



SERVICE DIVISION

DEALER TRAINING

AID # S1017

SUBJECT BRAKES

MODEL TRIUMPH TR7

AUSTIN

JAGUAR

MG

LAND ROVER

TRIUMPH

BRAKING SYSTEM

The TR7 has a conventional type braking system having disc brakes at the front and self-adjusting shoes at the rear.

Employed in the system is a Type 38 brake servo, a tandem master cylinder and a failure sensitive pressure reducing valve.

TANDEM MASTER CYLINDER INCORPORATING PRESSURE FAILURE SWITCH

BRIEF DESCRIPTION

The master cylinder employed on the TR7 is of the tandem variety using separate circuits for front and rear brake systems. Should a failure occur in one of the systems, the other will still be operational.

The main supply tank is translucent and has separate reservoirs so fluid loss in one of the systems will be immediately noticeable.

A pressure failure switch is incorporated into the main body of the master cylinder to illuminate a warning light on the fascia in the event of failure in one of the systems.

OVERHAUL PROCEDURE

1. Remove hydraulic pipes from the master cylinder (plug exposed parts).
2. Remove wires to the pressure failure switch.
3. Remove two nuts and separate master cylinder from servo.
4. Remove filler cap (drain tank and refit cap).
5. Remove two pozidriv tank retaining screws.

6. Remove tank from master cylinder.
7. Remove two rubber seals from cylinder recesses.
8. Extract circlip from the cylinder bore mouth and withdraw the primary piston and return spring.
9. Insert soft metal rod into the cylinder and depress the secondary piston. This will release the stop pin situated adjacent to the secondary piston feed port. Remove pin and withdraw secondary piston and return spring.
10. Using fingers only, remove rubber seals, piston washers and spring retainers taking note of their positions.
11. Unscrew pressure failure switch from cylinder body.
12. Unscrew plug and remove distance piece and failure switch valve complete with spring.

REASSEMBLY

13. With the curved edge facing away from the fluid feed holes, locate a new piston washer on the secondary piston.
14. Using fingers only, ease one of the two similar main cups in the repair kit over the nose of the piston, clip facing away from piston washer.
15. Repeat procedure on primary piston.
16. Again using fingers only, seal the thinner of the two remaining cups onto the undrilled end of the secondary piston with the clip facing away from the cup at the opposite end.

17. The remaining cup is seated with fingers only into the groove at the bored end of the primary piston with the lip facing in the same direction as the cup at the other end of the primary piston.
18. Insert secondary piston return spring and spring retainer.
19. Insert secondary piston taking care not to bend back lip of leading seal. With a soft metal rod, depress the piston. When the piston head is seen to pass the feed port, insert the piston stop pin.
20. Enter the return spring, retainer and primary piston into bore ensuring the seal lip is not bent back. Fit the circlip.

PRESSURE FAILURE SWITCH VALVE

21. Carefully seat two new 'O' ring seals into the grooves on the piston and spring subassembly. Enter the assembly complete with spring and retainer into the bore taking care not to damage the rings.
22. Insert the metal distance piece and fit the end plug with a new copper washer. Tighten to a torque of 33 lbs/ft.
23. Position the two rubber seals into the cylinder body recesses. Ensure tank is clean and insert the two fluid feed tubes into the rubber seals. Insert the two securing screws and tighten to a torque of 12 lbs/ft.
24. Refit the master cylinder to the servo unit and tighten the nuts to 13 lbs/ft.
25. Reconnect fluid feed pipes and tighten tube nuts just sufficiently to prevent leakage.

26. Thoroughly bleed brakes.
27. Finally fit electrical failure switch. If switch is fitted prior to bleeding, the bleeding procedure will simulate brake failure causing movement of the switch valve and the electrical switch when bleeding brakes.

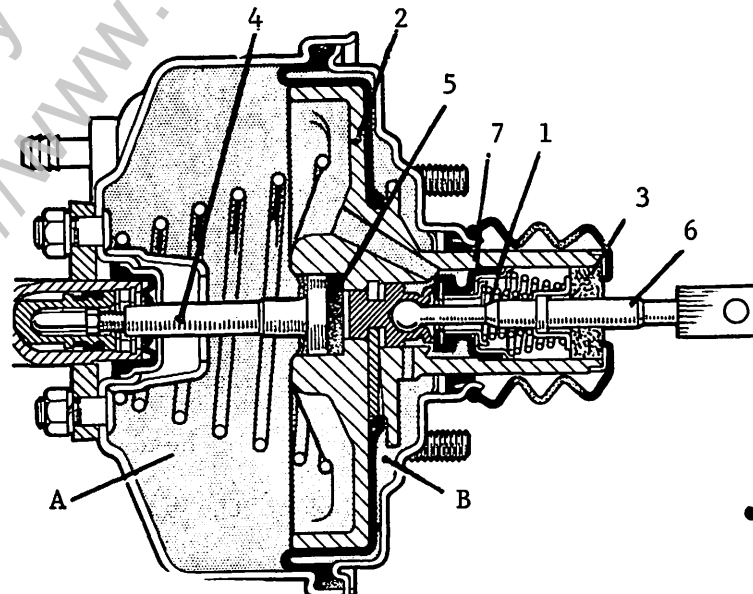
The torque of the switch is critical. If correct torque of 15 lbs/in. is exceeded, switch may fail to operate.
28. Check for leaks and road test.

BRAKE SERVO

BRIEF DESCRIPTION

The servo used on the TR7 is of the Lockheed direct acting type utilizing manifold depression to create a vacuum each side of a large diaphragm.

When the brake pedal is depressed, air under atmospheric pressure is admitted to the rear of the diaphragm providing power assistance. Should the vacuum fail, there is still a direct link between the brake pedal and the master cylinder giving unassisted braking.



OPERATION

RELEASED CONDITION

In the released condition, chambers A & B are interconnected and both exhausted via the vacuum connection attached to the engine inlet manifold.

The piston assembly and diaphragm are fully retracted by the large spring. The air valve body is held by the spring (1) against the seat formed in the face of the piston which is crimped onto the ball end of the push rod (b).

BRAKES APPLIED

Initial forward movement of the push rod allows the spring (1) to deform the air valve body (7) until its face seals the port in the face of the stem of the piston (2) and sealing off chamber B from chamber A.

Further forward movement of the push rod causes its piston to leave the face of the air valve body and air entering through the filter (3) passes through the bore of the air valve body into chamber B. The entering air, being at atmospheric pressure, thrusts the piston (2) and master cylinder push rod (4) forward and applies the brakes.

BRAKES HELD

The hydraulic resistance encountered in the braking system via the master cylinder push rod (4) exerts a reaction force on the rubber disc. (5). The disc is extruded in the bore of the piston until it is in contact with and exerts a force on the piston at the head of the push rod (6). This force balances the effort applied to the brake pedal and further movement of the push rod is arrested. The piston (2) continues to move to the

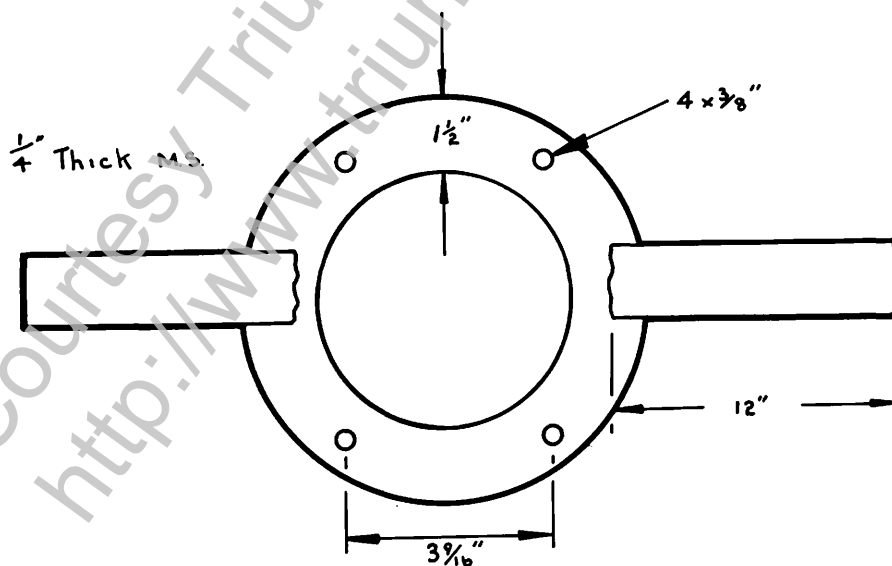
left, carrying the air valve body with it. As soon as the face of the air valve again contacts the sealing face of the push rod piston, the air supply to chamber B is cut off and a balanced condition, with the brakes partly applied, exists. Increased pedal pressure destroys this balance. The piston moves away from the air valve body. Air is again admitted to chamber B and heavier brake application results.

RECUPERATING CONDITION

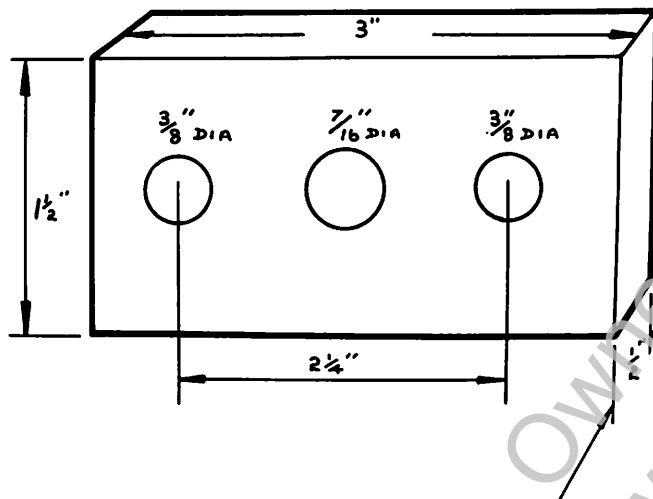
When the load is removed from the brake pedal, the push rod and piston (6) and the air valve (7) return to their original position. The air valve closes and the vacuum passage between chambers A and B is reopened and a balanced pressure exists on both sides of the piston (2).

TOOLS REQUIRED FOR OVERHAULING SERVO

SPECIAL TOOLS



SERVO COVER REMOVAL TOOL



DUMMY MASTER CYLINDER FLANGE

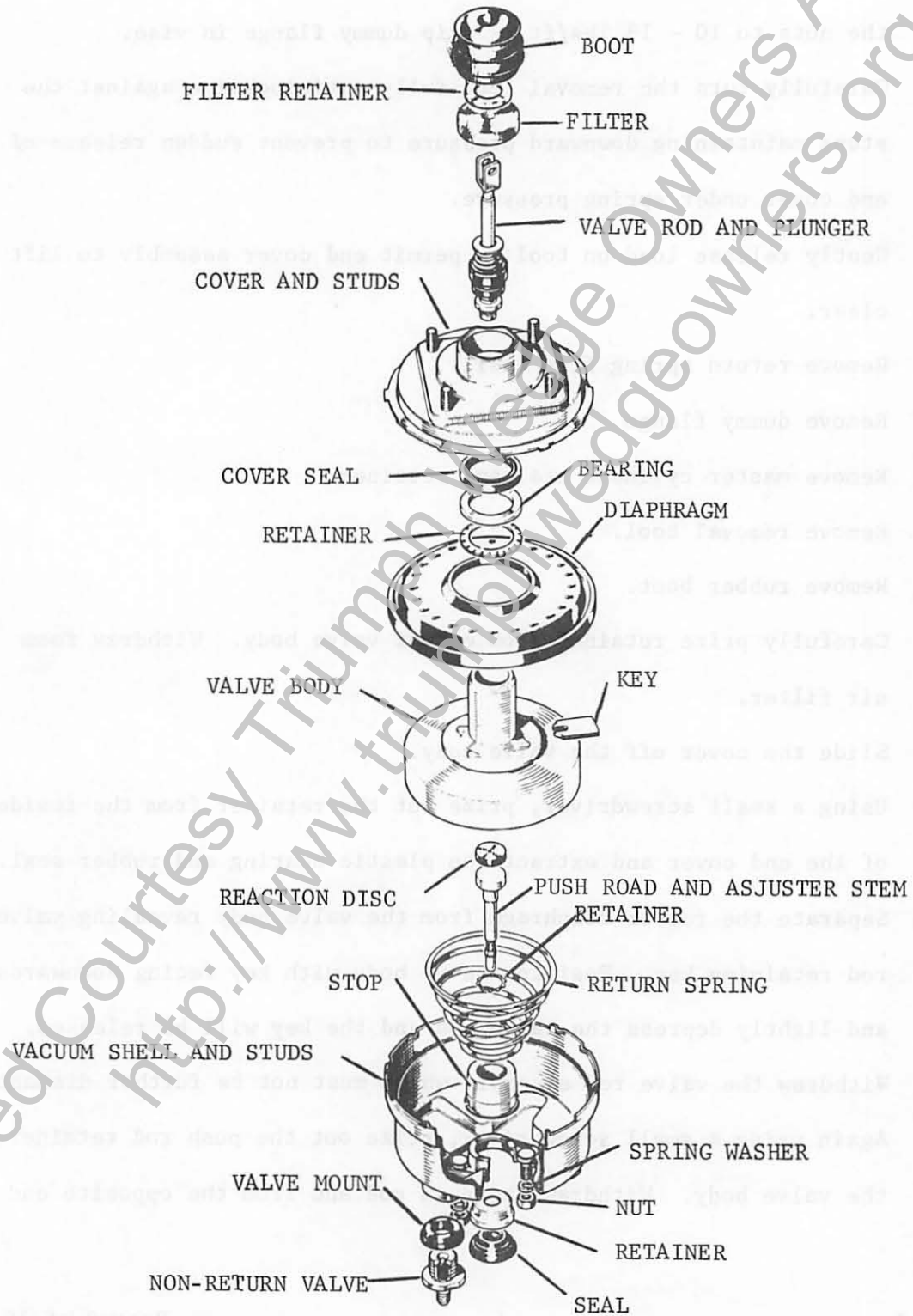
SERVO

OVERHAUL PROCEDURE

1. Disconnect - hydraulic pipes (plug exposed ports)
2. Disconnect - vacuum hose
3. Disconnect - wires to pressure failure switch
4. Disconnect - brake pedal from servo valve rod.
5. Remove servo and master cylinder assembly and empty the supply tank.
6. Position cover removing tool over the four mounting studs. Fit the four nuts and tighten to 10 - 13 lbs/ft.
7. Mark the servo and shell in line with master cylinder to maintain correct relationship on reassembly.
8. Support unit by gripping one arm of the removal tool in a vise. Unscrew two nuts and separate the master cylinder from the servo, (the

- rubber seal and retainer fitted between master cylinder and servo will usually be left in servo shell and can be removed later).
9. Fit the dummy master cylinder flange over the two studs and tighten the nuts to 10 - 13 lbs/ft. - grip dummy flange in vise.
 10. Carefully turn the removal tool fully anticlockwise against the stops maintaining downward pressure to prevent sudden release of end cover under spring pressure.
 11. Gently release load on tool to permit end cover assembly to lift clear.
 12. Remove return spring from shell.
 13. Remove dummy flange
 14. Remove master cylinder seal and retainer.
 15. Remove removal tool.
 16. Remove rubber boot.
 17. Carefully prize retainer from end of valve body. Withdraw foam air filter.
 18. Slide the cover off the valve body.
 19. Using a small screwdriver, prize out the retainer from the inside of the end cover and extract the plastic bearing and rubber seal.
 20. Separate the rubber diaphragm from the valve body revealing valve rod retaining key. Position valve body with key facing downwards and lightly depress the valve rod and the key will be released.
 21. Withdraw the valve rod assembly which must not be further dismantled.
 22. Again using a small screwdriver, prize out the push rod retainer from the valve body. Withdraw the push rod and from the opposite end of

the body, push out the rubber reaction disc using a pencil to prevent damage.

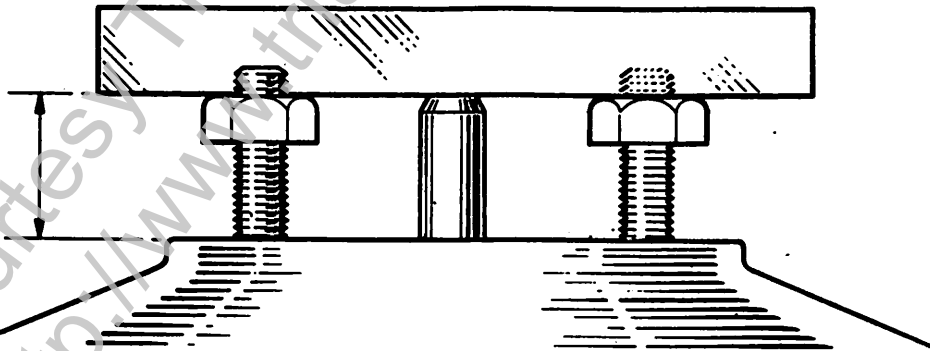


ASSEMBLY

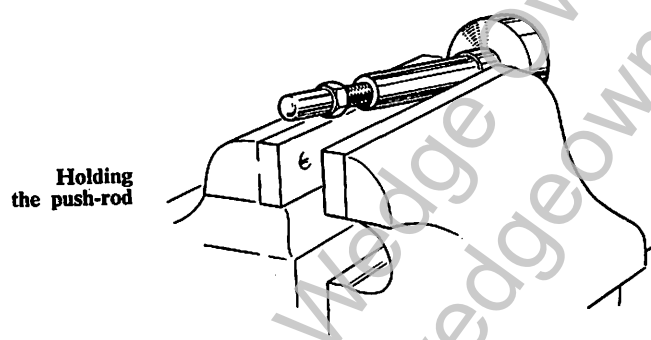
23. Lightly coat the rubber contact surfaces of the valve rod assembly with Lockheed disc brake lubricant. Seal rubber valve centrally and insert the assembly fully into the valve body.
 24. Place the valve rod retaining key into the valve body recess, slot towards valve rod. Depress the valve body and key will drop into place.
 25. Refit rubber diaphragm ensuring inner lip is seated in groove - lubricant must not be used on diaphragm.
 26. Lubricate a new rubber reaction disc with Lockheed disc brake lubricant and insert it into the valve body.
 27. Coat end cover seat and nylon bearing with disc brake lubricant and fit them to the end cover together with a new retainer.
 28. Slide the valve body fully into the end cover maintaining correct relationship.
- NOTE: Valve body retaining key above the valve rod in installed position.
29. With a pair of scissors or razor blade, cut the new foam filter from the center hole to the outside edge and fit it around the valve rod into the valve body recess. Press in filter retainer and rubber boot checking boot is correctly seated over lugs.
 30. Fit dummy cylinder flange and cover removal tool. Tighten both to 10 - 13 lbs/ft.
 31. Grip the dummy flange in a vise and position small end of return spring into shell recess.

32. Lightly smear the outside edge of the rubber diaphragm with disc brake lubricant. Holding the cover removal tool, guide the end cover over the vacuum shell slightly anticlockwise of correct fitted position.
33. Gently press the end cover down ensuring rubber diaphragm seats evenly and is not trapped. Align the notches with the indents and turn tool clockwise until lugs contact the ends of the shell recesses. The location marks on the shell end cover will then be aligned.
34. Release the dummy flange from the vise. Invert the unit and secure one arm of the removal tool in the vise. Remove the dummy flange.
35. Insert the push rod through the shell into the valve body.

NOTE: The distance the stem of the push rod protrudes from the shell is critical and must be checked accurately before continuing assembly.



36. Lay a metal straight edge across the two nuts. Pin down the studs to the correct height. The distance from the flat face of the shell to the tip of the push rod should be 0,403" - 0,413".
37. If the length of the push rod requires alteration, to avoid damage to the stem, grip the push rod in a vise by the shoulder adjacent to the head.



38. Check the torque required to turn the adjusting nut is not less than 5 lbs." Should the torque required be lower, then a new push rod adjuster assembly will be needed.

NOTE: One complete turn of the hexagon on the adjusting stem, alters the length of the rod by 0,035".

39. Coat the push rod with disc brake lubricant in the area below the adjuster nut and carefully insert the retainer in the end of the shell using suitable metal tubing. Avoid using force otherwise reaction disc could become compressed spoiling push rod setting. Fit rubber seal (very lightly greased) and ensure the seal is bedded down and the smooth portion of the push rod extends through

the seal leaving the adjusting nuts and threads exposed otherwise destruction of the vacuum may occur impairing the performance of the unit.

40. Mount the master cylinder on the studs with supply tank adjacent to vacuum hose connection and making sure that the master cylinder is fully seated into the rubber seal. Fit nuts and tighten to a torque of 10 - 13 lbs/ft. Release servo unit from vise and take off the cover removing tool.

FAILURE SENSITIVE PRESSURE REDUCING VALVE

DESCRIPTION

This valve, a non-serviceable item, is installed in the brake circuit between the master cylinder and front and rear wheel cylinders.

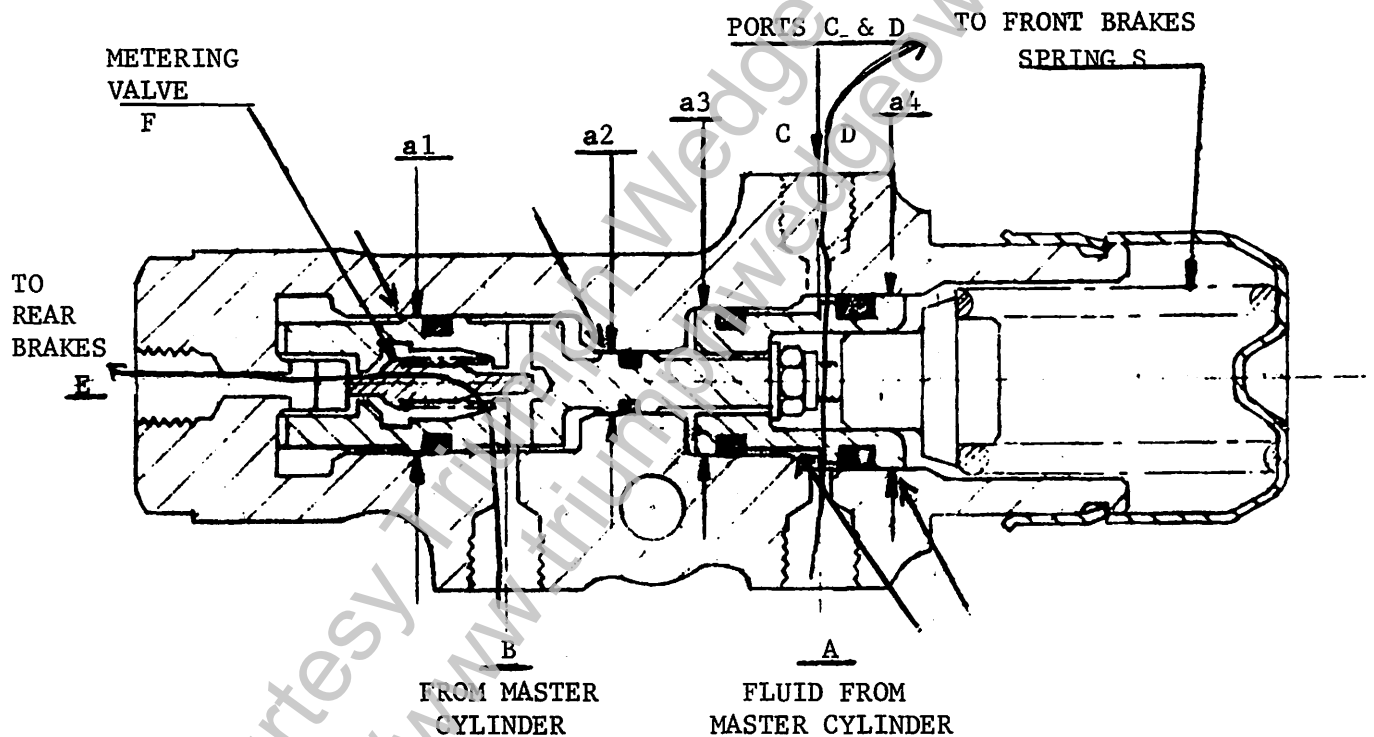
Its function is to limit the pressure applied to the rear brakes in proportion to the pressure applied to front brakes, thus reducing the possibility of the rear wheels locking under varying conditions of vehicle load and road surface.

The pressure reducing valve incorporates a primary and a secondary plunger which are bolted together.

The secondary plunger houses a metering valve assembly which is pushed towards the end plug of the reducing valve body by a light spring. A powerful coil spring pressing on the primary plunger forces both the plunger assemblies towards the end plug and in this position a boss on the end plug holds the metering valve open.

OPERATION

Fluid pressure from the primary chamber of the master cylinder is fed into the valve at port A and out to the front brakes via port C and D. The secondary master cylinder chamber feeds fluid into port B through internal passages in the valve plunger, past the metering valve and out to the rear brakes via port E. The large spring S is preloaded to bias the valve plunger to the left.



Hydraulic pressure acts on the annular area (a1 - a2) forcing the plunger towards the end plug. Area a1 and annular area (a2 - a3) tend to move the plunger to the right, away from the end plug, thereby closing the metering valve F. Pressure at the rear outlet port E therefore falls relative to input pressure. As the pressure is increased at port A and B, the plunger is forced to the left, opening the metering valve F, and

With REAR PRESSURE

allowing a small quantity of fluid to be fed to the rear brakes. The resultant increase in pressure acting on area a1 causes the plunger to again move towards the right, closing the metering unit valve. This procedure continues until there is no further increase in pressure from the master cylinder.

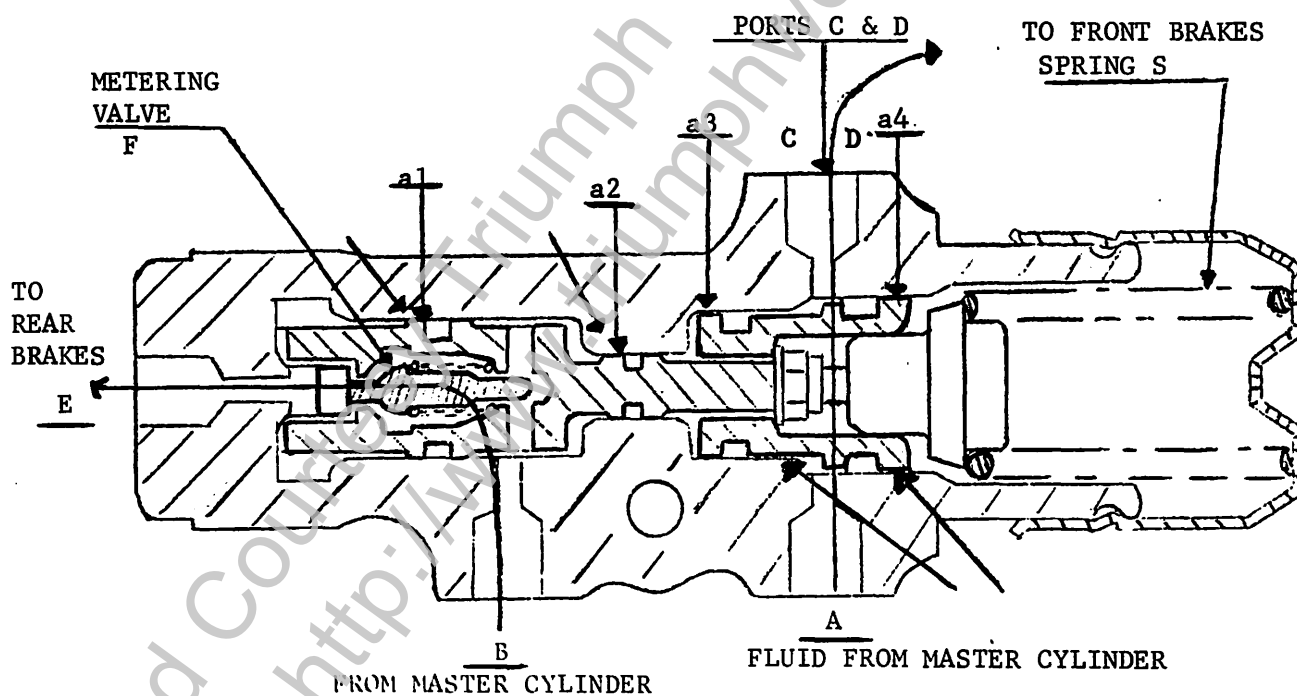
SHOULD FRONT BRAKES FAIL -

There will be no pressure at (a4 - a3) so valve will be open and pressure available to rear brakes.

SHOULD REAR BRAKES FAIL -

Valve inoperative - pressure fed to the front brakes in normal manner.

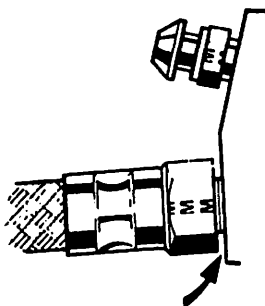
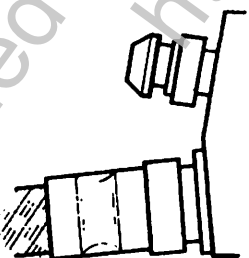
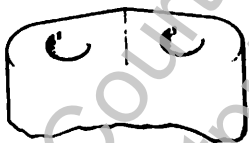
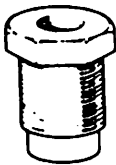
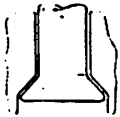
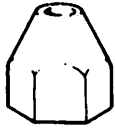
FAILURE SENSITIVE PRESSURE REDUCING VALVE



UNIFIED

METRIC

COMMENTS



The illustrations show metric and the equivalent Unified (U.N.F.) parts for comparison.

Metric pipe nuts, hose ends, unions and bleed screws are colored BLACK and most are also identified with the letter 'M'.

Metric pipe flares must be used.

End of a metric hose is also colored BLACK.

Metric parts are not counterbored - some U.N.F. threaded parts also had no counterbore - always check.

If the thread of a component is in doubt, screw the hydraulic connections and bleed screw fully in with the fingers. If they cannot be screwed right in or if they are unduly slack, the threads may not be compatible.

Metric hose seals against the bottom of the port, gap between hose hexagon and face of cylinder or calliper.