



SNS COLLEGE OF TECHNOLOGY

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DEPARTMENT OF AUTOMOBILE ENGINEERING

**COURSE NAME : 23AUT101 – ELEMENTS OF
AUTOMOTIVE SYSTEM**

I YEAR /II SEMESTER

Unit 4 – Suspension Spring



Suspension Spring



- Suspension springs are essential components of a vehicle's suspension system, absorbing and damping the shocks from road irregularities to provide a smoother ride.
- Different types of suspension springs are used depending on the vehicle design and application.
- The primary types are
 1. leaf springs,
 2. coil springs, and
 3. torsion bars.



Leaf Spring



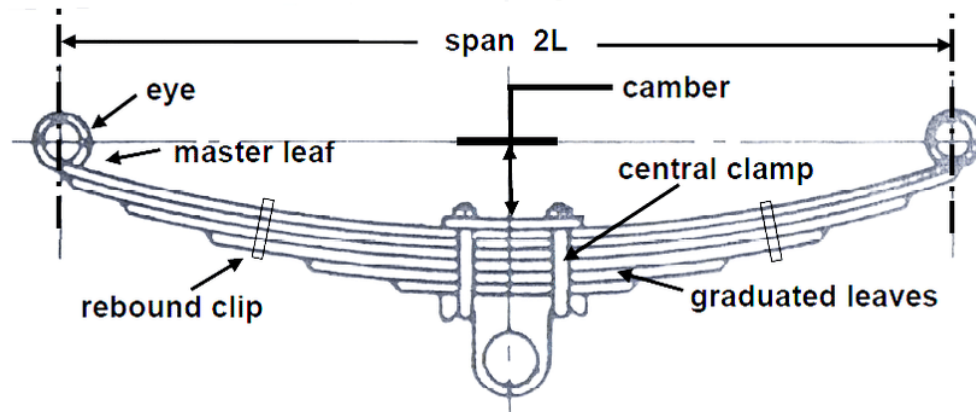
Leaf springs consist of several layers of metal (known as leaves) stacked on top of each other. These layers are typically made of steel and are curved slightly into an arc.

Types

- **Mono-Leaf Springs:** Single leaf, typically used in light vehicles.
- **Multi-Leaf Springs:** Multiple leaves stacked together, used in heavier vehicles.

Applications

Commonly used in trucks, commercial vehicles, and some off-road vehicles due to their durability and load-carrying capacity.





Leaf Spring



Advantages

- **Durability:** Can handle heavy loads and withstand rough terrain.
- **Simple Construction:** Easier and cheaper to manufacture and maintain.
- **Load Distribution:** Distributes the vehicle load evenly across the axle.

Disadvantages

- **Ride Comfort:** Provides a rougher ride compared to other types of springs.
- **Weight:** Heavier than coil springs, contributing to unsprung weight.
- **Flexibility:** Limited flexibility compared to coil springs.



Coil Spring



Coil springs are helical springs made of elastic material (typically steel) that compress and expand to absorb shock.

Types

- **Constant Rate Springs:** Provide a consistent spring rate throughout their compression.
- **Variable Rate Springs:** Spring rate changes with compression, providing a softer ride under normal conditions and stiffer response under heavy loads or during cornering.

Applications

Commonly used in passenger cars, SUVs, and light trucks due to their excellent ride quality and handling characteristics.





Coil Spring



Advantages

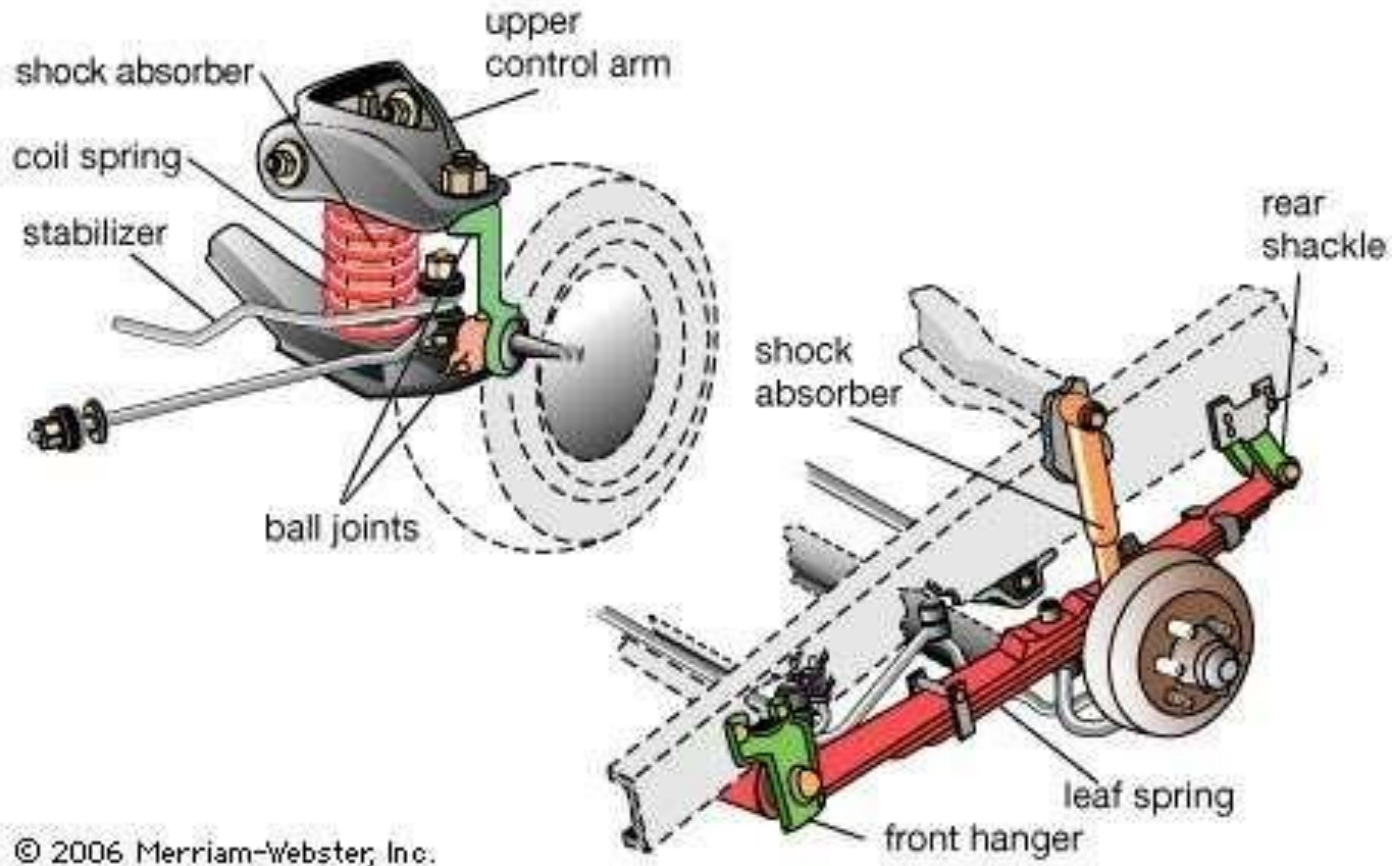
- **Ride Comfort:** Provides a smoother ride and better handling compared to leaf springs.
- **Compact Design:** Takes up less space and can be easily integrated into various suspension designs.
- **Flexibility:** More adaptable to different suspension configurations and vehicle dynamics.

Disadvantages

- **Load Capacity:** Generally not as capable of handling heavy loads as leaf springs.
- **Durability:** Can be more susceptible to wear and damage over time compared to leaf springs.



Suspension System



Coil spring is the most common type of spring found on modern vehicles.

Leaf springs are now limited to the rear of some cars.



Torsion Bar

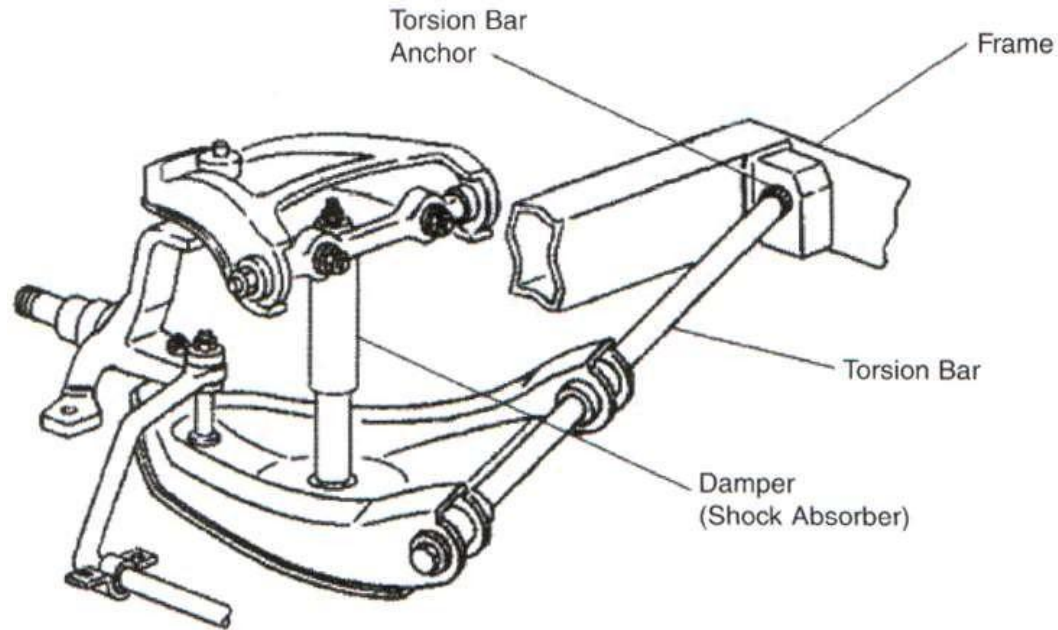


Figure 8.18. A torsion bar suspension. Adapted from TM 9-8000 (1985).

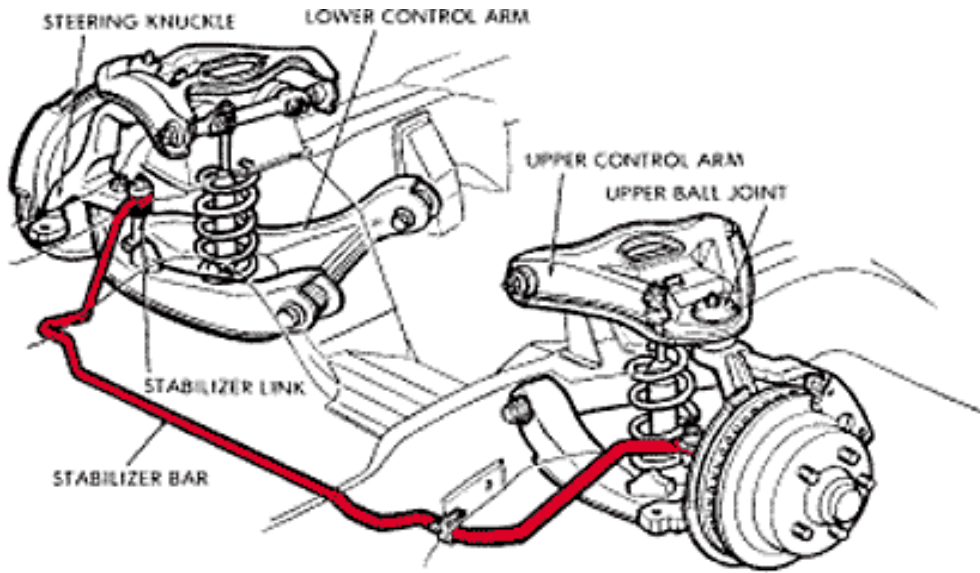
- One end is attached to the frame and the other to the lower control arm.
- Up and down of the suspension system twists the torsion bar.
- It will then try to return to its original shape, moving the control arm to its original place.



Suspension System



Sway Bar (*Stabilizer Bar*)



- Used to keep the body from leaning excessively in sharp turns.
- Fastened to lower control arms. (*rubber bushings are used*)
- During cornering, centrifugal force makes the outside of body drop and inside raise.
- The bar's resistance to twisting motion limits body lean in corners.