

# Talking about the Automobile Braking System

**Zhiqiang Xu**

Guangdong University of Science & Technology, Dongguan 523083, China

**Abstract.** With the continuous progress of society, the continuous development of the times, people's living standards continue to improve, people continue to improve the pursuit. With the rapid development of automobile manufacturing, the car will be all over the tens of thousands of households, the increase in car traffic, a direct result of the incidence of traffic accidents. Brake system is the guarantee of the safety of the car, its technical condition is good or bad, directly affect the operational safety and transportation efficiency, so the brake system is absolutely reliable. The requirements of the car on the braking system is to have a certain braking force to ensure reliable work in all cases, light and flexible operation. Normal braking should be good performance, in addition to a foot sensitive, the emergency brake four rounds can not be too long, not partial, not ring.

## 1. Introduction

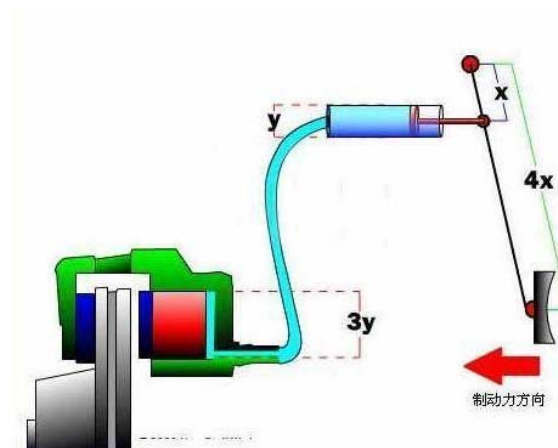
In the course of the use of the car brake system, it is difficult to cause malfunction due to wear, corrosion, aging, fracture and offset, resulting in brake failure and extended braking distance, damage the stability of the direction of the vehicle during braking, noise, And shorten its life. In the daily use of the car, often encountered in the brake system failure, if not timely detection and removal, easily lead to mechanical failure, accidents. Therefore, according to the specific conditions of use of the car, the car brake system for routine inspection and maintenance. Damage to the components of the car brake should be repaired or replaced in time to prevent the occurrence of abnormal braking in the traffic, resulting in unnecessary accidents.

## 2. Car Brake System Overview

### 2.1. *The concept of automotive brake system*

A brake system is a series of specialized devices used in the car to exert a certain force on the outside (mainly the road) in certain parts of the car (mainly the wheels). Figure 1 is the car brake system model.





**Figure 1.** Automotive brake system model

## 2.2. The role of the car brake system

The role of the car brake system is to make the driving car in accordance with the requirements of the driver forced to slow down or even stop; so that the car has been stopped in a variety of road conditions (including on the ramp) stable parking; The car speed is stable.

The role of the brake from the car can only be acting on the car and the direction of the direction of the car driving the opposite direction, and the size of these external forces are random, uncontrollable, so the car must be installed a series of specialized devices to achieve The above functions.

## 2.3. Requirements for automotive brake systems

Brakes as the necessary driving safety components of the car, regardless of its structure, must meet the required braking performance.

- (1) The braking system should be durable, not because of vibration or shock and damage its structure and performance.
- (2) The brake must have wear compensation device. The brake clearance must be easily compensated by manual or automatic adjustment.
- (3) The brake system brake pedal free travel should be consistent with the relevant technical provisions of the car.
- (4) All the wheels of the car should be equipped with brakes.
- (5) The role of traffic brake should be able to reasonably between the distribution of the shaft.
- (6) The use of vacuum power brake system, when the vacuum booster failure, the braking system can still maintain a certain braking performance.
- (7) The driving brake in the maximum braking force when the pedal force, for the number of seats less than or equal to 9 passenger cars should not be greater than 500N, for other vehicles should not be greater than 700N.
- (8) The emergency brake must be in the driving brake system has a pipeline failure in the case, the vehicle within the specified distance to stop.
- (9) Emergency braking can be a brake system with emergency features or separate from the brake system independent of the system.
- (10) The use of hydraulic brake car, the reservoir of the filling point must be easy to close, from the structural design must ensure that the container can not open the conditions can easily check the liquid surface. If you can not meet the conditions, you must install the brake surface is too low alarm device.
- (11) The use of hydraulic brake motor to maintain the pedal force of 700N to 1min, the pedal must not slow to move to the floor of the phenomenon.
- (12) Motor vehicles in the course of running, there should be no self-braking phenomenon.

Braking system as an important safety factor for car driving safety, must ensure that the braking system can work properly, therefore, the car's braking system should meet the above basic requirements.

### 3. Car Break System Maintenance

#### 3.1. Common problems and troubleshooting methods of automobile brake system

*3.1.1. Common Causes of Braking System Faults and Countermeasures.* (1) Due to brake pipe (such as joints) oil or blocked, resulting in insufficient supply of brake fluid, brake oil pressure caused by brake failure. Should promptly check the brake pipe, remove the leakage, add brake fluid, clear the pipeline.

(2) Due to the brake tube into the air leaving the brake slow, or brake pipe heat, resulting in brake fluid gasification, pipe bubbles. As the gas is compressible, the brake torque is reduced during braking. Maintenance, the brake cylinder and tube air can be net and fill the brake fluid.

(3) Due to improper braking gap caused. When the friction between the working surface of the brake disc and the working surface of the brake drum is too large, the stroke of the brake cylinder is too large, resulting in slow braking and reduced braking torque. Maintenance, according to the specification should be fully adjusted brake clearance, flat head screwdriver from the high-speed hole to move the ratchet, the brake drum completely open, clear the gap, and then return the ratchet wheel 3-6 teeth, you can get a standard gap.

(4) Due to brake drum and friction lining caused by poor contact. If the brake than the deformation or brake drum roundness of more than 0.5mm or more will lead to friction lining and brake drum contact failure, brake friction torque decreased. If this phenomenon is found, it is necessary to boring boring or correcting the repair. Brake drum boring after the diameter of no one in 220mm, or should replace the new pieces.

(5) Because the brake friction plate is stained with oil stains or flooded damp, the friction coefficient sharply reduced, causing brake failure. Maintenance, remove the friction plate with gasoline cleaning, and heating with a torch baking, so that the oil into the film seepage, severe oil must be replaced when the new film. For water-based friction plates, continuous braking can be used to generate heat to evaporate the water and restore its coefficient of friction.

(6) Due to the brake master cylinder, the master bowl (or other pieces) damage caused. In this case the brake pipe can not produce the necessary internal pressure, oil leakage, resulting in poor braking. Should promptly dismantle the brake master cylinder, pump the bowl to replace the damaged parts.

*3.1.2. Hydraulic foot brake system of the general failure and troubleshooting methods.* Symptom 1: When the car is running, the car can not be decelerated or parked immediately.

Analyze the cause of the malfunction: The hydraulic system is mixed with air, resulting in brake failure; the total pump oil inlet hole or the vent plug, causing the brake failure; the friction contact with the brake drum, the friction surface hardening, with oil, not immediately brake; brake shoe wear thin, brake clearance is too large.

Troubleshooting: some air mixed hydraulic system to check the total emissions; the oil pump into the hole or holes, and dredge; check the brake system brake, re closed friction plate, friction film and brake drum contact surface must reach more than 50%, removal of the friction surface of oil, or more for a new friction plate; the replacement of a new friction plate, and re adjust the brake clearance.

Breakdown phenomenon 2: when the automobile is in use, when braking, the automobile braking deviation.

Fault analysis: deviation phenomenon of gap size auto left and right wheel brake drum and the friction of the inconsistent result under emergency braking; left and right wheel friction materials are

not the same or individual wheel friction plate with oil pump; automobile individual is mixed in the air; individual wheel tire pressure is insufficient.

Troubleshooting: check the car around the gap between the wheel brake drum and the friction plate, and adjust the brake clearance; replacing the friction plate for the same material, if there is oil cleanup; elimination of air pump in the individual; the car checked each wheel pressure, ensure the wheel pressure line.

Fault phenomenon 3: the car in use brake, brake pedal difficult, and brake pedal can not immediately return to the place, brake drum fever.

Analyze the cause of the trouble: the distance between the air valve and the vacuum valve is not in accordance with the technical specifications of the vehicle; the piston of the afterburner is not running smoothly; the rod is bent or assembled too tight.

Removal method: re adjust the distance between the air valve and the vacuum valve; check whether the afterburner is deformed; replace it if necessary; and lubricate; check the push rod and correct it.

*3.1.3. General trouble and troubleshooting of pneumatic foot brake system.* Fault phenomenon 1: when the vehicle is running, the indicator of air pressure indicator drops obviously.

Fault analysis: brake valve to the brake chamber of pipeline are leakage; brake valve damage; brake chamber and the film damage.

Troubleshooting: re welding repair leakage; the replacement of a new brake seat replacement film.

Fault phenomenon 2: the brake of the car braking lock phenomenon.

Analyze the cause of the trouble: the caliper is loose; the caliper spring prevents the vibration of the car; the brake is out of tune; the parking brake is too tight; the brake return spring is broken.

Troubleshooting: check and adjust the caliper fixing device; the installation of a new spring; re check and adjust the brake; check the wire rope through the brake plate, and re adjustment; remove the spring has been broken, and the replacement of a new spring.

Breakdown phenomenon 3: when the automobile is moving, uses the brake, the brake pedal shakes, the automobile body shakes.

Analysis of the cause of the failure: brake drum rupture, resulting in car brake body trembling; friction plate damage; brake drum out of round.

Troubleshooting: check the brake drum, the replacement of a new check and replace the brake drum; friction; remove the brake drum, brake drum to the internal hole of the boring, boring after automobile brake drum diameter must comply with the relevant technical regulations.

Fault phenomenon 4: the use of braking when the car is running, the car can not slow down or stop; after the use of one or more brakes, the brake suddenly does not work.

Analysis of the causes of failure: 1. First of all, observe whether the barometer has air pressure indication, check whether there is compressed air in the air cylinder. The barometer indicates zero, and there is no compressed air in the reservoir. Check the status of the press belt, if the belt broken, should be replaced; if the belt slip, should adjust its tightness. Remove the air out of the press, start the engine, check the compressor condition, if the compressor does not press the air, it indicates that the compressor air valve is not sealed properly or the spring is broken and the pressure relief valve is invalid, it should be replaced. If the compressor is in good condition, check whether the line between the cylinder and the air tank is leaking. If the pipe joint is loose and the air leaks, the compressor shall be fastened. If the trachea breaks down, it should be repaired or replaced. If the indicator is zero, there is compressed air in the storage tank, which indicates that the pipeline of the reservoir to the brake valve is leaking and should be repaired. If the barometer indicates normal, there is compressed air in the air storage tank, indicating that the fault is in the brake control device.

2, if the above inspection is normal, check the brake pedal and brake valve pull arm whether out of line, if out of line, should install complex.

3, step on the brake pedal test.

(1) The barometer reading does not drop or fall very small. Check the brake pedal free travel, if the free travel is too large, indicating that the brake valve intake valve can not open, should be adjusted.

Activity check the brake arm pull, if the arm does not move, the brake valve push rod stuck, should be dismantled and repaired.

(2) The reading of the barometer drops continuously, and there is a sound of leakage. Check the brake valve is leaking, if the gas leak, that the brake valve diaphragm rupture, should be replaced. Check the brake valve to the air brake chamber pipe is leaking, if the leak, indicating that the brake valve diaphragm rupture, should be replaced. Check the brake valve to the air brake chamber pipe is leaking, if the leak, indicating that the brake chamber diaphragm rupture, should be replaced.

(3) Lift the brake pedal, check the brake valve is leaking, if the gas leak, indicating that the brake valve intake valve seat seal is lax or hairpin, should be replaced.

(4) Through the above inspection are normal, step on the brake pedal, if the barometer reading down normal, should be broken inspection wheel brake, check the brake clearance is too large, brake shoe branch underwriting, whether there is no rust death, etc..

#### 4. Conclusion

To sum up, we can see that the car brake system is related to the safety of traffic. So we have to drive before we first have a full understanding of the traffic, including the understanding of the car itself and the understanding of the traffic norms; Secondly, in the process of driving we have to learn to use the braking system to ensure our safety; Finally, we must understand how to achieve self-help and maintenance in the event of a brake system failure.

#### References

- [1] Zhang Xiaoyu. Application mechanics of automobile engineering [M]. Vehicle power, 2013, (2): 65-98.
- [2] Tan Ying, Zhang Jun. Automobile Internship Guide Driver, 2011, (5): 127-131.
- [3] LIU Jian-jun. Effects of Vehicle Braking System [J]. Journal of Xinyu University 2012 (02)
- [4] H Holec, Applied mechanics of Automotive Engineering (Oxford: Pergamum Press, 2011), 22.
- [5] YANG Fei-qiu. Study on the Influence of Automobile Braking [J]. Journal of Shandong Normal University Foreign Language Institute. 2011 (05)
- [6] How to improve the performance of traffic brake [J]. Test Weekly. 2011 (17)
- [7] Pang Weiguo. Study on the Improvement of Automobile Braking Performance [J]. Journal of East China Normal University, 2012 (2): 19-21.