

Published February 15, 2011

What Is A Brake Servo and How Does It Work?

by Ronny Shaver

Early braking systems in cars were primitive and required strong legs to operate. Over the years auto makers came up with different ways of improving braking and decreasing driver effort to operate the brakes. Rolls-Royce used a unique mechanical servo system until the mid 60's on standard cars and the mid 70's on the Phantom series.

The servo is a unit that uses the actual motion of the car to assist in stopping the car. The unit is attached to the side of the transmission and geared to the output shaft. So when the car is moving, the unit will work even if the car is not running, unlike vacuum assisted brakes on other cars. It is comprised of a dry clutch assembly similar to a clutch on a manual transmission car, except that it is engaged when one applies the brake pedal instead of disengaged. When the car is moving and the brake pedal is applied, the servo engages and uses the inertia of the car's motion to apply additional force to the braking system. The faster the car is moving and the harder the brake pedal is applied, the more force is added to braking.

Application of the servo is actuated through linkages and a cam type expander. Two linkages working against each other actuate a cam and ball bearing mechanism that apply pressure on the clutch. In this mechanism, ball bearings are placed between two opposed cams (ramps), the cams are then moved towards each other causing the ball to roll up each ramp, which expands the mechanism. The expansion of the mechanism applies the clutch and engages the servo. One linkage is attached to the brake pedal and the other to the rear brake shoes through a series of linkages and pivots.

Once the servo is engaged, it turns and moves a different set of linkages connected to the braking system. The servo works in forward and reverse, switching directions along with the car. This switching of directions, causes a "lag" in braking. The "lag" is caused by the releasing and reapplying of the brakes. The car wheels must move about 18 inches for this overlap to occur. It takes some getting used to, especially in tight parking conditions. Just remember, through linkages connected to the servo cam system, the brake pedal is still applying the rear brakes during the "lag", but not with servo assist.

Early cars had mechanical only braking systems. Rolls-Royce started combining hydraulic and mechanical systems in the post-war cars. The first series had rear mechanical and front hydraulic brakes. A master cylinder was installed and connected to the front brakes. The servo was attached to linkages that would apply both the mechanical and hydraulic systems together. Early Silver Clouds had hydraulic only systems with one master cylinder connected to the servo. They then switched to two master cylinder systems. One master cylinder would apply one brake shoe in each front wheel and all the rear shoes. The other master cylinder applies one shoe on each front wheel.

It is important to remember that since the brake pedal is connected to the rear shoes through mechanical only linkages, it will always have a "hard" feel. The height of the pedal is determined by mechanical adjustments only. On the later cars with hydraulic systems, many people mistakenly think that the master cylinder is fine because the pedal is hard or the master cylinder is bad because the pedal is low. The systems are separated by the servo.

Thank you for the questions and keep them coming. Please send your questions to Ronny at ronnyshaver@ronnysgarage.com.

Happy Motoring!
Ronny