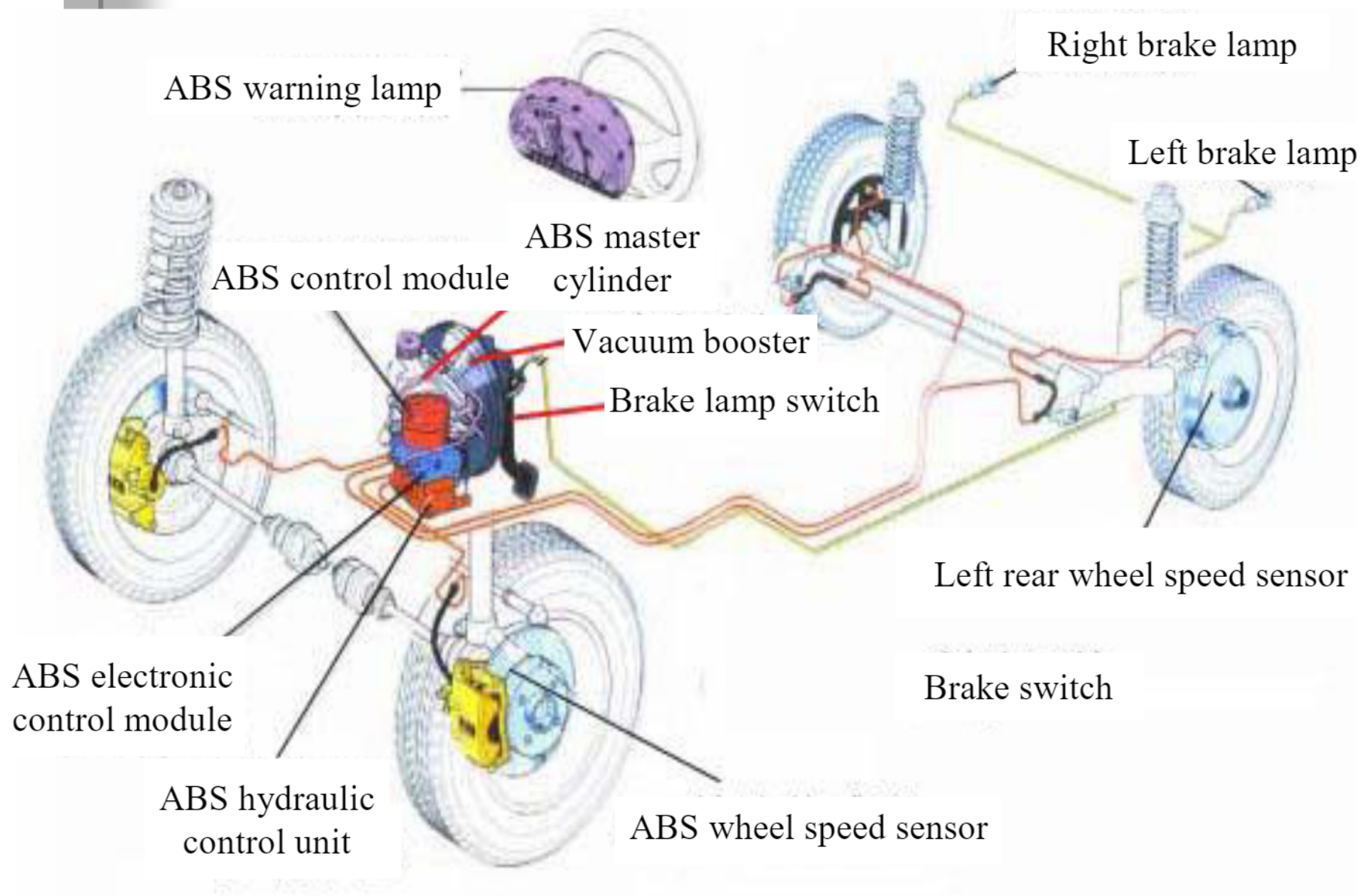


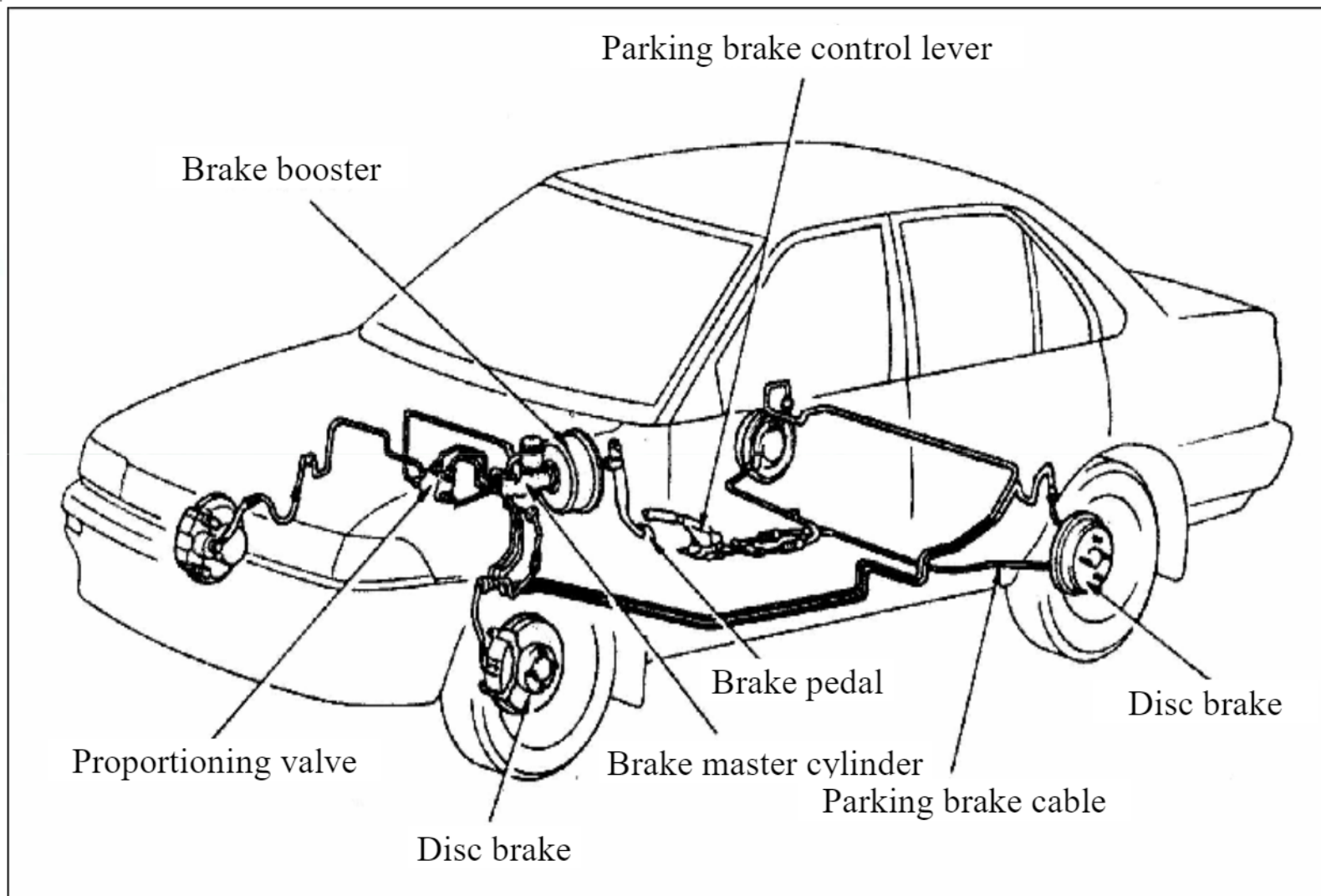
S11 Brake System



S11 Brake System Introduction

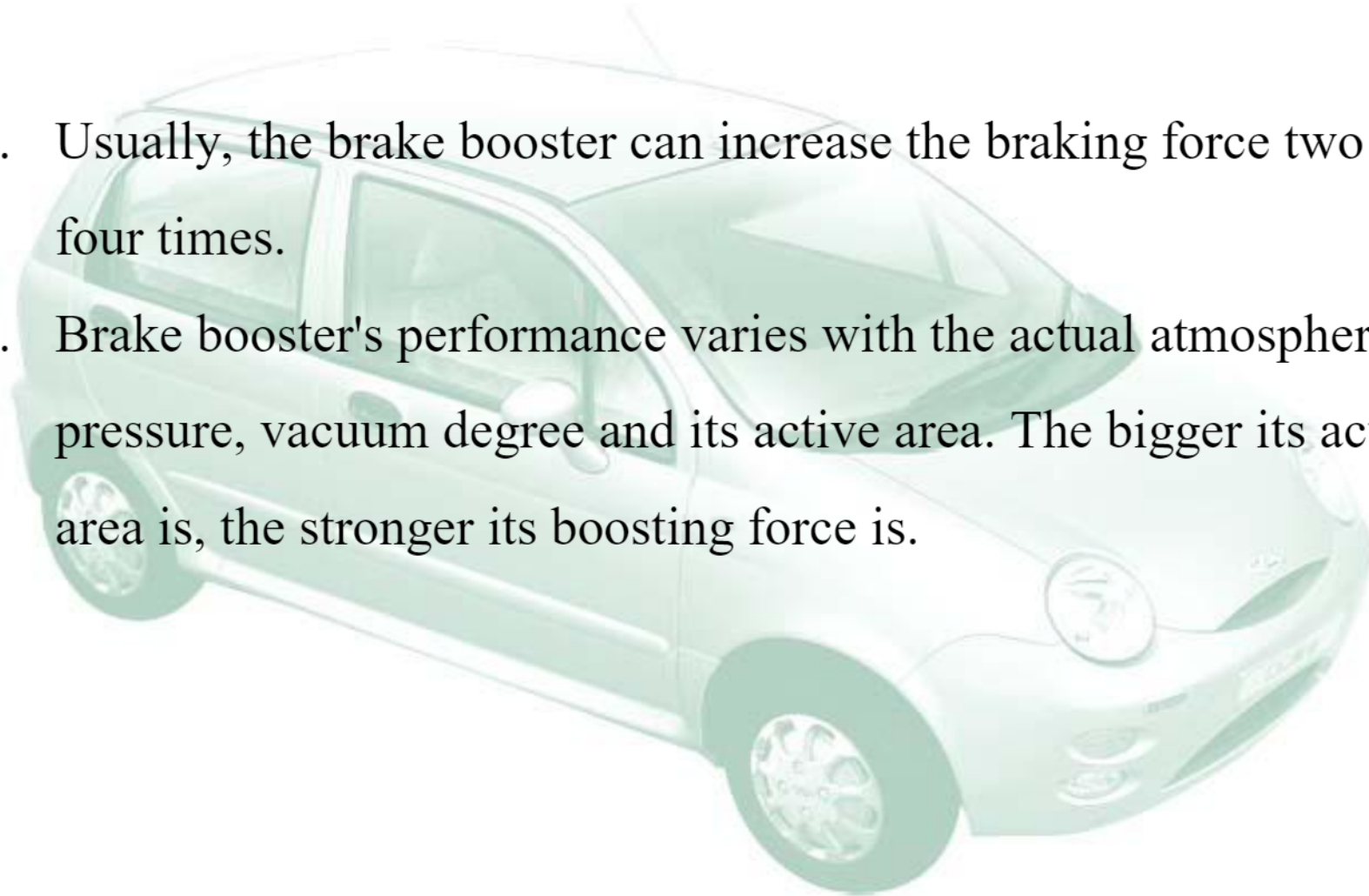


Composition of Ordinary Brake System

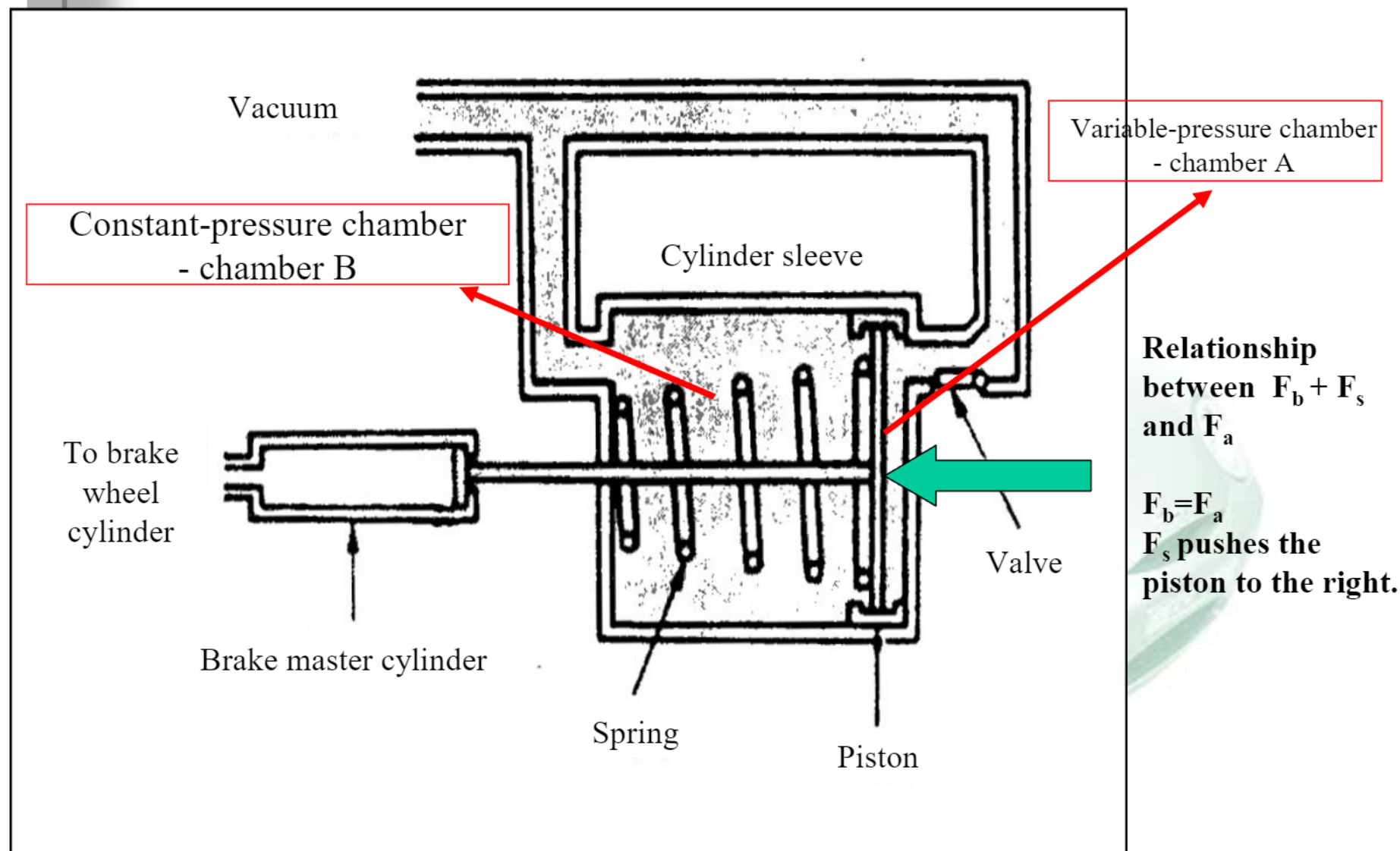


Brake Booster

1. Usually, the brake booster can increase the braking force two to four times.
2. Brake booster's performance varies with the actual atmospheric pressure, vacuum degree and its active area. The bigger its active area is, the stronger its boosting force is.



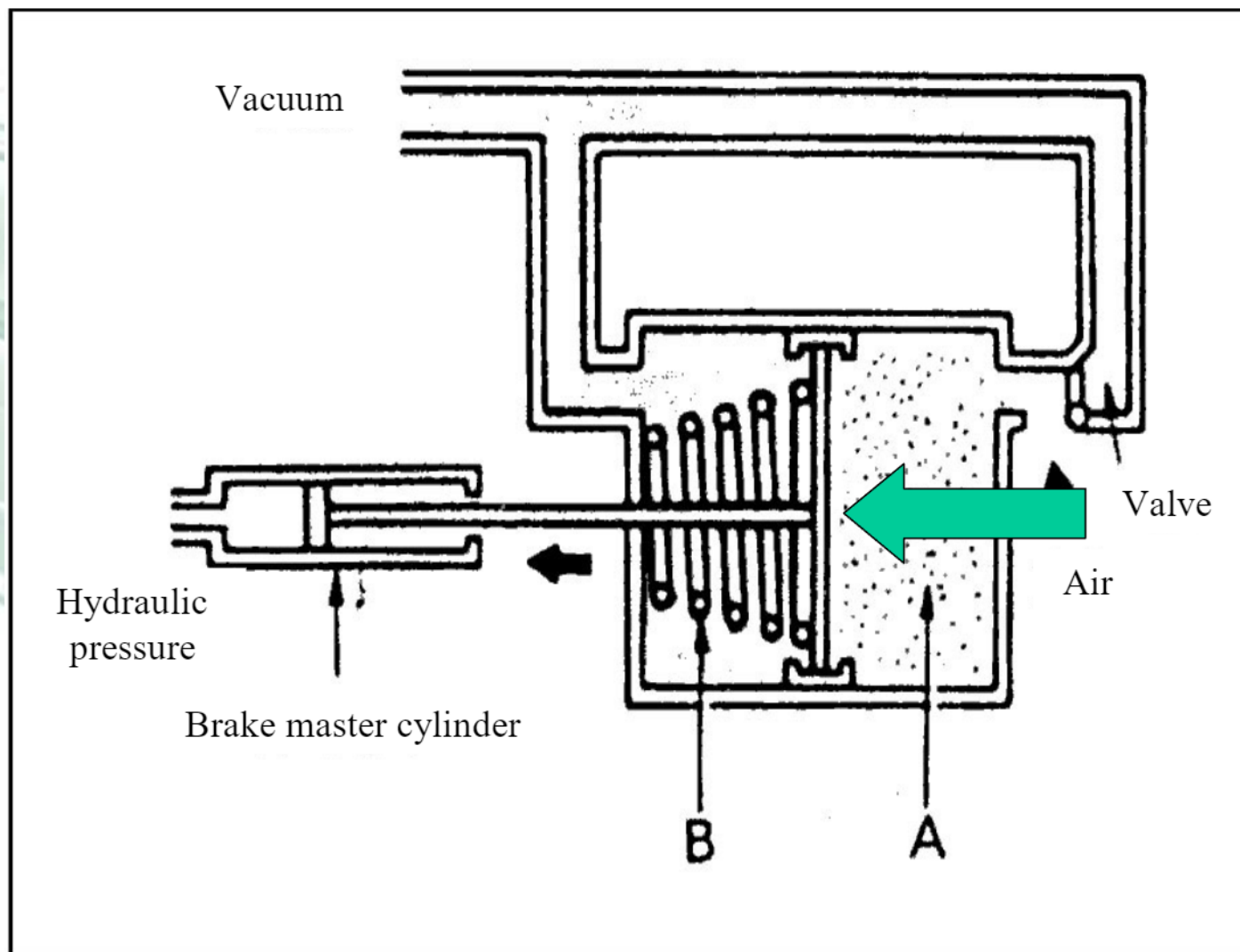
Brake Booster not in Braking



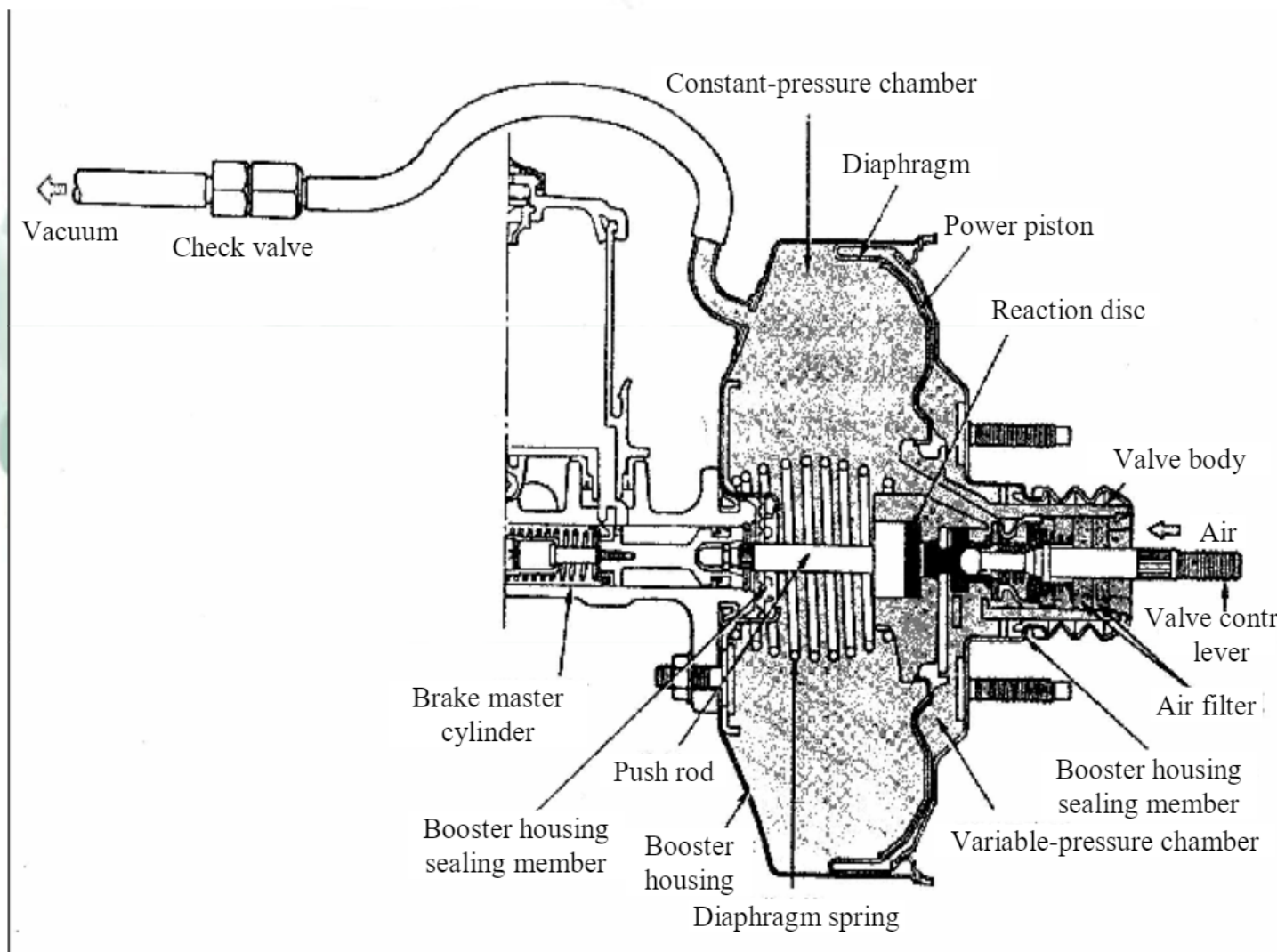
Brake Booster in Braking

Relationship
between $F_b + F_s$
and F_a

$F_b + F_s < F_a$
 **F_a pushes the
piston to the right**



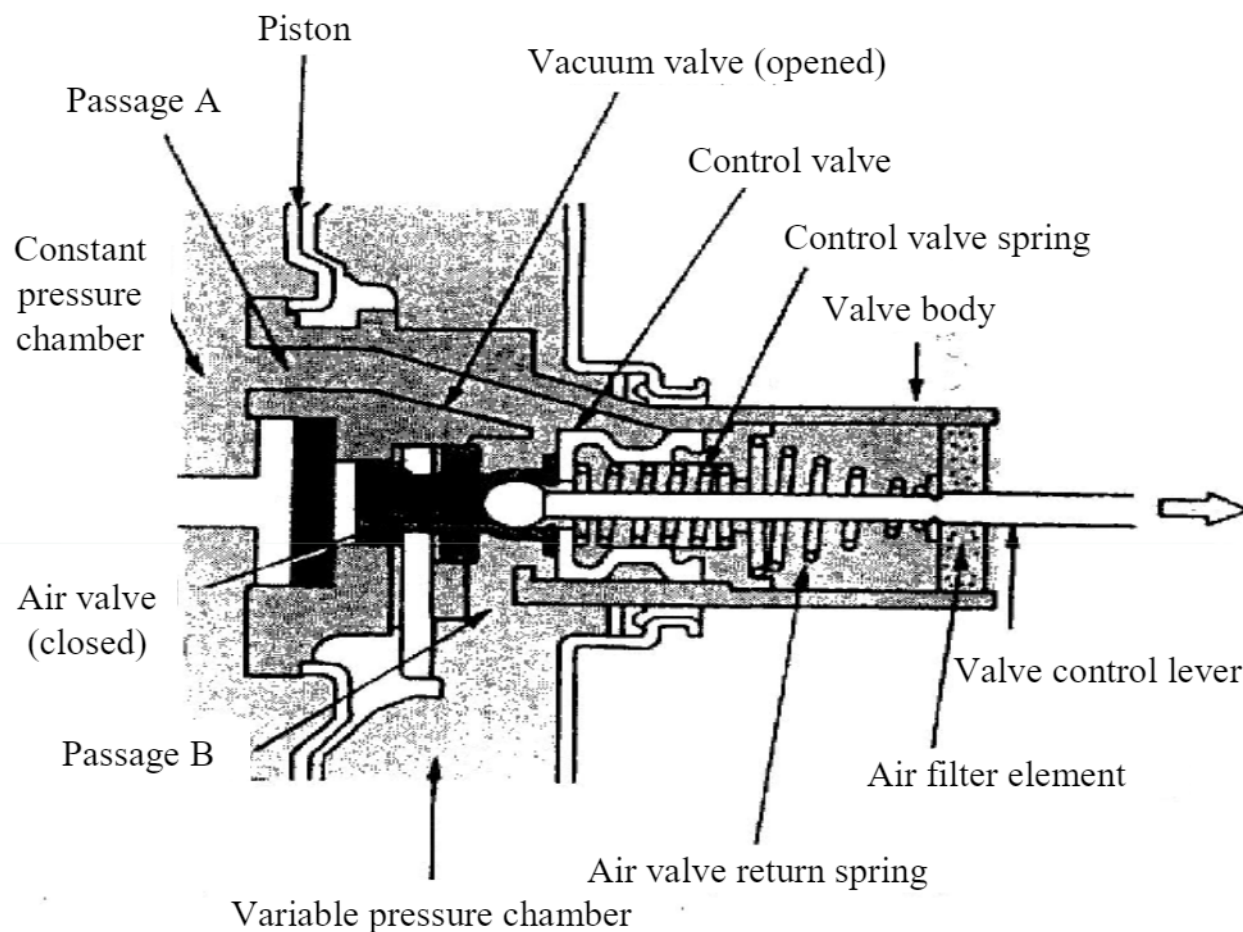
Brake Booster Structure



1. Brake Booster not in Braking

**Opened vacuum
valve & control
valve**

**A is connected
with B**

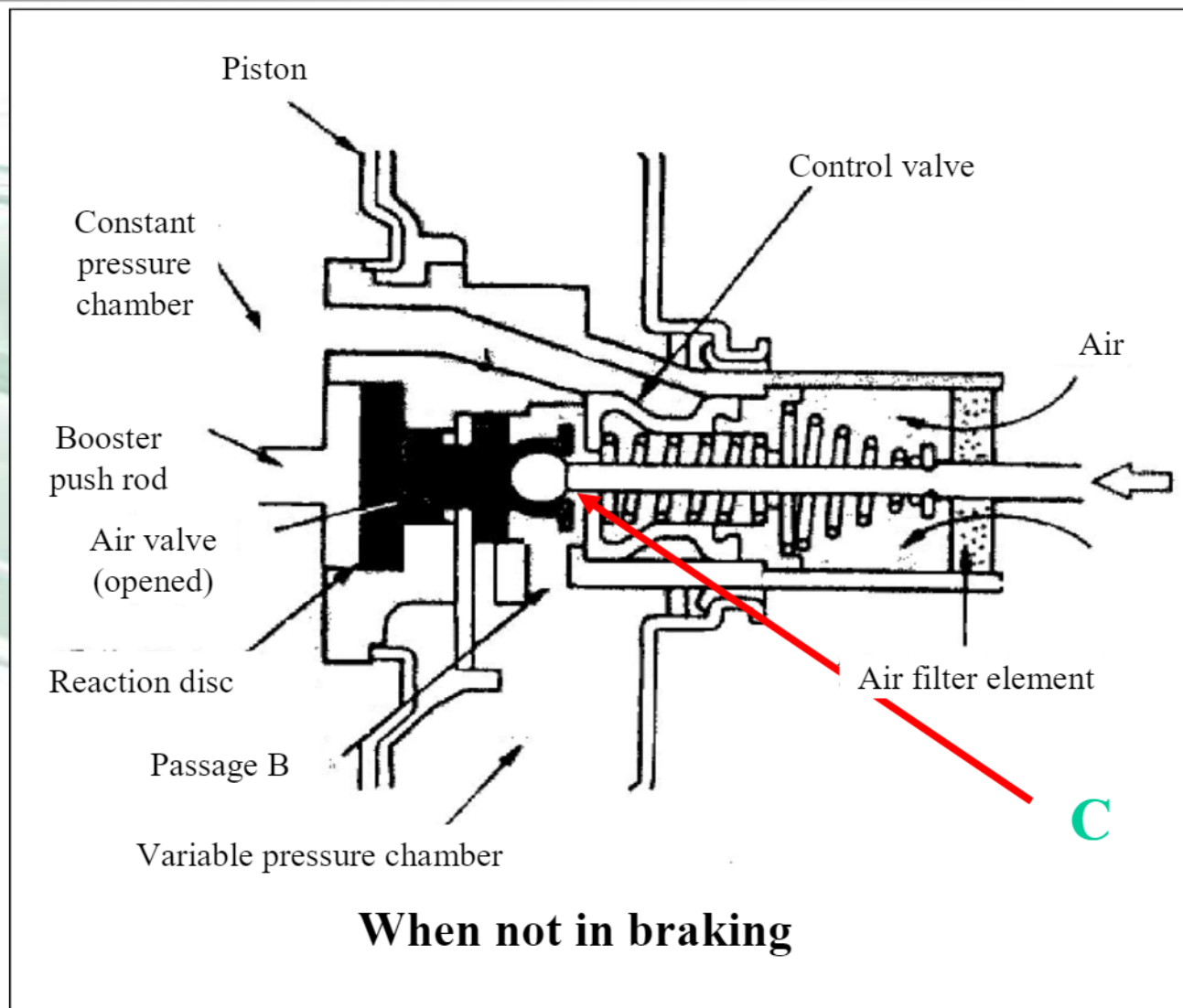


When not in braking

2. Brake Booster in Braking

**Closed vacuum
valve & control
valve**

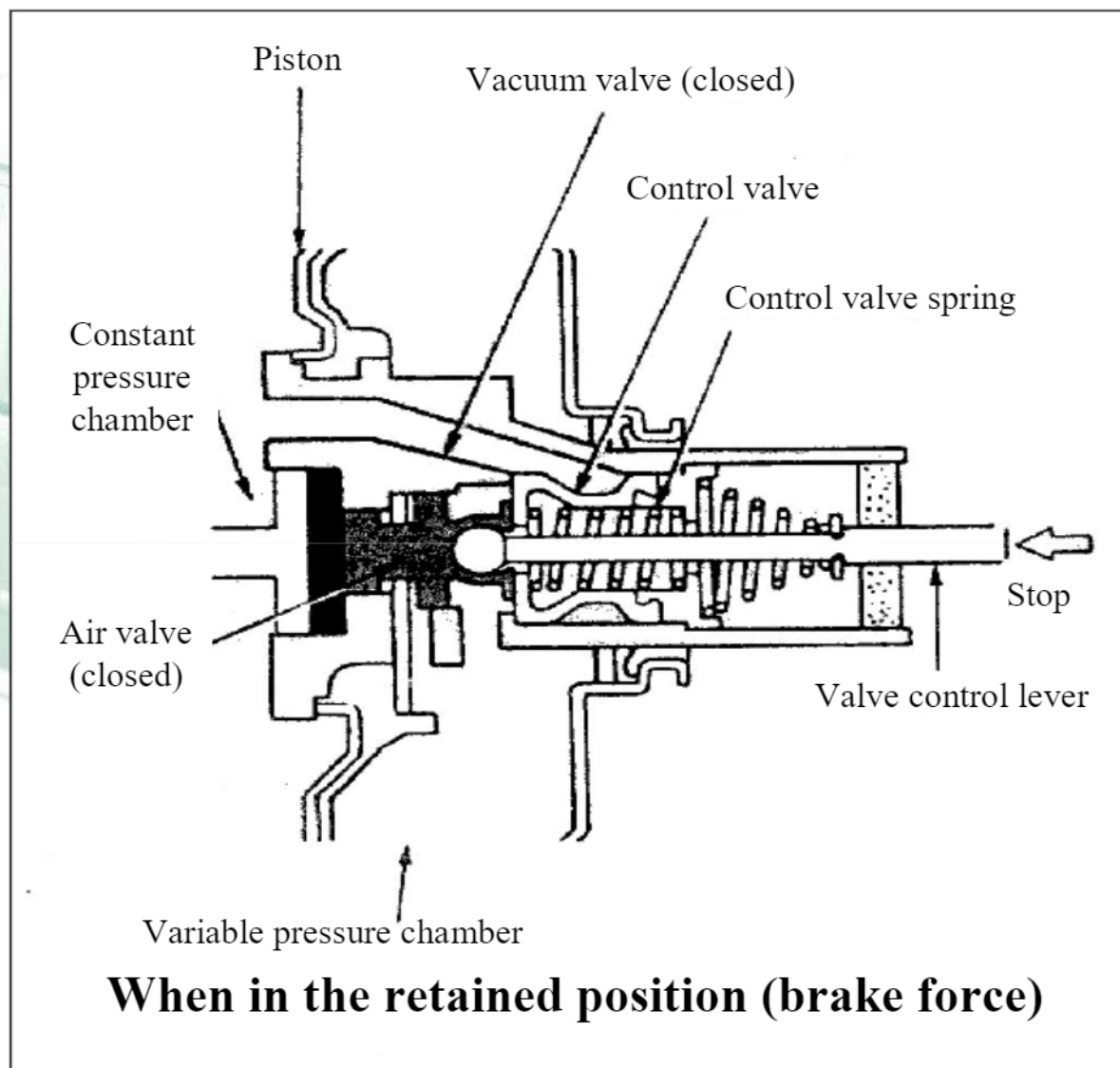
**A is not connected
with B
B is connected
with C**



3. Brake Booster in the Retained Position

**Closed vacuum
valve & control
valve**

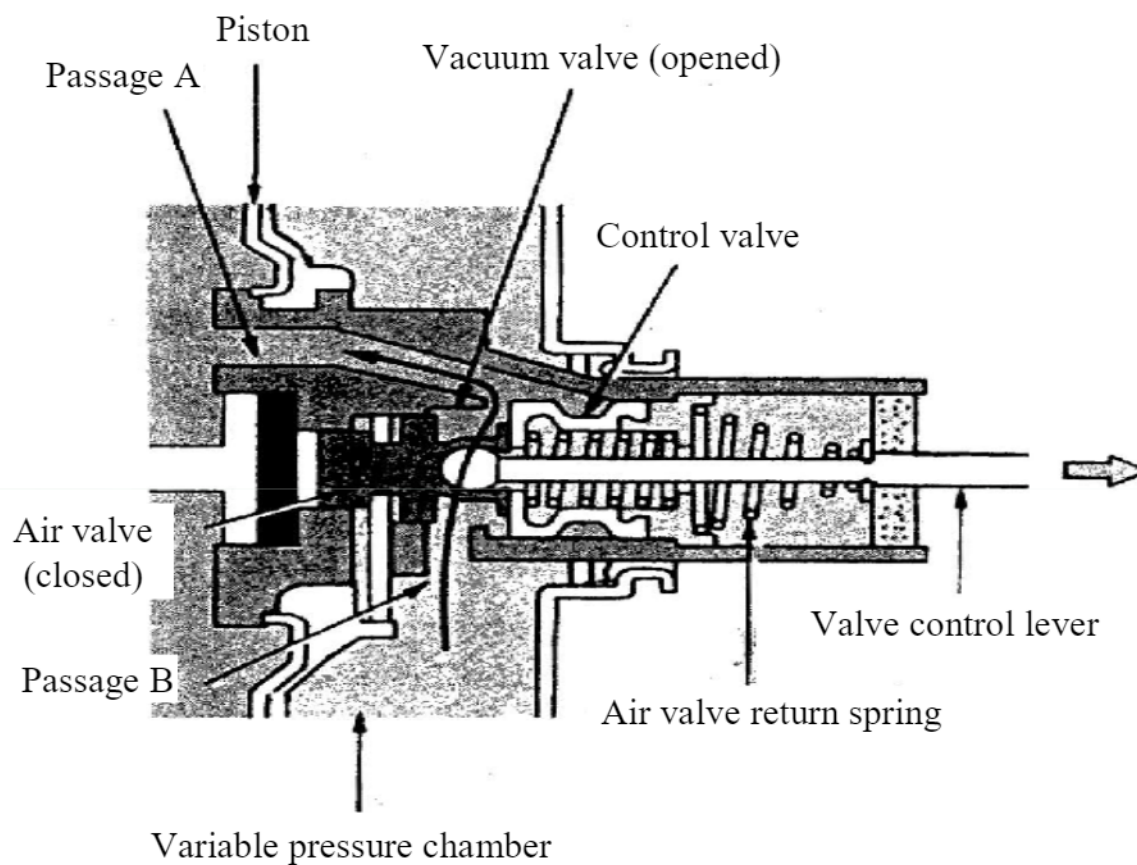
**A is not connected
with B or C**



4. Brake Booster in the Released Position

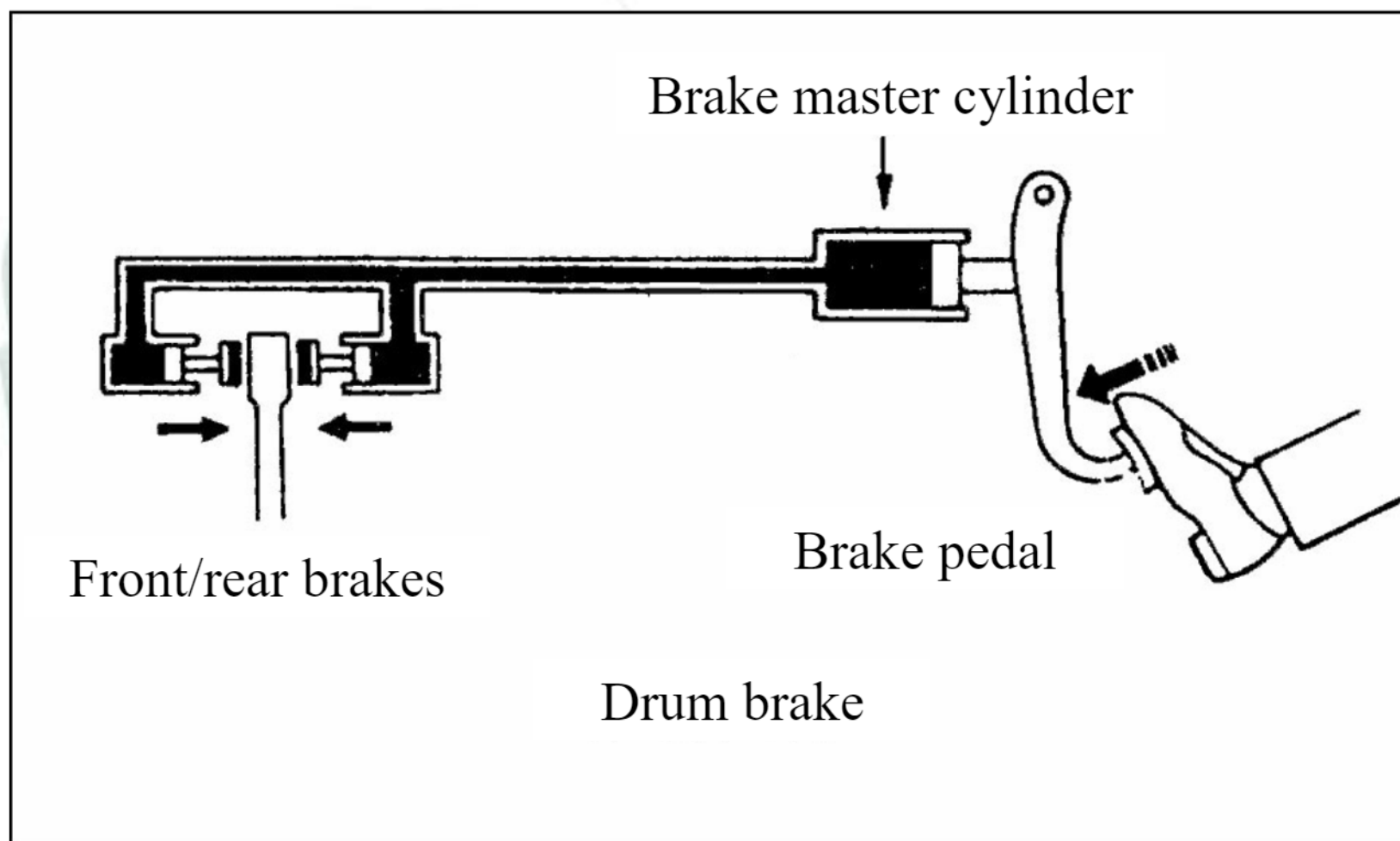
Opened vacuum
valve & control
valve

A is connected
with B and C

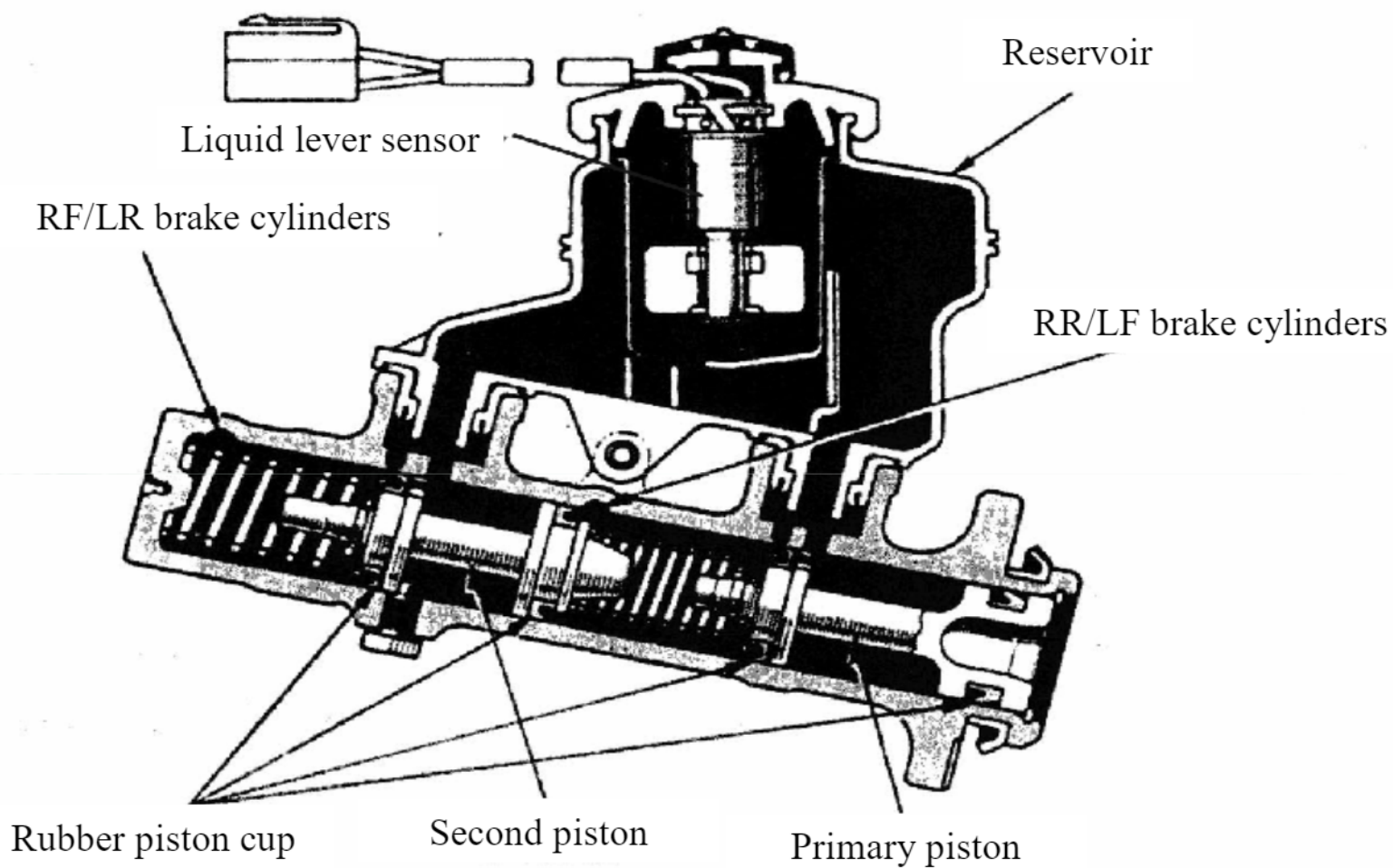


When in the released position (brake)

Purpose of Brake Master Cylinder

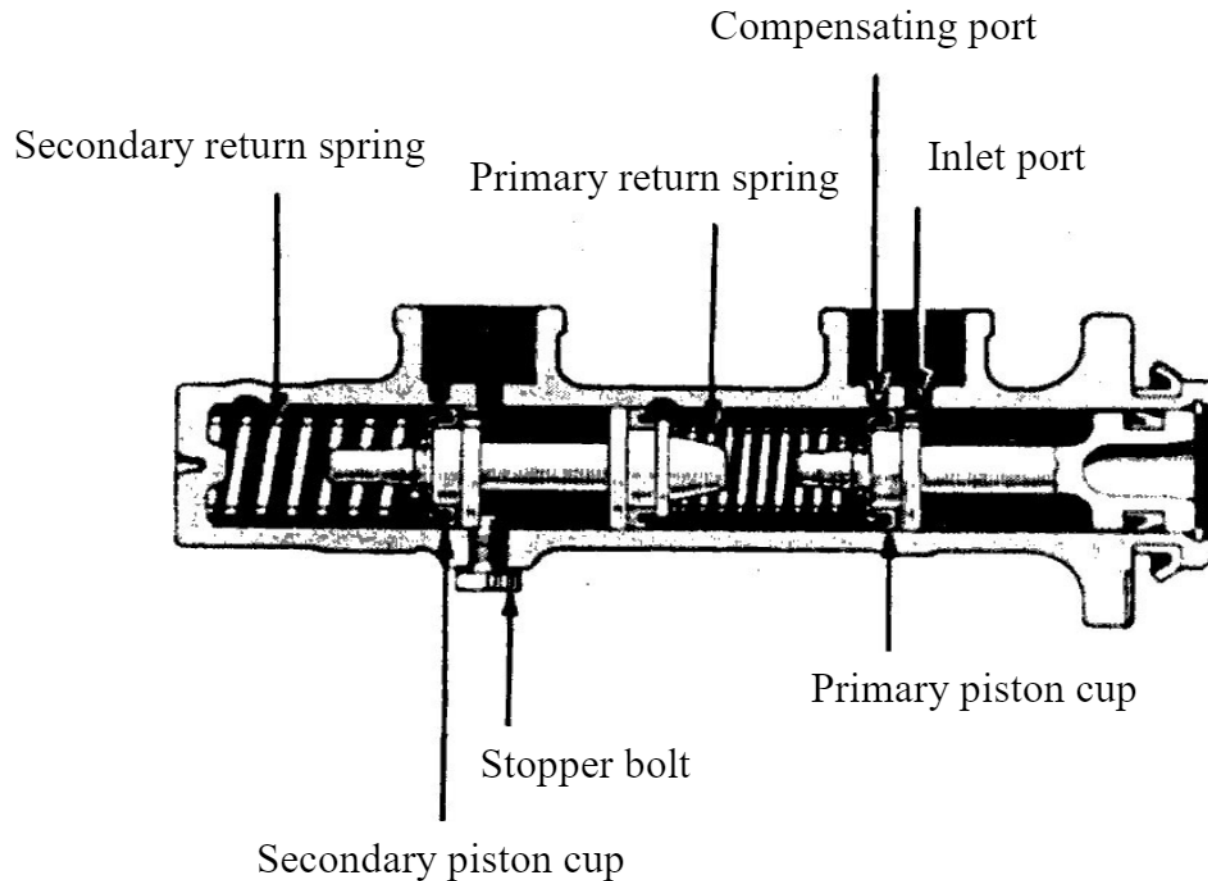


Brake Master Cylinder Structure



Tandem brake master cylinder

1. Brake Master Cylinder not in Braking

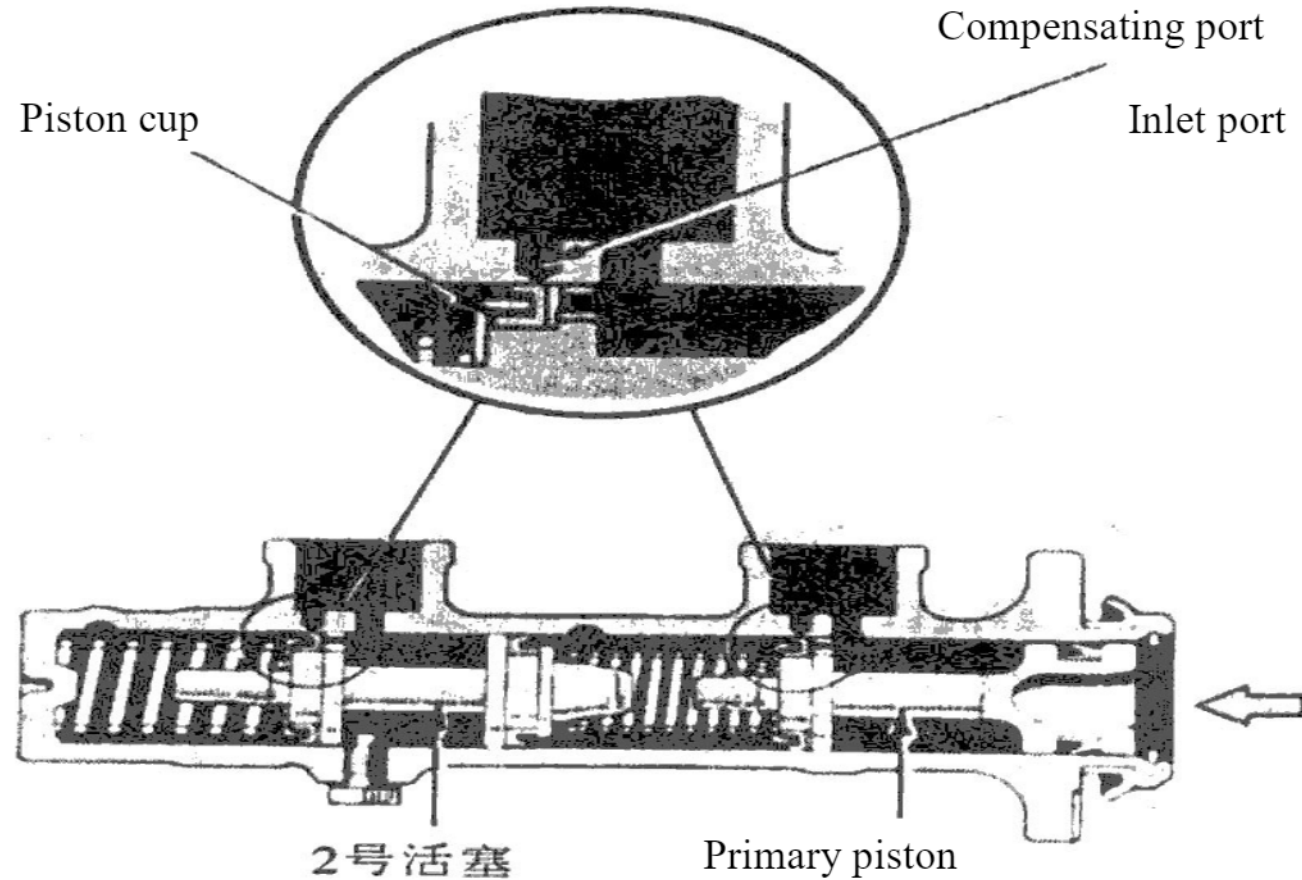


When not in braking

Piston cup is located between inlet port and compensating port

2. Brake Master Cylinder in Braking

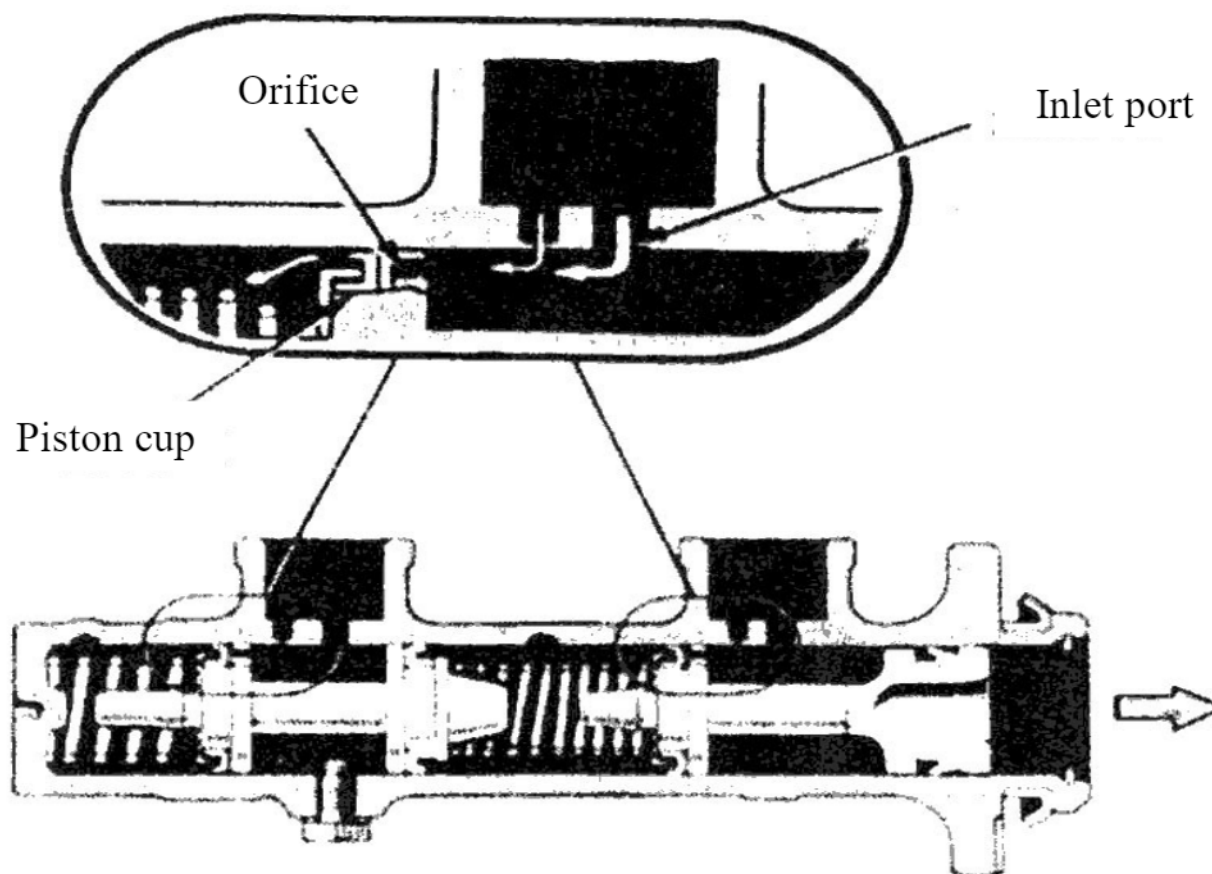
Both inlet port
and
compensating
port are closed
with the oil
pressure
increased



When in braking

3. Brake Master Cylinder when Released (1)

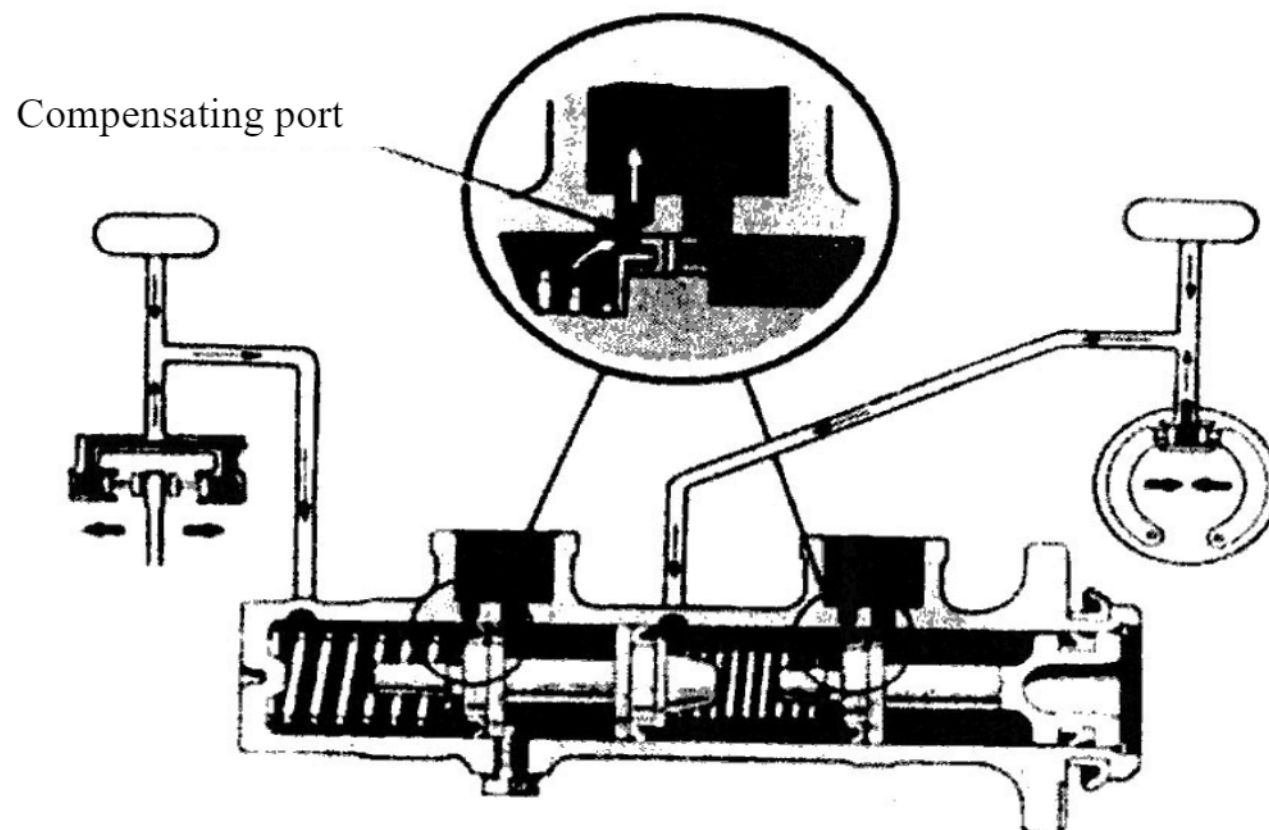
The orifice in the piston is opened and the brake fluid flows back to the piston-cup side



When brake pedal is released (1)

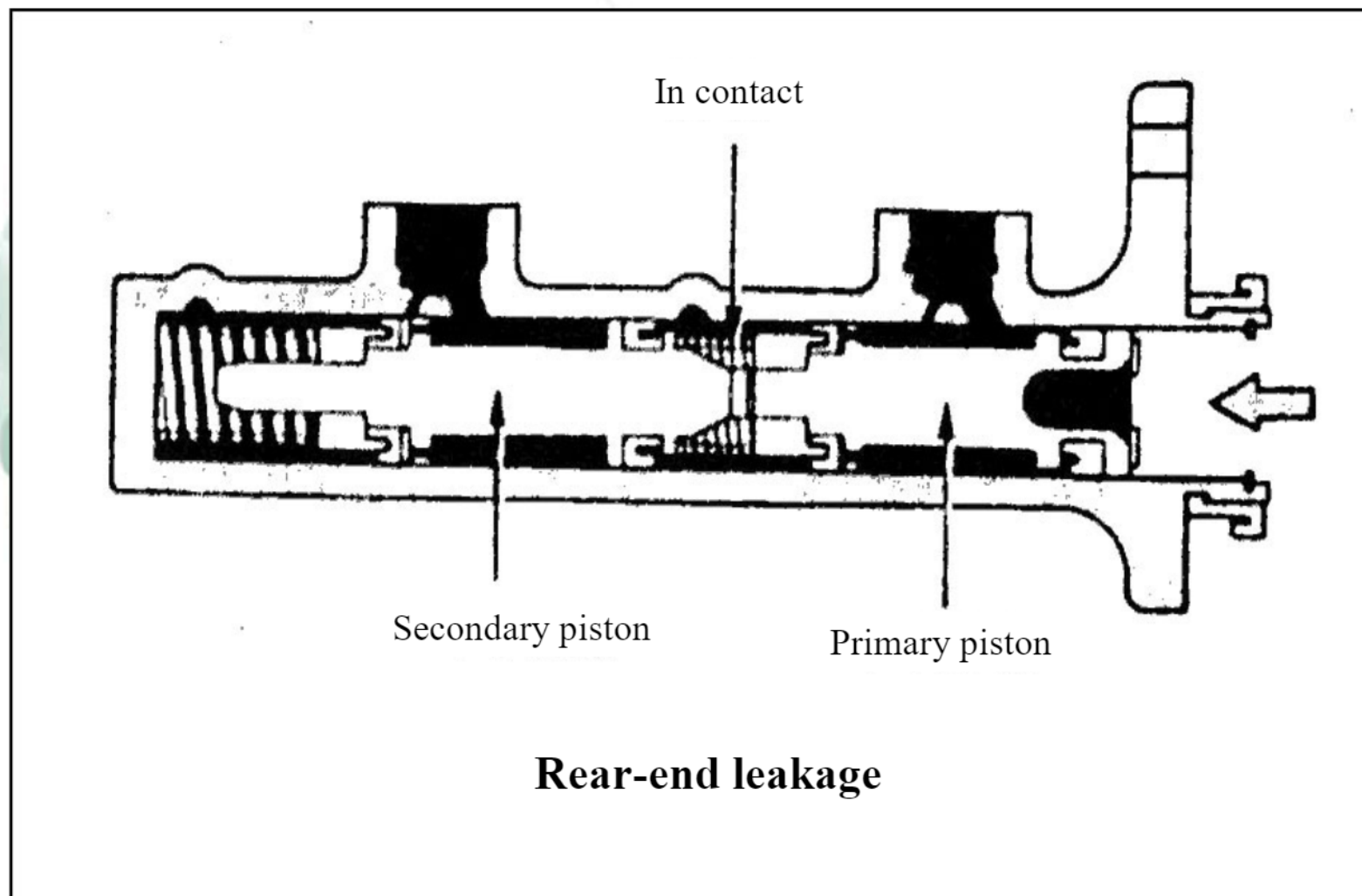
4. Brake Master Cylinder when Released (2)

The compensating port allows surplus fluid to flow back to the reservoir

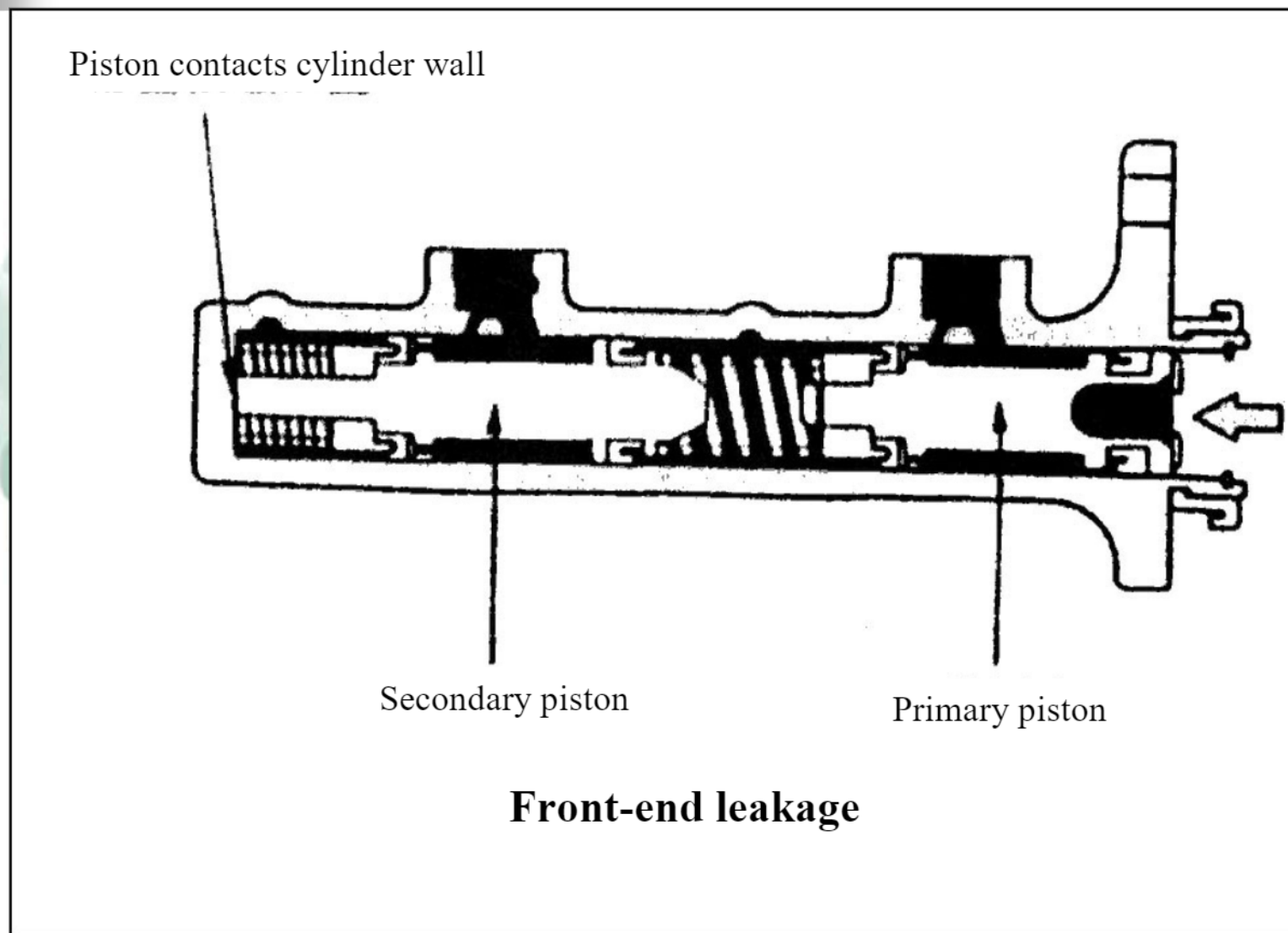


When brake pedal is released (2)

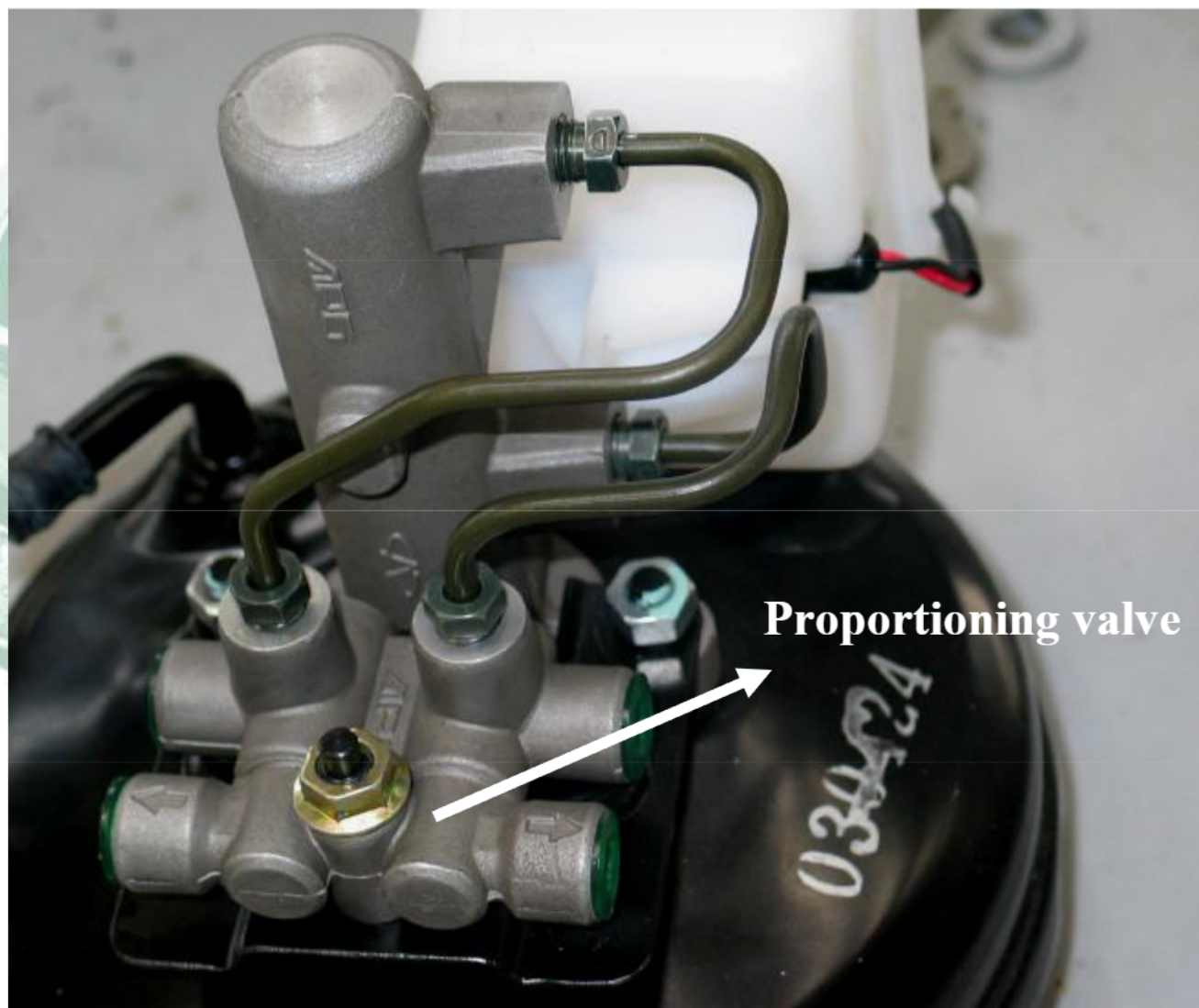
5. Rear-end Leakage



6. Front-end Leakage



Proportioning Valve



Importance of Proportioning Valve

1. Loads on front and rear wheels are different

The front wheels of the vehicle bear more of the vehicle weight than its rear wheels. In addition, its center of gravity will move forward when in braking, resulting in increased load on front wheels and reduced load on rear wheels. The bigger the braking force is, the more obvious this change is.

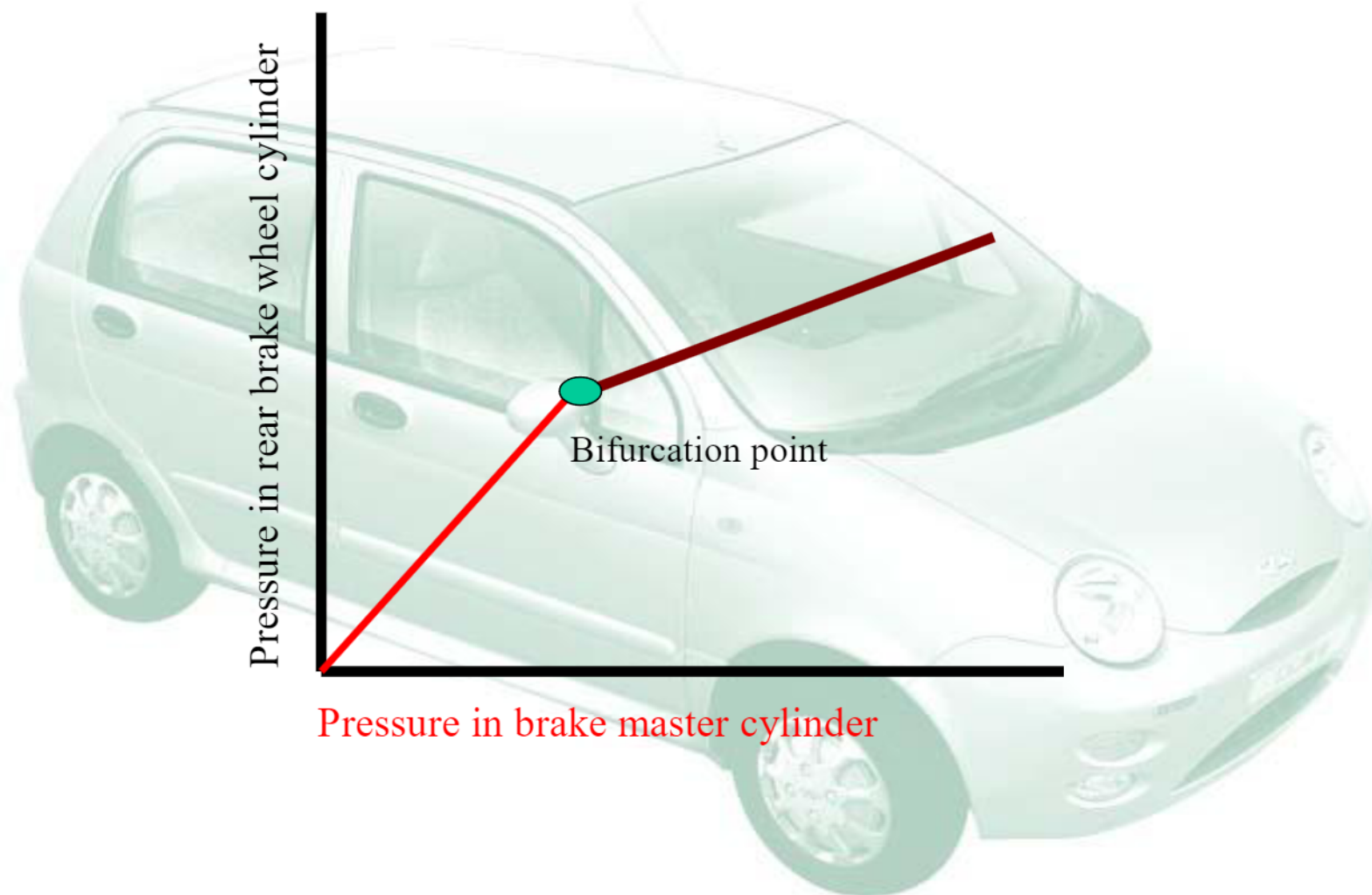
2. The risk of too early locking of rear wheels

When in braking, the load on rear wheels is light, and this causes them to be easily locked too early, thereby resulting in lateral sway of the vehicle body's rear half.

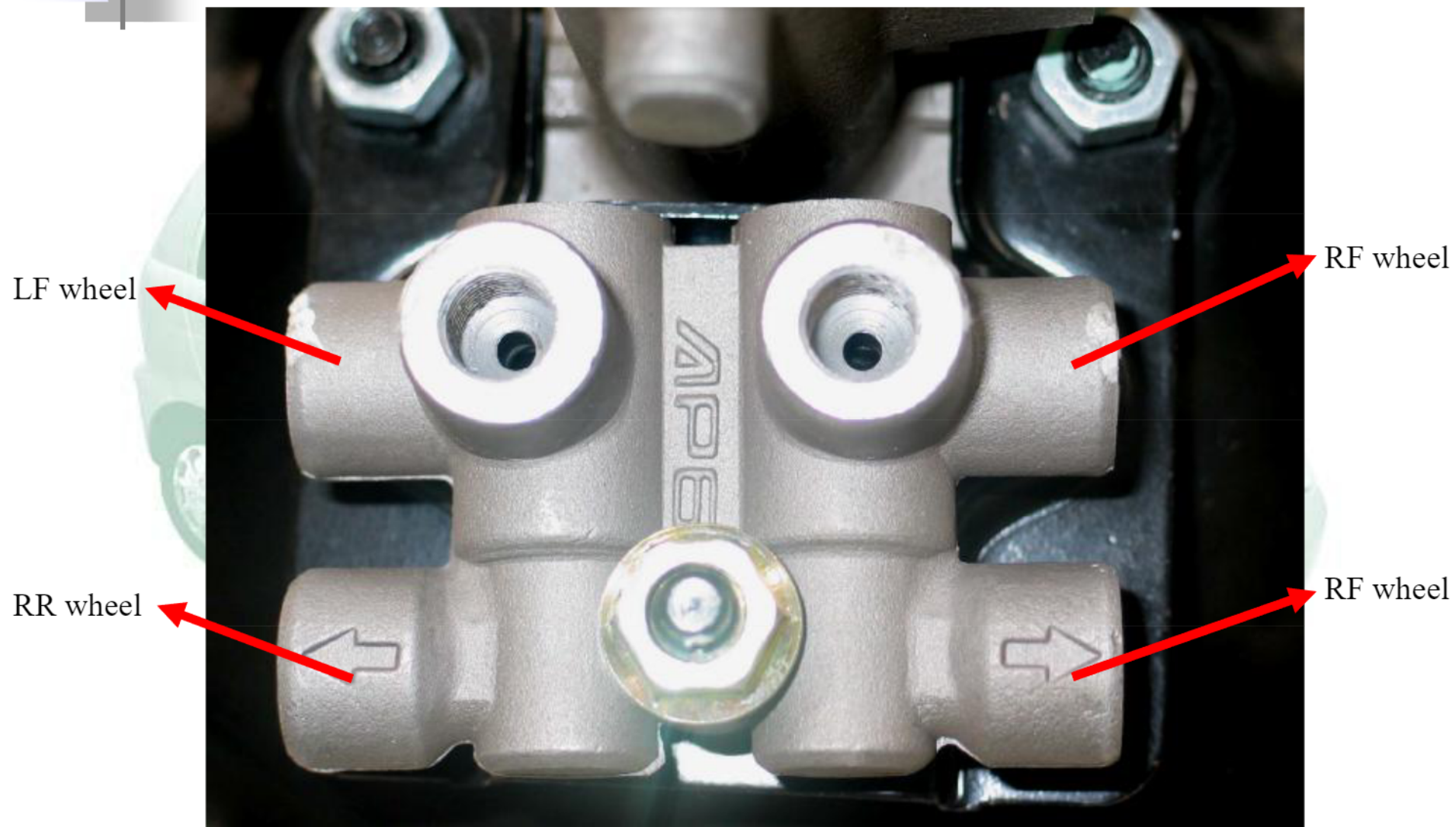
3. Measure to prevent the above problem from happening

Proportioning valve: to automatically reduce hydraulic pressures delivered from brake master cylinder to rear-wheel brake wheel cylinders. Pressure reduction is in proportion to the stepping force on the brake pedal.

Requirements on Rear-wheel Brake Force

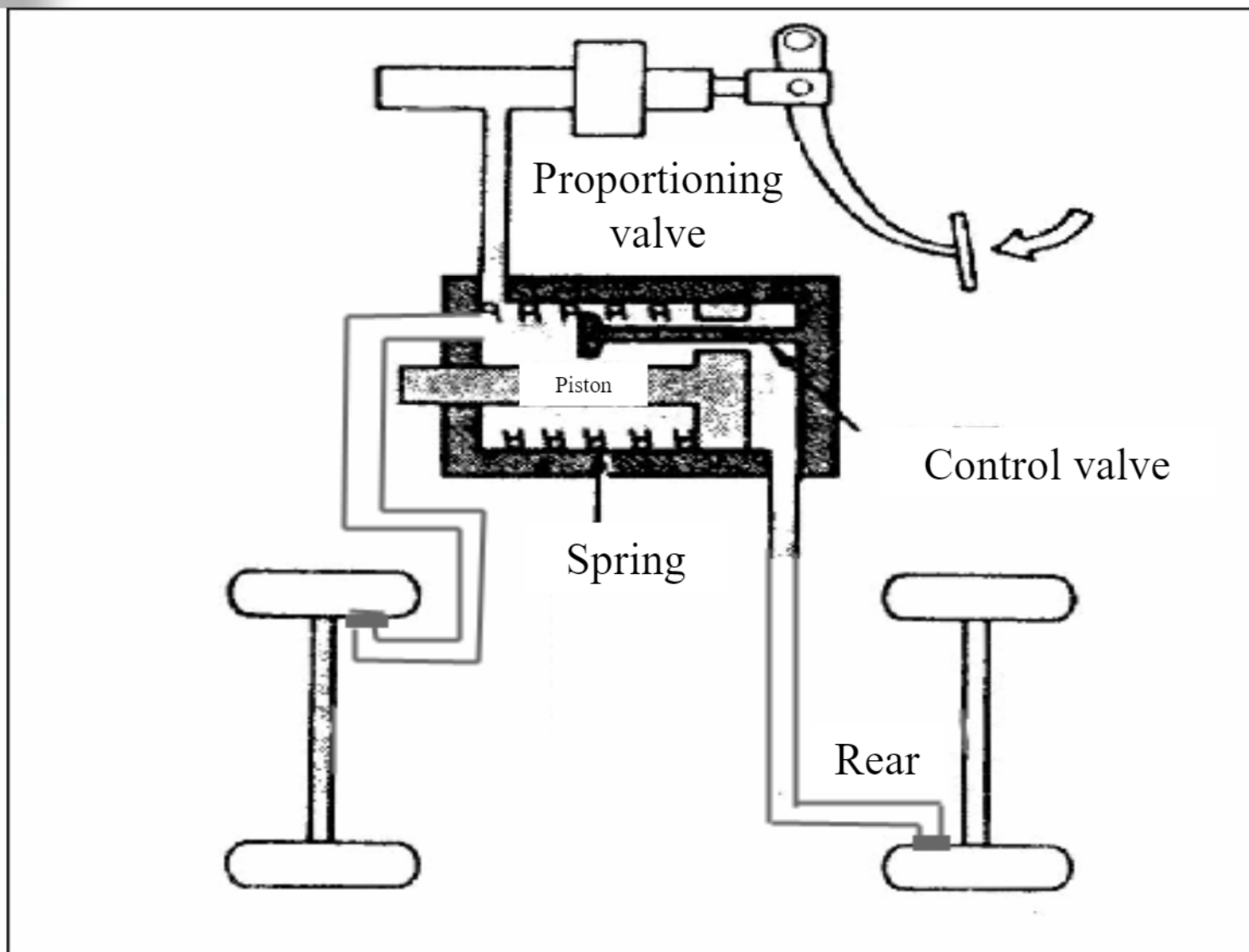


Proportioning Valve



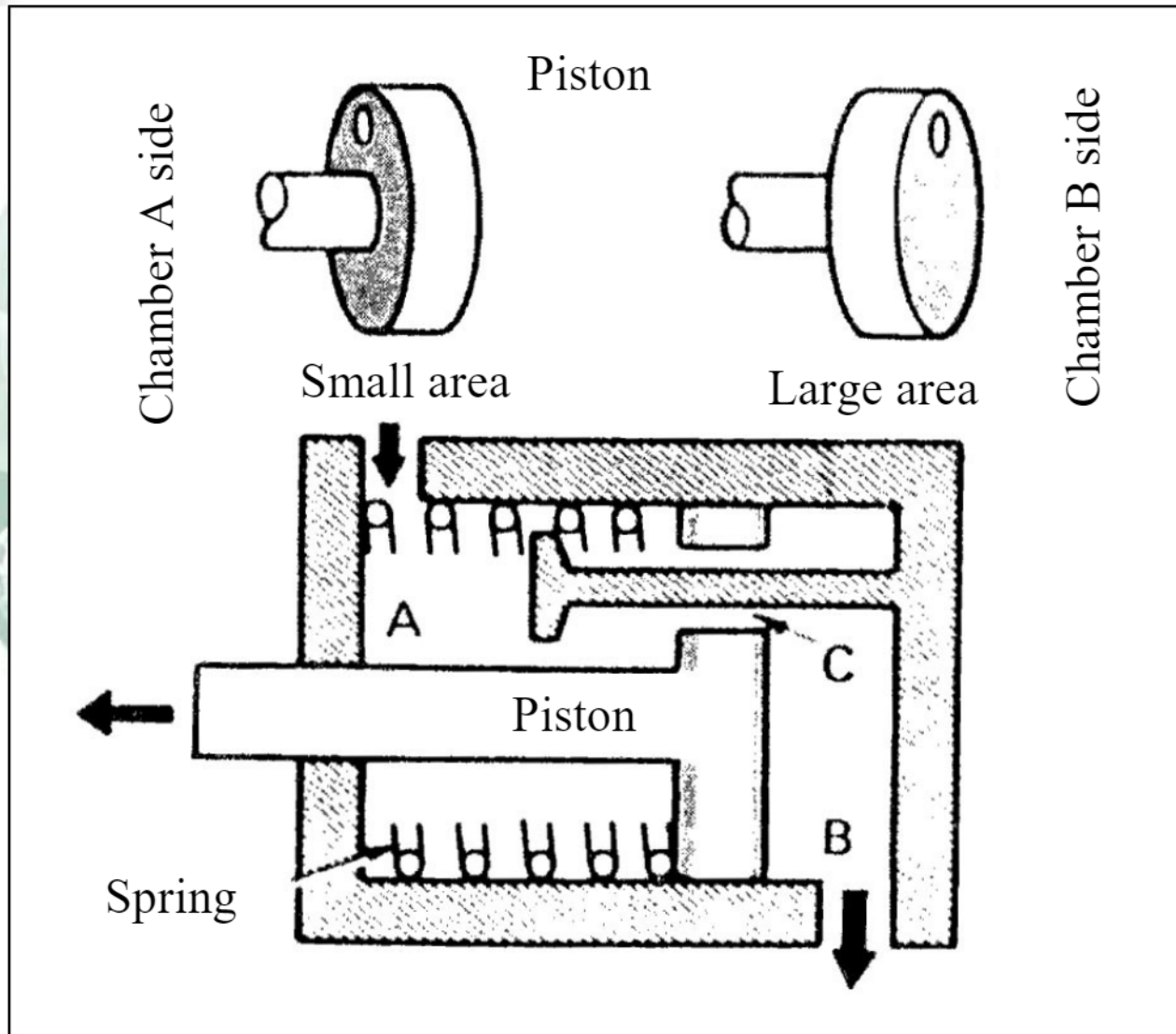
Working Principle of Proportioning Valve

— When the Pressure is zero



Working Principle of Proportioning Valve

— When the Pressure is Low



$$F_a + F_s = F_b$$

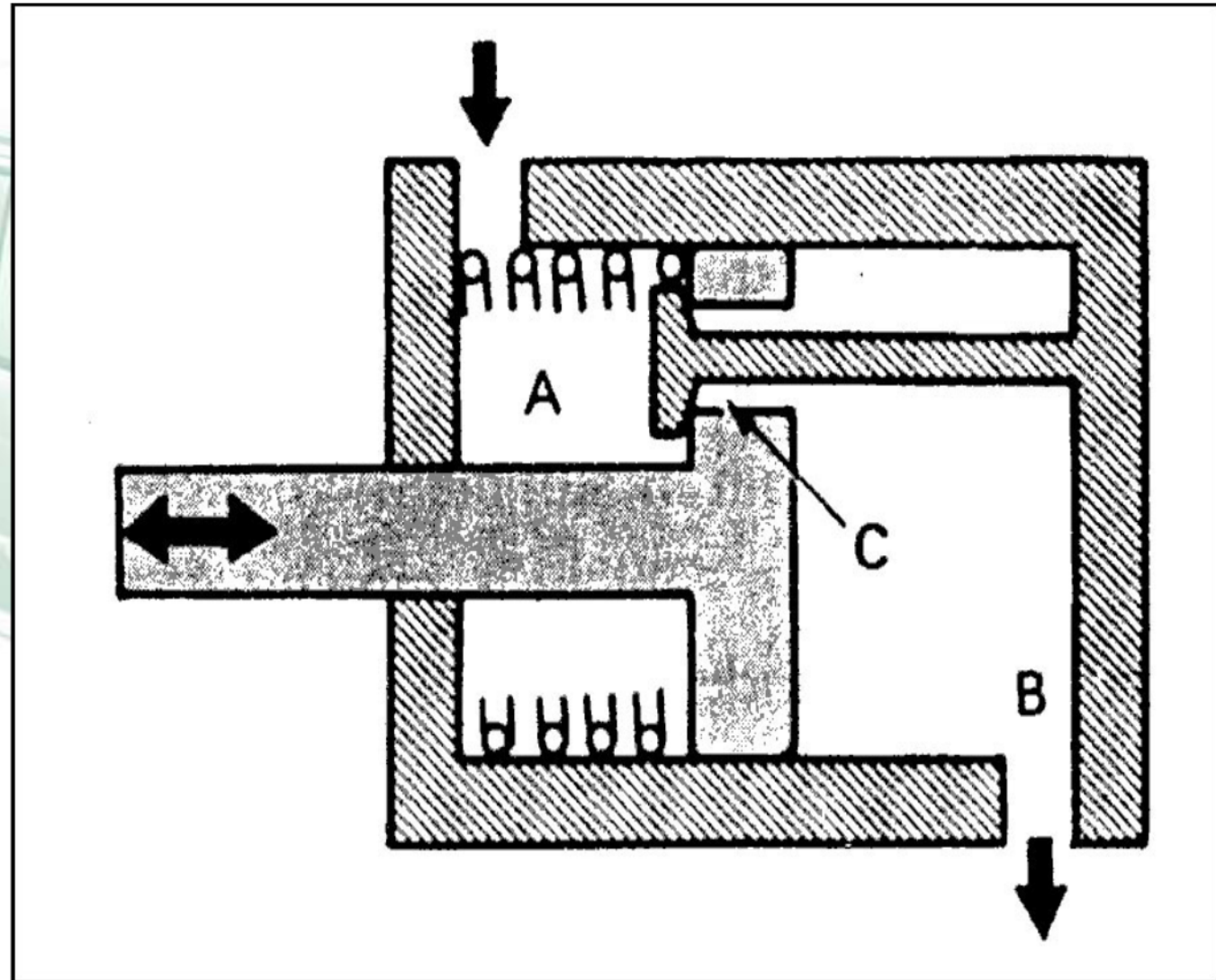
Working Principle of Proportioning Valve

— When the Pressure is high

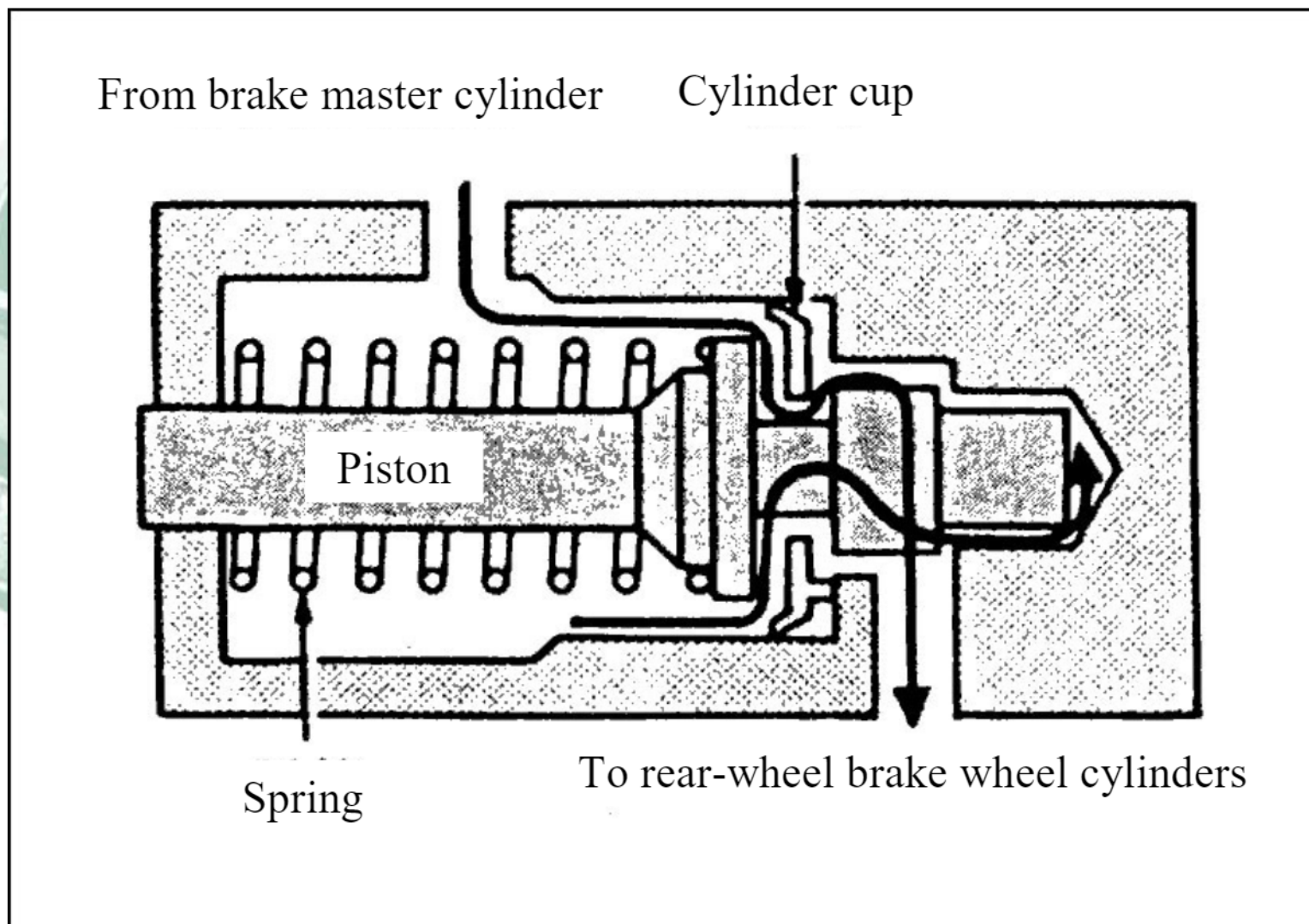


$$F_a + F_s < F_b$$

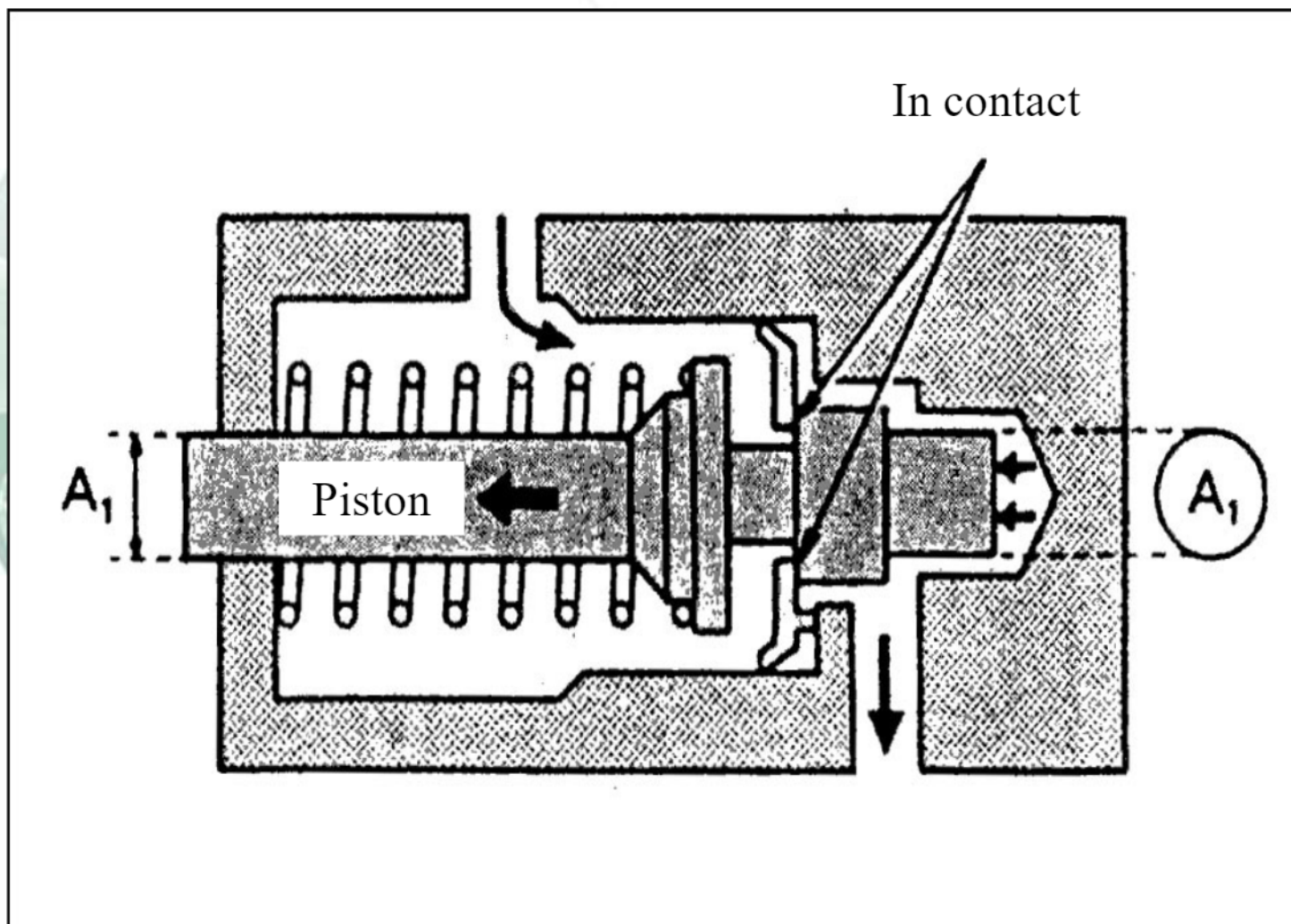
When the pressure is higher than some point, the difference between chambers A and B will overcome the spring's elastic force to make the piston move until the port C is closed.



1. When the Braking Pressure is Low

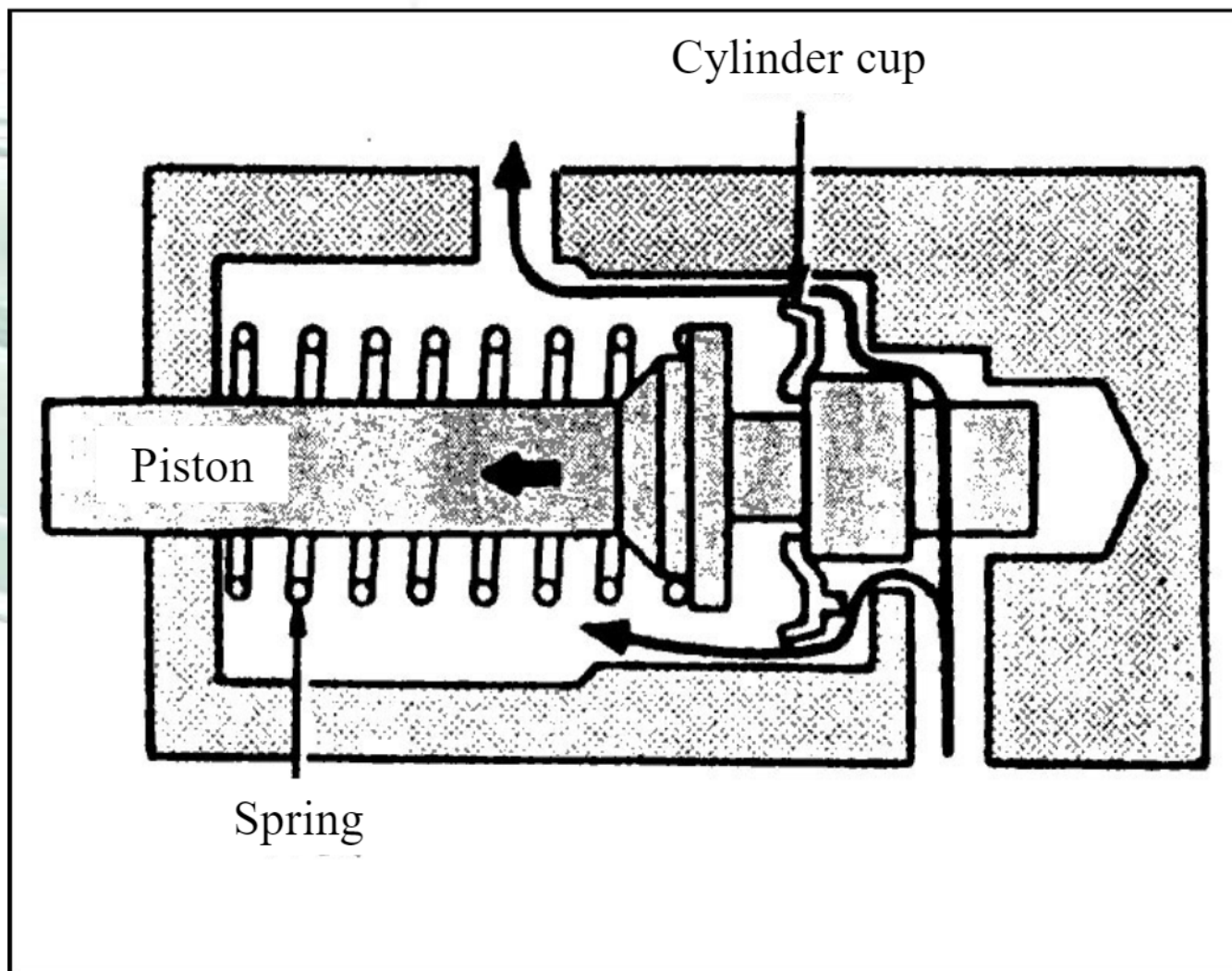


2. When the Braking Pressure is High

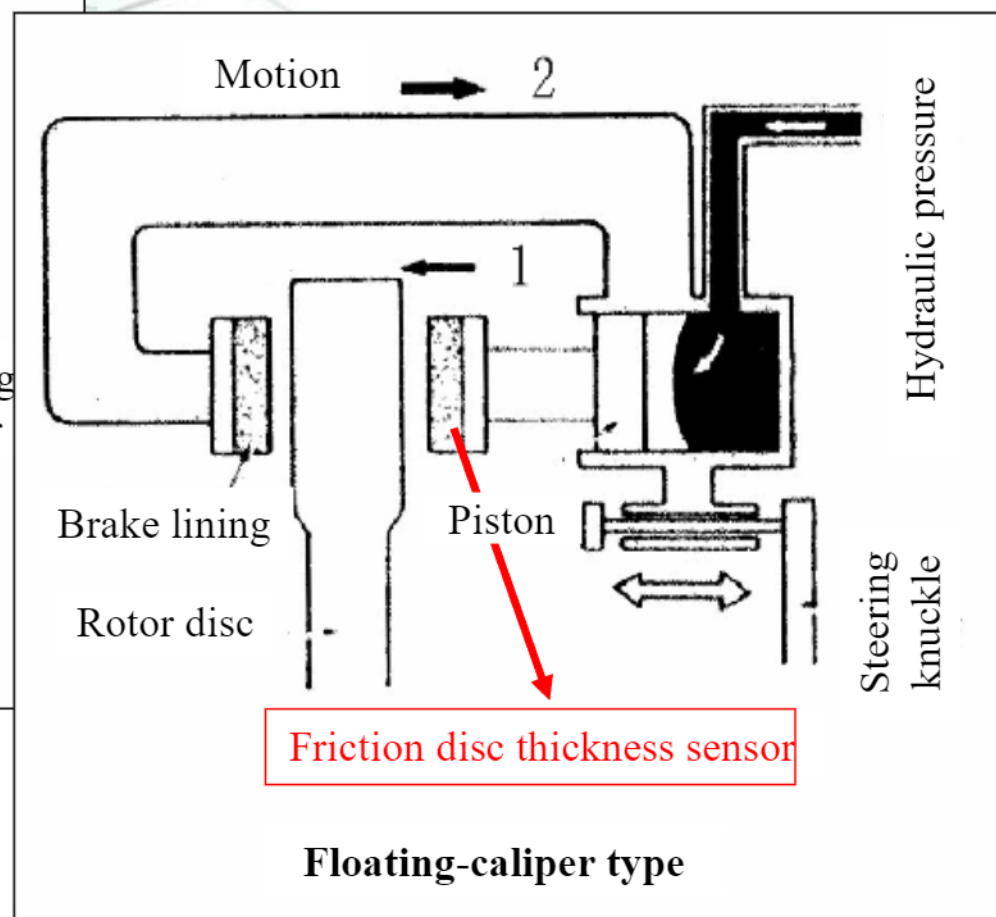
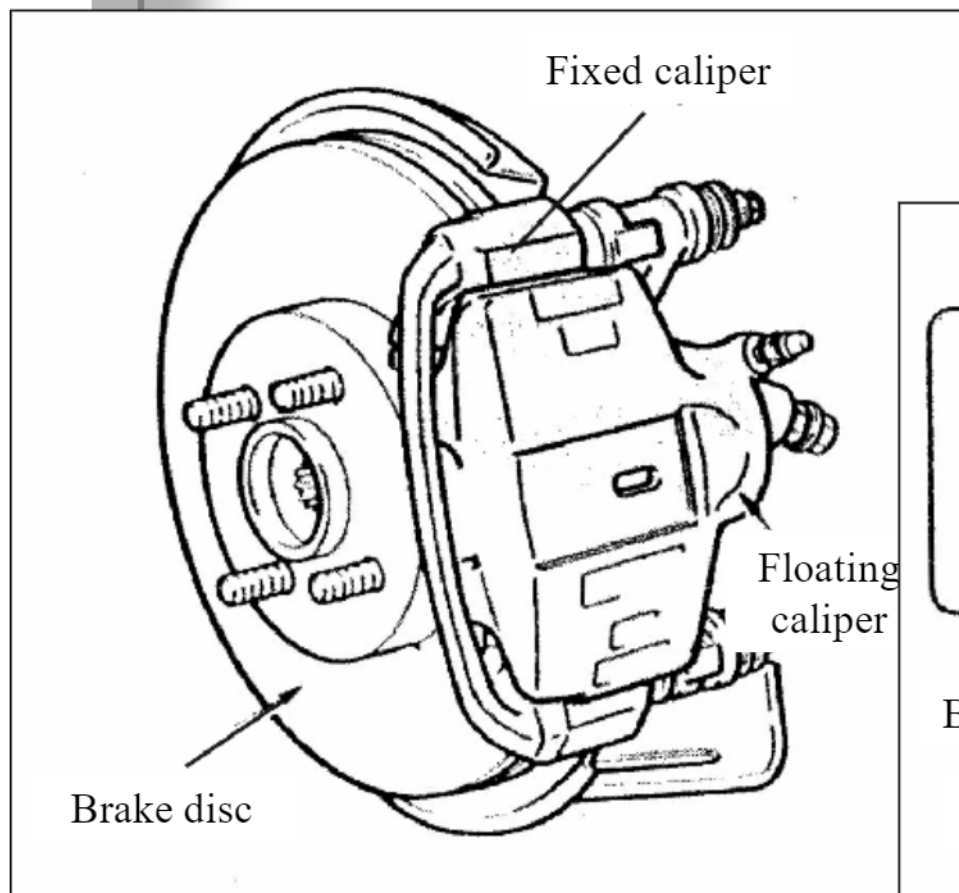


3. When the Brake Pedal is Released

When the brake pedal is released, the pressure drop in the left chamber will cause the piston to move to the left.



Disc Brake



Front-wheel Brake



Rear-wheel Brake



