**Lesson 10.AutomotiveBrakingSystem**



*Fig.4.1Typical Automotive Braking System*

The modern automotive braking system has been refined for over 100 years and has become extremely dependable and efficient. It is one of the most important mechanisms of the car as upon its proper performance the safety of passengers depends.

The typical braking system (*Fig. 4.1*) consists of disk brakes in front and either disk or drum brakes in the rear connected by a system of tubes and hoses that link the brake at each wheel to the master cylinder. The drum type may be either a band brake or a shoe brake. Depending on their functions, the automobile has foot brakes and hand brakes (parking brakes). According to their mode of operation, the brakes are classified as: mechanical brakes, hydraulic brakes, air brakes, electric brakes. Most braking systems in use today are hydraulic. The air brake uses compressed air to apply the braking force to the brake shoes. Electric brakes use electromagnets to provide the braking effort against the brake shoes. Brakes are controlled by the brake pedal.

When you step on the brake pedal, you are actually pushing against a plunger in the master cylinder, which forces hydraulic oil (brake fluid) through a series of tubesand hoses to the braking unit at each wheel. Since hydraulic fluid (or any fluid for that matter) cannot be compressed, pushing fluid through a pipe is just like pushing a steel bar through a pipe. Unlike a steel bar, however, fluid can be directed through many twists and turns on its way to its destination, arriving with the exact same motion and pressure that it started with. It is very important that the fluid is pure liquid and that there is no air bubbles in it. Air can be compressed, which causes sponginess to the pedal and severely reduced braking efficiency. If air is suspected, then the system must be bled to remove the air. There are "bleeder screws" at each wheel cylinder and caliper for this purpose.



*Fig. 4.2.Disc Brake Fig. 4.3. Drum Brake*

Disk Brakes

On a disk brake (Fig. 4.2), the fluid from the master cylinder is forced into a caliper where it presses against a piston. The piston, in-turn, squeezes two brake pads against the disk (rotor), which is attached to the wheel, forcing it to slow down or stop.

This process is similar to a bicycle brake where two rubber pads rub against the wheel rim creating friction.

The disk brake is the best brake that has been found so far. Disk brakes are used to stop everything from cars to locomotives and jumbo jets. Disk brakes wear longer, are less affected by water, are self adjusting, self cleaning, less prone to grabbing orpulling and stop better than any other system around. The main components of a disk brake are the Brake Pads, Rotor, Caliper and Caliper Support.

*Drum Brakes*

With drum brakes (*Fig. 4.3*), fluid is forced into the wheel cylinder, which pushes the brake shoes out so that the friction linings are pressed against the drum, which is attached to the wheel, causing the wheel to stop.

In hybrid vehicle applications, wear on braking systems is greatly reduced by energy recovering motor-generators, so some hybrid vehicles such as the GMC Yukon hybrid and Toyota Prius use drum brakes.

In either case, the friction surfaces of the pads on a disk brake system or the shoes on a drum brake convert the forward motion of the vehicle into heat. Heat is what causes the friction surfaces (linings) of the pads and shoes to eventually wear out and require replacement.

***III. Match two parts of the sentences according to the text:***

|  |  |
| --- | --- |
| 1. Heat is what causes the friction …  | a) effort against the brake shoes.  |
| 2. In contrast to a steel bar fluid can be directed …  | b) pure liquid and that there is no air bubbles in it.  |
| 3. It is of great significance that the fluid is …  | c) either a band brake or a shoe brake.  |
| 4. The typical braking system consists of …  | d) linings of the pads and shoes to eventually wear out and require replacement.  |
| 5. According to the mode of brakes operation, their classification may be represented as: …  | e) disk brakes in front and either disk or drum brakes in the rear.  |
| 6. The drum brake can be classified as: …  | f) through many twists and turns on its way to its destination.  |
| 7. Process is similar to a bicycle brake where …  | g) mechanical brakes, hydraulic brakes, air brakes, electric brakes.  |
| 8. Electric brakes use electromagnets to provide the braking …  | h) two rubber pads rub against the wheel rim creating friction.  |