Shock Types

There are two major categories of shock absorbers, which are based on the way they react to force.

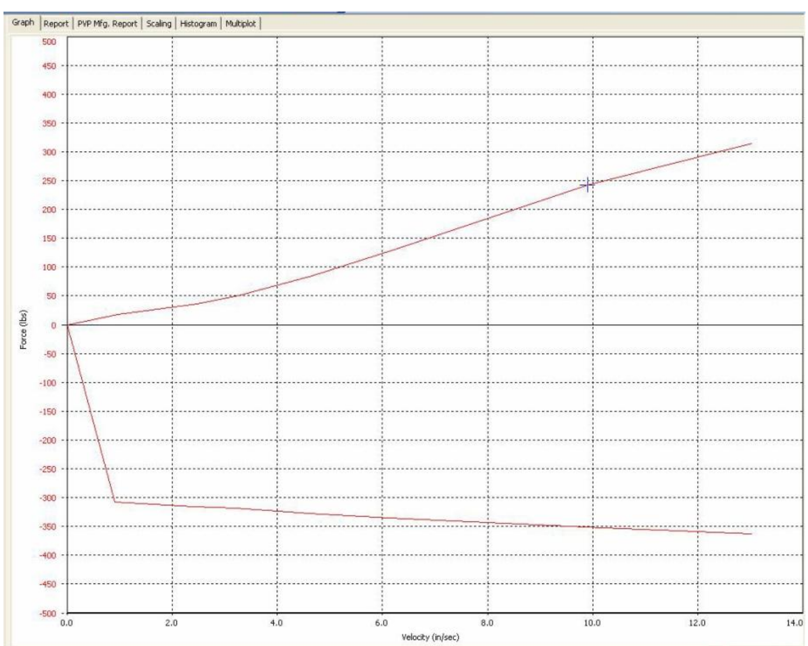
Linear shocks were the standard before recent advancements in shock technology. Linear shaft velocity increases, damping forces increase at a linear rate. On a shock dyno graph (Diagram B) both compression and rebound damping appear as approximately straight lines diverging from each other as shaft velocity (or force exerted on the shock) increases. This style of shock has been a boon for racers because it allows increased control at lower shaft speeds, which is vital for controlling a race car through the corners.

The third type of shock is a fairly recent development. Digressive shocks are essentially the opposite of progressives. As shaft speed increases, damping forces increase at a decreasing rate. Diagram C is a shock dyno graph of a typical digressive shock dyno curve. Digressive shocks provide low-speed damping control without being unreasonably harsh on rough racetracks. Both modern linear and digressive shocks allow separate damping and rebound rates. So far manufacturers have not been able to combine, say, digressive rebound with linear compression in one shock yet.

The Dyno Sheet

Most racing shock manufacturers adhere to a simple numbering system to describe their valvings, but don't be fooled into thinking that you are comparing apples to apples. For example, Bilstein measures its valvings in newtons per meter while Penske uses American pounds and inches. The only way to know how shocks from different manufacturers will compare on the track is to put them on a shock dyno. Also, the dyno will tell you how a shock will behave at every velocity you are likely to see on the racetrack. Normally, shock movements associated with body roll (roll, squat, dive) in short-track racing range between zero and four inches per second. Ruts, holes and other harsh track conditions generally fall into the six- to 12-inch range. This makes it easier to diagnose what is happening where on the dyno sheet.

Most shock dyno sheets graph shaft velocity along an axis of force exerted in both compression and rebound. The more force it takes to move the shaft a given distance, the more the shock will resist movement of the suspension either up or down. Shaft position does not affect damping. This is important to remember since a common misconception is the farther the shaft travels into the shock body the harder it is to compress. This is almost universally untrue.



The above graph is a good example of a digressive shock. Notice the steep drop off in the rebound side of the shock. As the velocity increases over 1" per second, the force it takes to move the shock at that speed is linear, but in the beginning of the rebound stroke, there is a substantial amount of bleed. A great example of a sprint car/mini sprint left rear shock.