control of the brakes is always at the command of the driver. Some units have an input to output boost ratio of  $2\frac{3}{4}$  to 1, some have a boost ratio of 2 to 1, and the Powerstop (type 5156) has a boost ratio of  $1\frac{1}{2}$  to 1.

Between the engine inlet manifold and the vacuum reserve tank, or, if a tank is not fitted, between the manifold and the servo unit, is a non-return valve. This valve retains vacuum

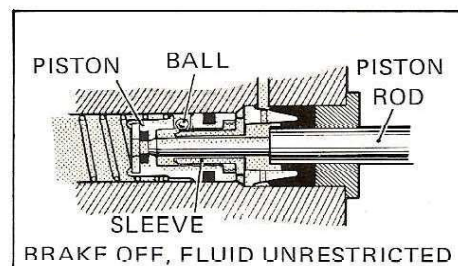
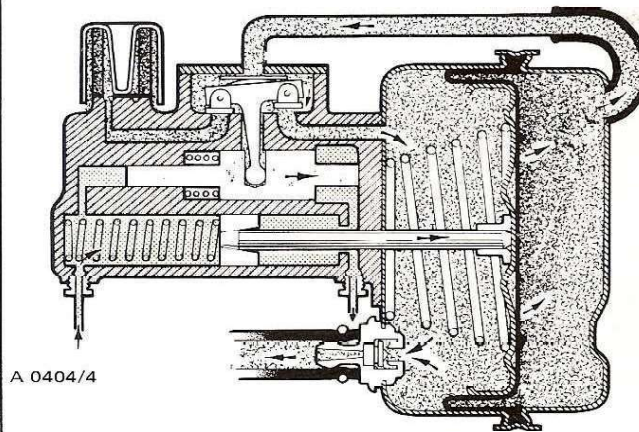
in the tank or servo unit so that power operation of the brakes is possible for a limited period, should a vacuum failure occur. Fig. 6 shows the types of non-return valves in use: Type 'A' screws directly into the engine manifold; Types 'B' and 'C' are usually fitted in the servo body of Mk 11A units; and Type 'D' which is a push fit in the rear shell of the unit and may have a straight or right angled nozzle. Type 'D' is white in colour so that it can be distinguished from the slave adaptor coloured red. If a red slave adaptor is fitted in the rear shell instead of a white type 'D' non-return valve, a non-return valve must be fitted at some other point in the vacuum line.



Type 'A' works in the opposite way to types 'B', 'C' and 'D' as the half ball, or plate valve, is in the opposite end of the valve body. The illustration shows the arrangement of the internal parts of types 'A' and 'B', and also shows the 'V' cuts in the hexagon body which identify type 'A'.

**4** BRAKE HELD ON

A 0405/1

**5** BRAKE RELEASED

A 0405/2



## Servicing

After 40,000 miles (64,000 km) or three years, whichever is reached first, the Servo or Powerstop should be replaced by a new guaranteed unit, alternatively, it should be completely overhauled and the diaphragm, seals and gaskets changed using the parts from the relevant Girling Service Kit. Provided the internal working surfaces are in perfect condition, the unit will be satisfactory for a further period of service, but where doubt exists concerning the condition of the parts, a new guaranteed unit should be fitted.

The vacuum pipe and filter element should be renewed when the unit is replaced or overhauled. In between service periods, the filter element should be changed whenever new brake shoes or new disc brake pads are fitted.

Listed below are the kits available to service the unit; the relevant parts contained in each kit can be seen on the illustration (Fig. 7).

### MAJOR OVERHAUL KIT

Rubber Sleeve  
Plug  
Diaphragm  
Body Gasket  
Copper Washers (three)  
Plug Seal  
Control Piston Seal (primary)  
Control Piston Seal (secondary)

Piston Rod Gland Seal  
Output Piston Seal  
Output Piston Assembly  
Clamping Ring  
Valve Chest Cover Gasket  
Grommet (non-return valve)  
Girling Grease No. 64949009

### FILTER KIT

Filter Element  
Filter Base Washer

### NON-RETURN VALVE KIT

Non-return Valve  
Grommet  
Girling Grease No. 64949009.

## KEY

- |                              |   |
|------------------------------|---|
| 1. CONTROL SEAL (SECONDARY)  | 26. COVER GASKET (VALVE CHEST)            |
| 2. CONTROL PISTON            | 27. 'T' LEVER VALVE ASSEMBLY              |
| 3. CONTROL SEAL (PRIMARY)    | 28. ANTI-KNOCK OUTPUT PISTON ASSEMBLY     |
| 4. SPRING ABUTMENT           | 29. SERVICE CLAMPING RING                 |
| 5. SPRING                    | 30. DIAPHRAGM PLATE & PISTON ROD ASSEMBLY |
| 6. RETAINER                  | 31. DIAPHRAGM                             |
| 7. CIRCLIP                   | 32. CLAMPING RING                         |
| 8. PLUG                      | 33. FRONT SHELL                           |
| 9. PLUG SEAL                 | 34. RUBBER SLEEVE                         |
| 10. BUSH                     | 35. PLUG                                  |
| 11. PISTON ROD GLAND SEAL    | 36. VACUUM PIPE                           |
| 12. SPACER                   | 37. ABUTMENT WASHER                       |
| 13. SLEEVE                   | 38. (COPPER) WASHER                       |
| 14. PISTON SLEEVE SPRING     | 39. CLAMPING PLATE                        |
| 15. OUTPUT PISTON SEAL       | 40. GROMMET                               |
| 16. ANTI-KNOCK OUTPUT PISTON | 41. NON-RETURN VALVE/ADAPTOR              |
| 17. BALL                     | 42. HYDRAULIC BODY                        |
| 18. OUTPUT PISTON SPRING     | 43. VALVE                                 |
| 19. PISTON STOP              | 44. VALVE SPRING                          |
| 20. COVER                    | 45. 'T' LEVER                             |
| 21. FILTER ELEMENT           | 46. SPRING PLATE                          |
| 22. FILTER BASE WASHER       | 47. LEVER GUIDE                           |
| 23. BODY GASKET              | 48. SPRING CLIP                           |
| 24. REAR SHELL               |   |
| 25. DIAPHRAGM RETURN SPRING  |   |

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