

## Glossary of Terms

**Ackerman angle/error-** When a vehicle is turning, the tire on the outside of the turning diameter must travel a greater distance than the inside tire. For the tires to track perfectly through the turn without scrubbing (“squealing”) the inside tire should be turned more than the outside tire.

**Adjusting Sleeve** – Tube with internal left-hand threads on one end, right hand threads on the other end. Threaded between two socket assemblies to provide turnbuckle like length adjustment.

**Alignment-** the act of aligning or state of being aligned; *especially*: the proper positioning or state of adjustment of parts (as of a mechanical or electronic device) in relation to each other.

**Angularity-** Total movement of a stud within a socket assembly in a plane passing through the stud. The change of the angle of a ball stud with the center of the ball being the vertex.

**Articulation** – Same as angularity.

**Axial End Motion** - Movement between the ball stud and the socket along the centerline axis of the ball stud under a specified load.

**Ball Joint** – Any socket assembly allowing articulation and rotation of the stud.

**Bearing** – The contact surface between two moving parts, or the physical part containing this surface.

**Breakaway/Breakout Friction-** Frictional force required to start a body in motion over a surface.

**Bump Steer-** Bump steer is similar to roll steer. It involves the toe change of the road wheel as it is “bumped” into jounce or rebound. The design considerations are similar to roll steer.

**Camber-** a slant in the steerable wheels on a vehicle that makes them slightly closer together at the bottom than at the top.

**Caster-** the slight usually backward tilt of the upper end of the kingpin of an automobile for giving directional stability to the front wheels.

**Center Link-** A link between the steering gear pitman arm and a idler arm attached to the opposite side of the frame.

**Clamp** – Strap around end of adjusting sleeve. When bolt / nut connecting ends of clamp is tightened, adjusting sleeve is clamped to mating threaded socket assembly.

**Cobra** – Transition area between the socket and stem of a rod end.

**Diametrical Interference**- Difference between the inside diameter (I.D.) of the seal and the shaft outside diameter (O.D.), or between the O.D. of the seal and the housing I.D.

**Drag Link**- It is the connection from the steering gear output pitman arm and the device (drag link or center link) that controls the movement of the front wheels.

**Drift** – Tendency of a vehicle to divert from a straight course without steering input.

**End Motion** - Movement between the ball stud and the socket under a specified load.

**End Play** - Free movement between the ball stud and the socket assembly.

**Grease** – Lubricant consisting of carrier medium (Thickener), oil and additives used to reduce friction and wear.

**Hydraulic Lock** – When a threaded rod is tightened into a blind hole (as in an inner/outer tie rod end attachment), an air pocket can be trapped in the bottom of the hole. As the rod is threaded further in, the pressure builds. If the pressure cannot release through thread clearance, the joint will lock, preventing the rod from being installed further.

**Idler Arm**- an arm similar in shape to the pitman arm attached to the steering gear for the purpose of supporting links and translating motions to the near-by-front wheel. It is controlled by the pitman arm attached to the steering gear output shaft, and the outer ends of these two arms usually follow similar paths.

**Interference Load**- pressure loading which arises at the surface to be sealed, caused by the deformation of the seal material during assembly.

**Intermediate Arm**- an oscillating arm, which is usually attached to the frame front cross member. It supports the weight of the linkage at that point and translates motion to the wheels.

**Inter-seal Pressure** - Fluid pressure that may, in some circumstances, arise between two seals fitted to a double-acting piston.

**Jounce**- Suspension movement in an upward manner, to load the spring.

**Kinetic Friction**- Minimum frictional force required maintaining a body in motion sliding over a surface.

**Knuckle-** The suspension hub carrier. Also called the spindle. The steering arm is usually cast or forged integral to the knuckle. The knuckle controls the attachments for the upper ball joint, lower ball joint and steering tie rods.

**Knurl-** one of a series of small ridges or beads on a metal surface to aid in gripping.

**Lash** – free movement between the ball stud and the socket.

**Nibble** – Repeated steering wheel oscillations (typically under +/- 5 degrees) generated by an imbalance in the wheel/tire/brake system. Typically vehicle speed sensitive.

**Pitman Arm-** The lever arm that is attached directly to the steering gear output shaft for the purpose of imparting motion to the steering linkage.

**Pull** – Tendency of a vehicle to divert from a straight course without steering input.

**Radial End Motion** - Movement between the ball stud and the socket perpendicular to the centerline axis of the ball stud under a specified load.

**Radial Interference-** Difference in dimension between the radial section of a seal and the radial space into which it is installed.

**Rebound-** Suspension movement in a downward manner, to unload the spring. Opposite of jounce.

**Roll Steer-** Roll steer takes place when the body of the vehicle rolls with respect to the chassis causing geometry changes in the steering linkage. If the geometry change causes the left and right tires to no longer be parallel, the result is roll steer.

**Rotating Torque** – See kinetic friction.

**Running Friction-** See kinetic Friction.

**Seal-** Item used to prevent moisture or contaminants from entering the socket.

**Seal Extrusion-** Displacement of part of a seal into the extrusion gap under the action of fluid pressure or thermal expansion.

**Seal Extrusion Gap-** The clearance on the low-pressure side between components that confine the seal.

**Shimmy** – Steering shake wherein road wheels “autosteer” at road frequency.

**Spin** – Deforming housing material with rollers on a circular track to attach the cap to the housing.

**Spin Lip** – The part of the housing deformed by the spinning operation.

**Squeeze**- The deformation of a seal caused by the difference in dimension between the seal and the space into which it is installed.

**Socket**- A member which encloses a stud and bearing, allowing both angular displacement and rotational movement.

**Socket Assembly**- The combination of a stud (pin) and a socket body. The spherical head of the pin, and the bearing which surrounds it, are enclosed by the socket body, allowing both rotational and angular movement of the stud with respect to the socket body.

**Static Friction**- see breakaway friction.

**Steering Arm**- (plane arm)- An arm attached solidly to the front wheel spindle. It carries that portion of the total weight of the linkage, which is not supported by the frame. The steering arm transfers motion of the steering linkage to the front wheels.

**Stiction**- The increase in static friction, which occurs with time, of stationary contact of a seal.

**Stick-slip**- The jerky motion of one surface when it is dragged across another surface.

**Stud**- The pin portion of a socket assembly. The stud head is usually surrounded by a bearing, which can be made to rock with a respect of the socket body. It can also rotate on its own axis in the bearing with relation to the socket.

**Toe In / Toe Out** – In the top view, if a pair of wheels are angled so that the front of the wheels is closer together than the back – toe in. If a pair of wheels are angled so that the front of the wheels is further apart than the back – toe out.

**Tie Rod**- a connecting medium having socket assemblies on each end, one of whose ends is attached to the steering arm. It is usually mounted across the centerline of the vehicle.

**Trackbar** – Rod attached between the axle and the frame to control relative lateral motion.

**Tribology**- a study that deals with the design, friction, wear, and lubrication of interacting surfaces in relative motion (as in bearings or gears).