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Dayton Parts™

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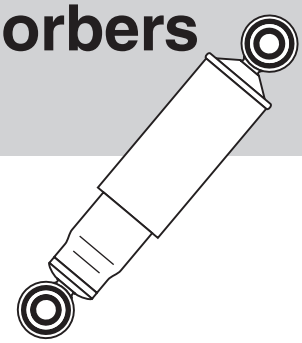
Shock Absorbers



PRODUCT **E**MPHASIS **P**ROGRAM

The Function of Shock Absorbers

A shock absorber is a velocity sensitive device that controls movement through a compression and rebound process in which a hydraulic buffer is created to stop unwanted motion, provide safe control of necessary motion and provide a measured response to a given energy input. Because of their ability to control motion, shock absorbers are used to provide vehicles from tanks to golf carts, **"Ride Control".**

By controlling or eliminating unwanted motion in vehicles, shock absorbers save wear and tear, maximize driver and passenger comfort and minimize cargo damage. As shocks are an integral part of the suspension system, replacing worn or inadequate units help maintain good ride control. Good ride control reduces excessive vibration.

Help prevent:

- Cracked radiators
- Premature electrical system failure
- Loose and broken clamps and brackets
- Cracked chassis components and frame rails
- Worn and broken leaf springs
- Worn and damaged air springs

Types of shock absorbers

Gas Charged

Magnum 60 - Magnum 65 - Magnum Cab Shocks - Magnum Coil-Over Stabilizers - Severe Service - Magnum RV

A Major advancement in Ride Control technology was the development of gas charged shock absorbers. Monroe revolutionized heavy-duty ride control when it applied this technology to heavy truck shock absorbers. Gas charging virtually eliminates aeration of the hydraulic fluid. Aeration of the fluid causes it to turn to foam, foam compresses, fluid does not. When aeration occurs the amount of resistance provided by the fluid is greatly reduced. Aeration causes fade and greatly diminishes shock absorber performance. Large bore gas charged shock absorbers provide the consistent control, performance and efficiency required for today's demanding air and taper leaf suspensions.

Heavy Duty Hydraulic

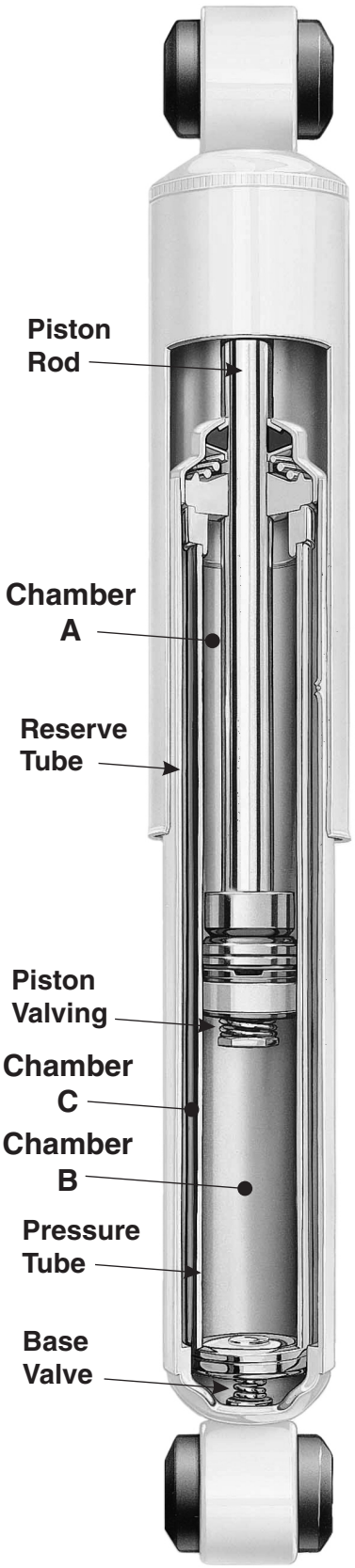
Magnum 70 - Magnum Steering Stabilizers

These shocks are designed to provide a firm, controlled ride for greater stability and comfort. They are available for most medium and heavy-duty trucks, trailers and buses currently in use. These units are built to last a long time, even under the demands of high mileage and severe service.

What Shock Absorbers Do

Shock absorbers damp or control motion. They help control tire bounce, excessive spring movement and reduce the road effects transmitted to the truck, driver and cargo. Good shocks help keep tires on the road and provide a more stable ride.

Shock absorbers are critical to control vibration and limit suspension travel on today's low rate air spring and taper leaf suspensions. And, shock absorbers can improve cost per mile by helping to reduce excessive vibration to improve the service life of equipment with less downtime.



How Shock Absorbers Work

Today's shock absorber is a velocity sensitive hydraulic damping device, because the faster it moves, the more resistance it has to the movement. This allows it to automatically adjust to road conditions.

A shock absorber works on the principle of fluid displacement on both its compression and extension cycles. A typical heavy truck shock will have more resistance during its extension cycle than its compression cycle.

The extension cycle controls motions of the vehicle body sprung weight. The compression cycle controls the same motions of the lighter axle and tire unsprung weight. This motion energy is converted into heat energy and is dissipated into the atmosphere.

Compression Cycle

During the compression stroke or downward movement, some fluid flows through the piston from Chamber B to Chamber A, and some through the compression valve into the reservoir, Chamber C. To control the flow, there are three valving stages in the piston and in the compression valves.

At the piston, oil flows through the oil ports, and at slow piston speeds, the first stage opens. This allows fluid to flow from Chamber B to Chamber A.

At faster piston speeds, the increase in fluid pressure below the piston in Chamber B causes the second stage piston valve to open. At high speed, the limits of the second stage phase into the third stage orifice restrictions.

At the bottom of Chamber B, oil that is displaced by the piston rod is passed through the three stage compression valve into Chamber C.

At slow speeds, the oil flows through an orifice in the compression valve. As the piston speed increases, the fluid pressure increases, causing the disc to open up away from the valve seat. Again, at high speeds the orifice restriction becomes effective.

Compression control, then, is the force that results from the higher pressure present in Chamber B which acts on the bottom of the piston and the piston rod area.

What Shock Absorbers Do *(continued)*

Extension Cycle

As the piston and rod move upward toward the top of the pressure tube, the volume of Chamber A is reduced, and thus is at a higher pressure than Chamber B. Because of this higher pressure, fluid flows down through the piston's three stage extension valve into Chamber B.

However, the piston rod volume has been withdrawn from Chamber B, greatly increasing its volume. Thus, the volume of fluid from Chamber A is insufficient to fill Chamber B. The pressure in Chamber C is now greater than that in Chamber B, forcing the compression intake valve to unseat. Fluid then flows from Chamber C into Chamber B, keeping the pressure tube full. Extension control, then, is the force present as a result of the higher pressure in Chamber A, acting over the piston area.

Shock Absorber Construction

Bore Size

Bore size is the diameter of the piston and the inside of the pressure tube. Generally, the larger the unit, the higher the potential control levels because of the larger piston displacements and pressure areas. The larger the piston area, the lower the internal operating pressure and temperatures. This provides higher damping capabilities.

Valving

Ride engineers select valving values for a particular vehicle to achieve optimum ride characteristics of balance and stability under a wide variety of driving conditions. Their selection of valve springs and orifices control fluid flow within the unit, which determines the "feel" and handling of the vehicle.

Full Displaced vs. Rod Displaced Valving

A typical rod displaced shock has a total of eight valving stages: A three-stage piston valve, A three-stage base valve, and two stages as the fluid passes through the piston.

Full displaced design allows ten stages by adding a blow-off valve and a dual rate piston replenishing spring.

Full displaced valving is often used for passenger car and light truck applications. Rod displaced valving is generallly used for medium and heavy truck applications due to higher control limits needed.

Gas Charged Shock Absorbers

A major advancement in ride control technology was the development of gas charged shock absorbers. Now, gas charging technology has been applied to shocks designed for heavy duty trucks. With today's lower spring rate taper leaf and air spring suspension systems, gas charging provides faster and more reliable response necessary to recover quickly from road irregularities.

Two-Tube Design

The advanced design of Monroe two-tube gas charged shocks solves many of today's ride control problems by adding a low pressure charge of nitrogen gas in the reserve tube. With the shock fluid under pressure, aeration is greatly reduced.

Aeration is the condition when the fluid inside the shock absorber mixes with air and turns into foam. Since foam compresses, the amount of resistance provided by the fluid is reduced. Gas charging virtually eliminates aeration and fade.

The gas pressure also provides resistance to fluid entering the reserve tube. This, combined with the large piston bore design, provides the extra working capacity needed for lower spring rate suspensions.

Shock Absorber Construction *(continued)*

How They Work

The pressure of the nitrogen in a Monroe gas charged shock varies from 60 to 150 psi, depending on the amount of fluid in the reserve tube and the bore size of the unit. The gas serves several important functions to improve the ride control characteristics of the shock.

One function is to increase the resistance of fluid flow into the reserve tube. This improves valving performance during the compression cycle.

Another function is to minimize aeration of the unit's hydraulic fluid. The pressure of the nitrogen gas prevents air bubbles or foam from weakening the hydraulic effectiveness of fluid flow through both the piston and base valve systems. Foam affects performance — foam compresses, fluid does not.

A third important function of the gas is to allow Monroe engineers greater flexibility in valving design. In the past, such factors as aeration forced compromises in design.

Features and benefits

As an industry leader in ride control products, Monroe has long been recognized for innovation and product quality around the world. Gas charging technology for heavy trucks was first introduced by Monroe and has since been offered on light and medium duty trucks. The continuous improvement in Monroe shocks is the result of millions of over-the-road test miles for virtually every class of truck - for every type of application - in all kinds of conditions.

- Gas charging - aeration and fade virtually eliminated
- Large piston bore for added working capacity
- Faster response and recovery
- Nylon banded piston provides superior heat resistance, enhancing shock absorber life
- Larger piston rod diameter for greater strength
- Teflon guide bushings reduce rod wear
- Heavy-duty DOM pressure tubes offer superior strength and durability
- Smoother, quieter, more controlled ride
- Unique hydraulic lock out limits extreme suspension travel
- 60 Day free ride offer

Dayton Parts supplies the complete line of Monroe commercial, severe service and recreational vehicle shock absorbers, steering stabilizers and accessories to outfit most light, medium and heavy-duty vehicles.

Troubleshooting Shock Absorbers

Regular checks of shock absorbers are critical to help prevent multiple problems. At every preventative maintenance inspection, check for hydraulic leaks, cracked or broken mounts and worn bushings. Besides these visual checks, it is important to determine if the unit is indeed functioning properly. A functioning shock absorber will produce heat as it controls suspension motion. After a test drive, immediately check the piston tube, (lower portion) of the shock absorber for heat. **CAUTION**: DO NOT touch a shock absorber directly with the skin as burns may result. Other signs that shock absorbers may require replacement include: excessive king pin and steering linkage wear, premature tire wear, air spring damage, frequent light bulb replacement, excessive body sway, excessive road shock and vibration.

Operators of vehicles with taper leaf springs and/or air suspensions should be particularly aware of the demands these units place on shock absorbers. Shock absorbers should be replaced on a regular basis on such vehicles and whenever a spring is replaced. Shock absorbers should always be replaced in pairs.