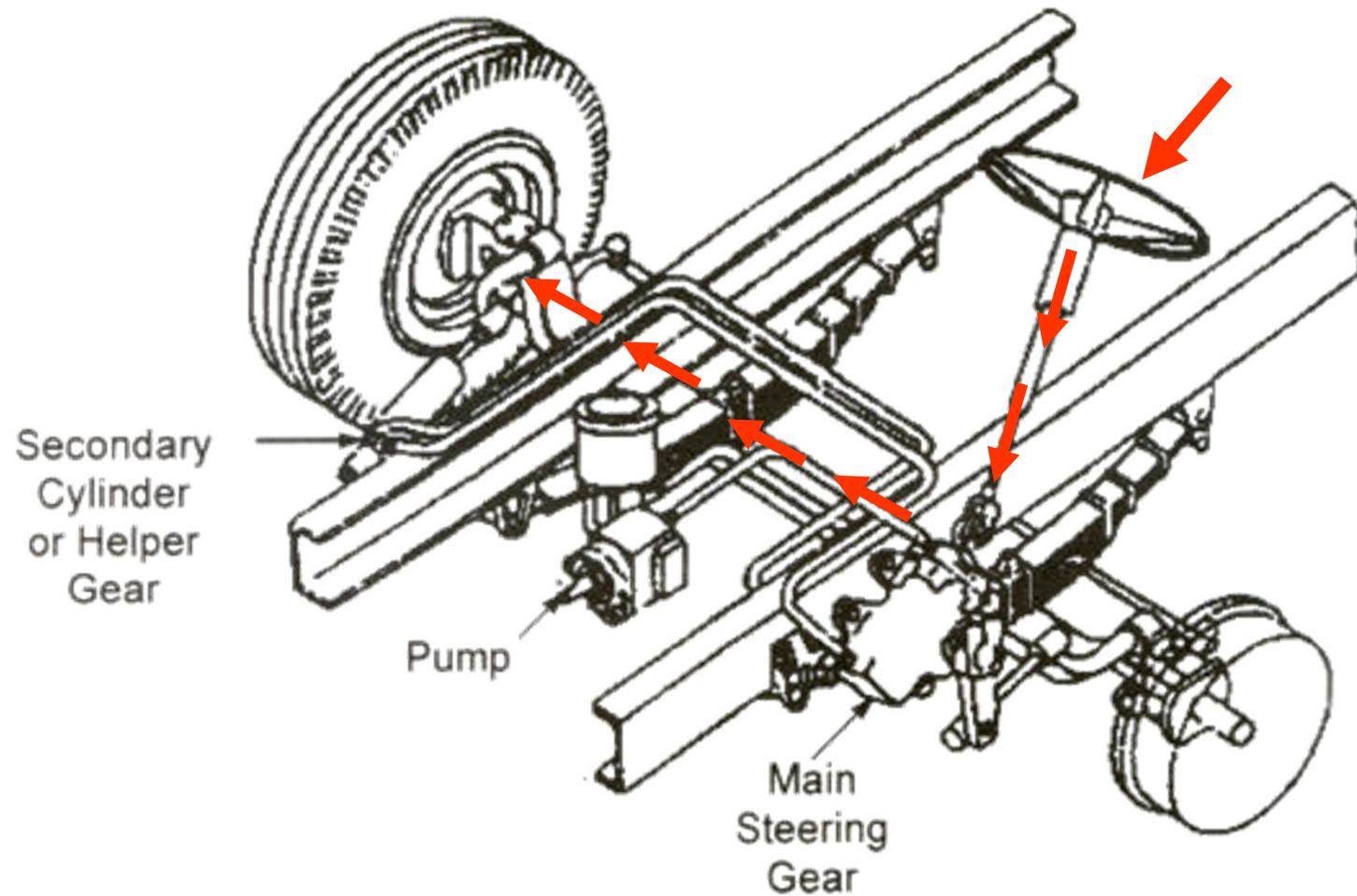


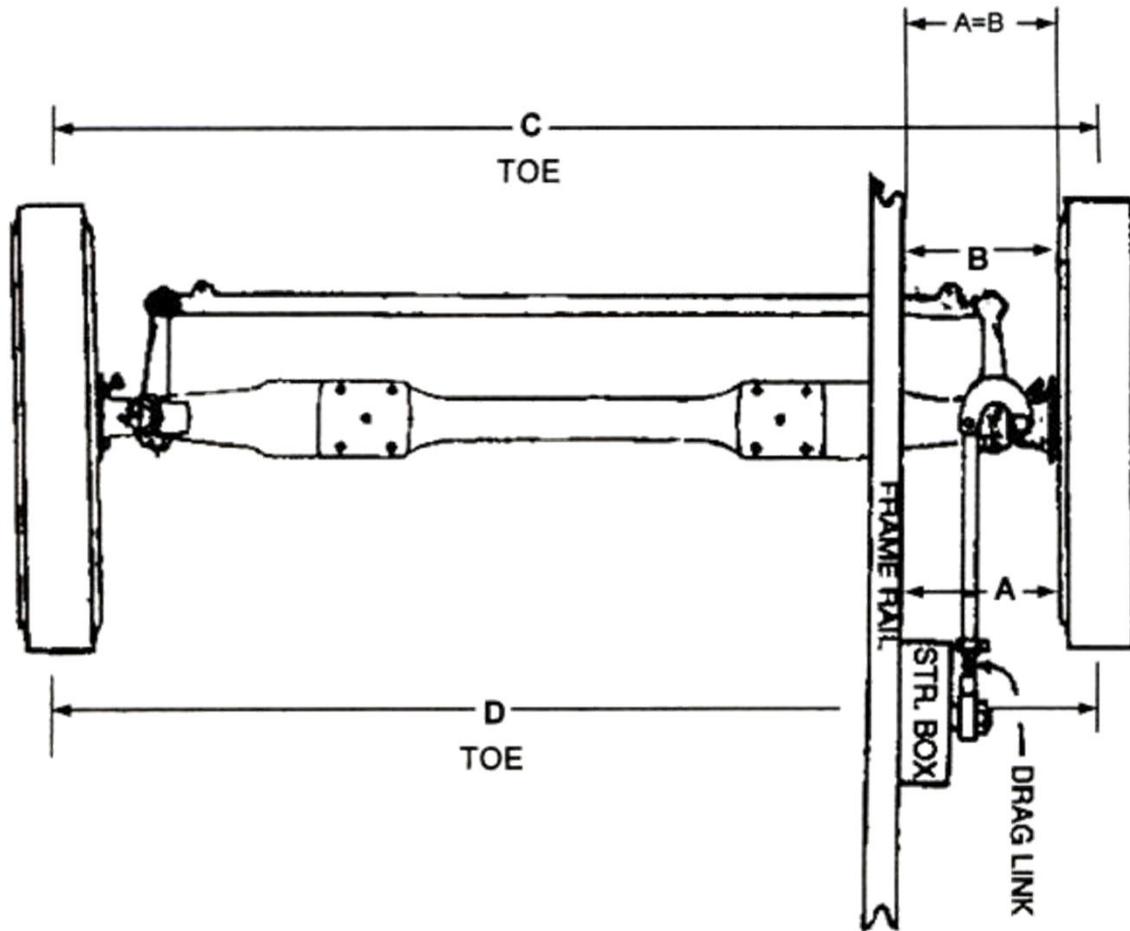
The Basics Of Power Steering

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Steering is a System



This Makes the System ...



- One unit, one component.
- Everything is attached.
- So it is almost impossible to have just one damaged part.



Visual Aids

- The steering wheel off center.
- The frame flexes when turning against the axle stops
- The axles stops are bent or broken
- The power steering fluid is brown or black

Visual Aids

- **The drag link and/or tie rods ends are screwed too far in or too far out.**
- **Cross member and or gusset problems. Rivets or bolts shear off.**
- **The hoses are hard and/or brittle.**
- **Seal leakage at the input or sector shaft.**

Additional Problem Indicators

- U-Bolts won't stay torqued
- Off setting spring hangers, shackles and pins wear out
- King pin wear on only one side
- Tires wear & scuff

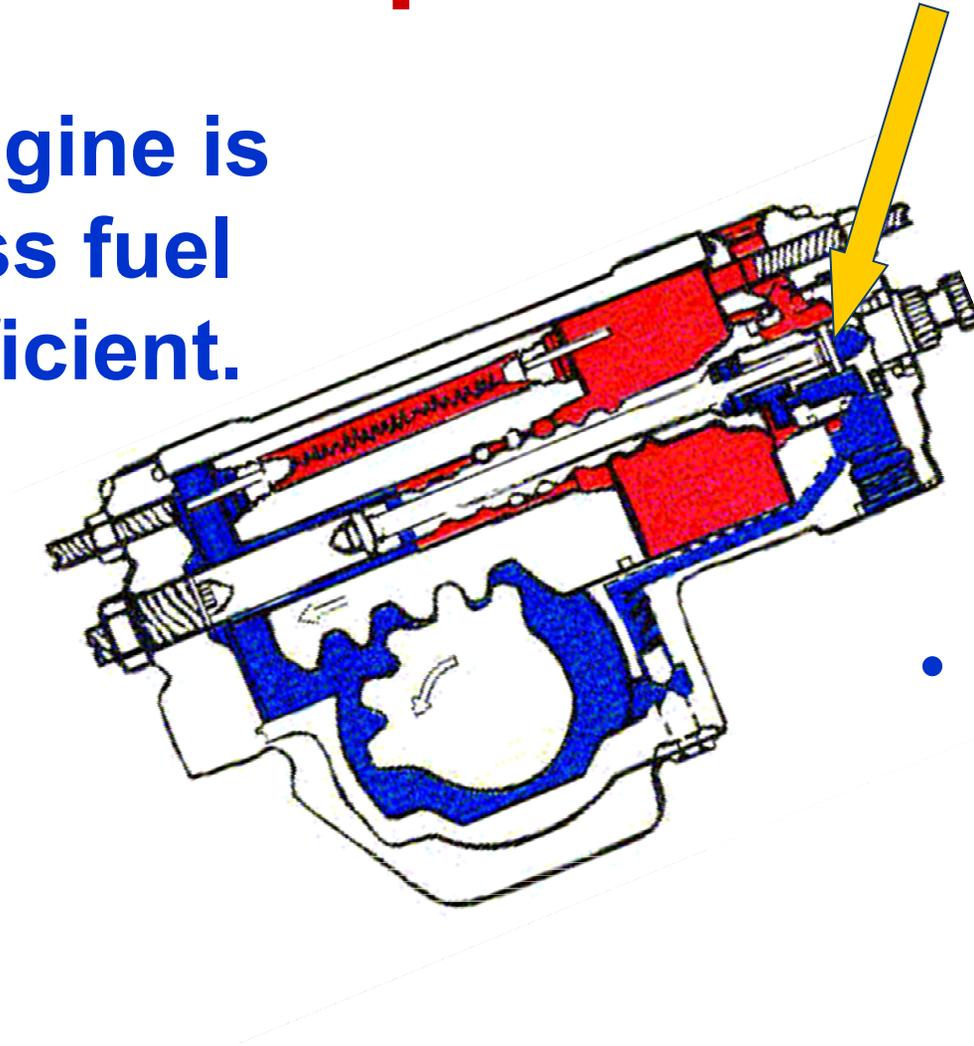
Number One Visual Aid

- If the steering wheel is off center. The spool valve at the top of the gear is likely to be open and circulating fluid.



With Spool Valve Open

- Engine is less fuel efficient.

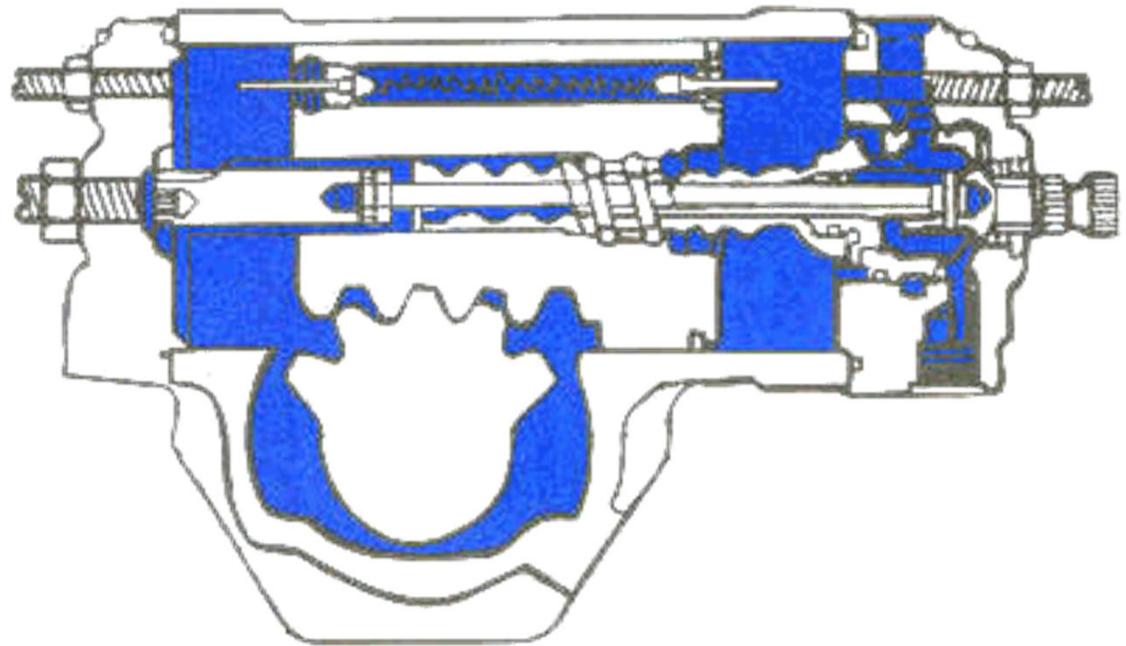


- Steering system over heats.

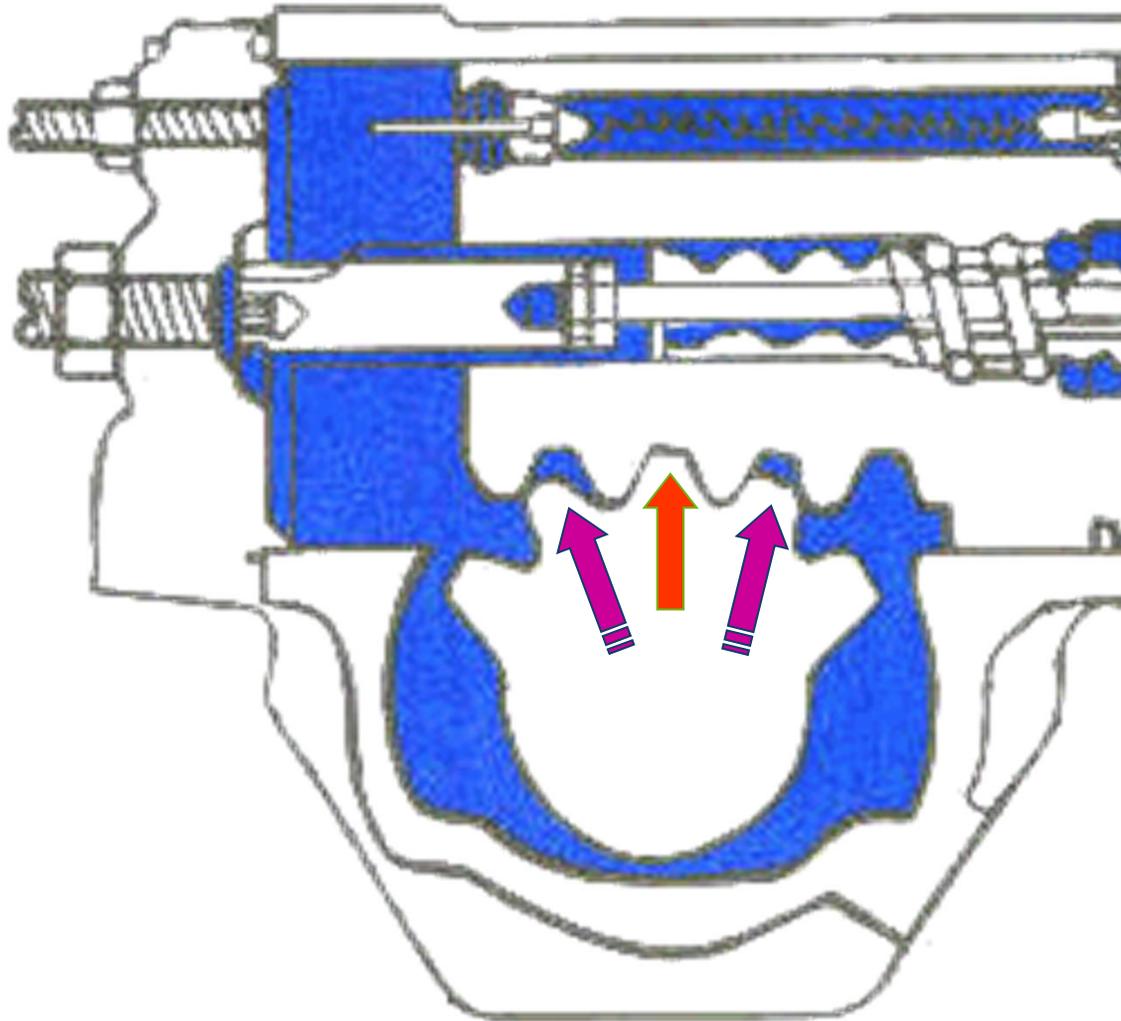


Neutral Position

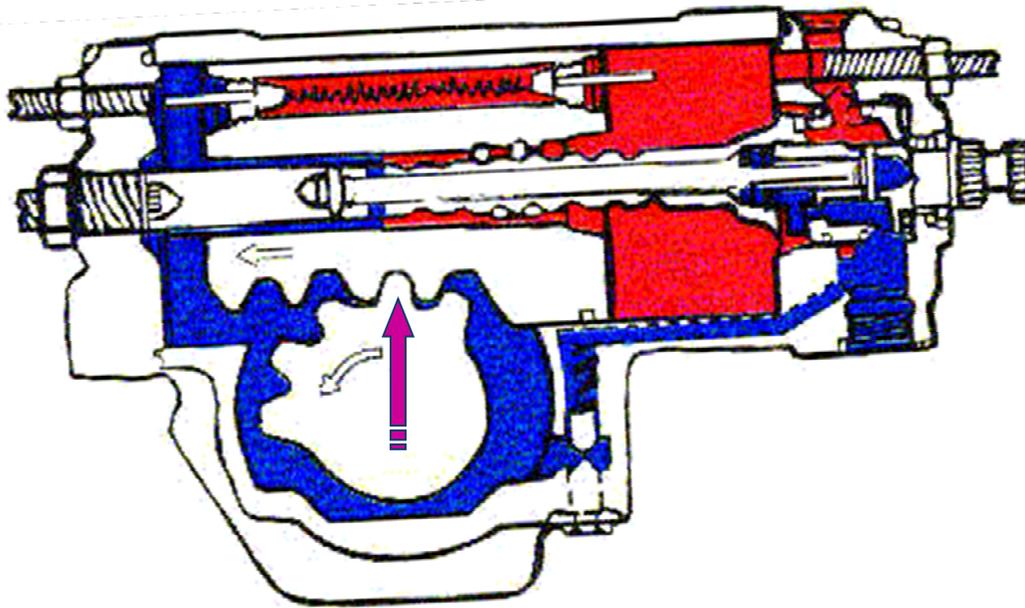
- If the Steering System is set up correctly it will run in the neutral or centered position 98% of the time bypassing fluid to the reservoir.



Neutral Position



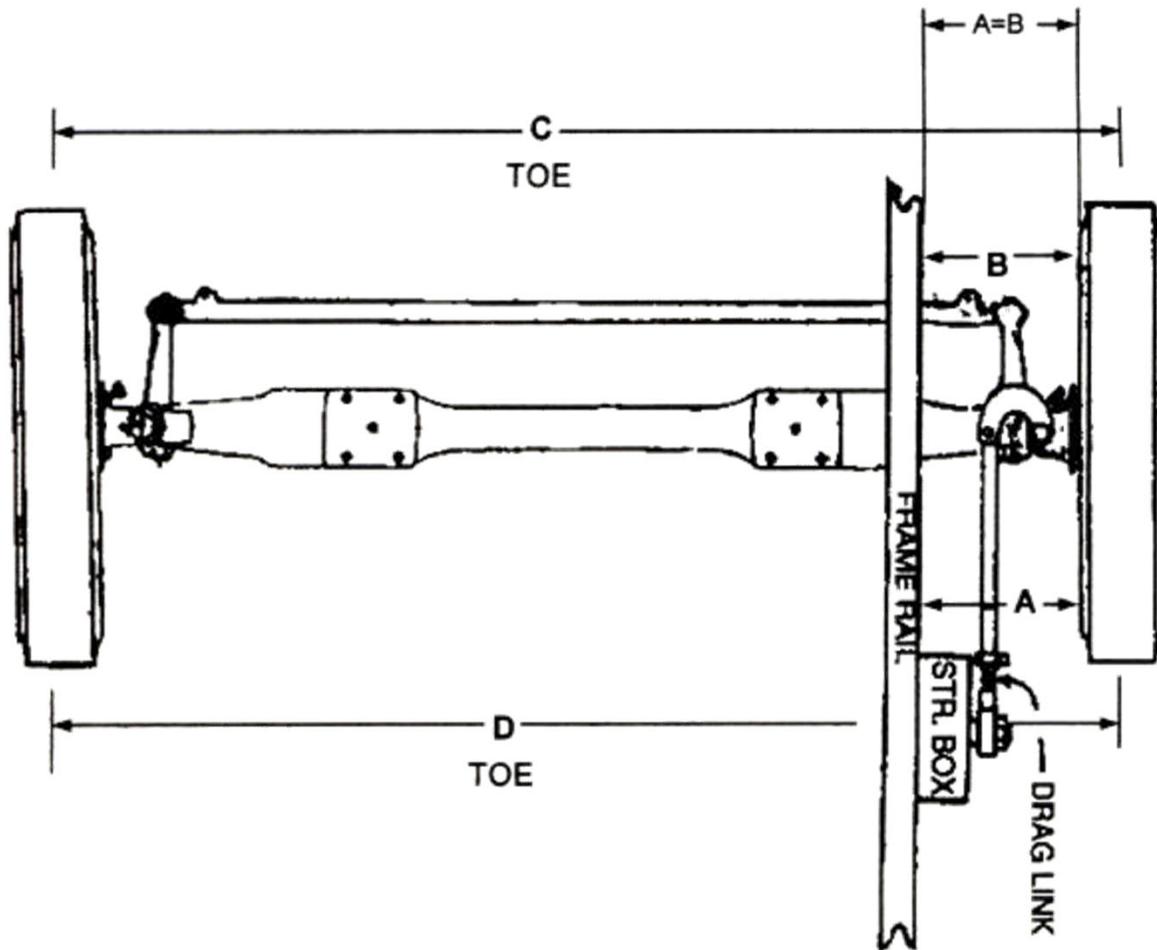
Turn Position



- Is when the steering system is most vulnerable.



The Geometric Set Up



- Align the left tire with the frame rail.
- By Making A & B equal.

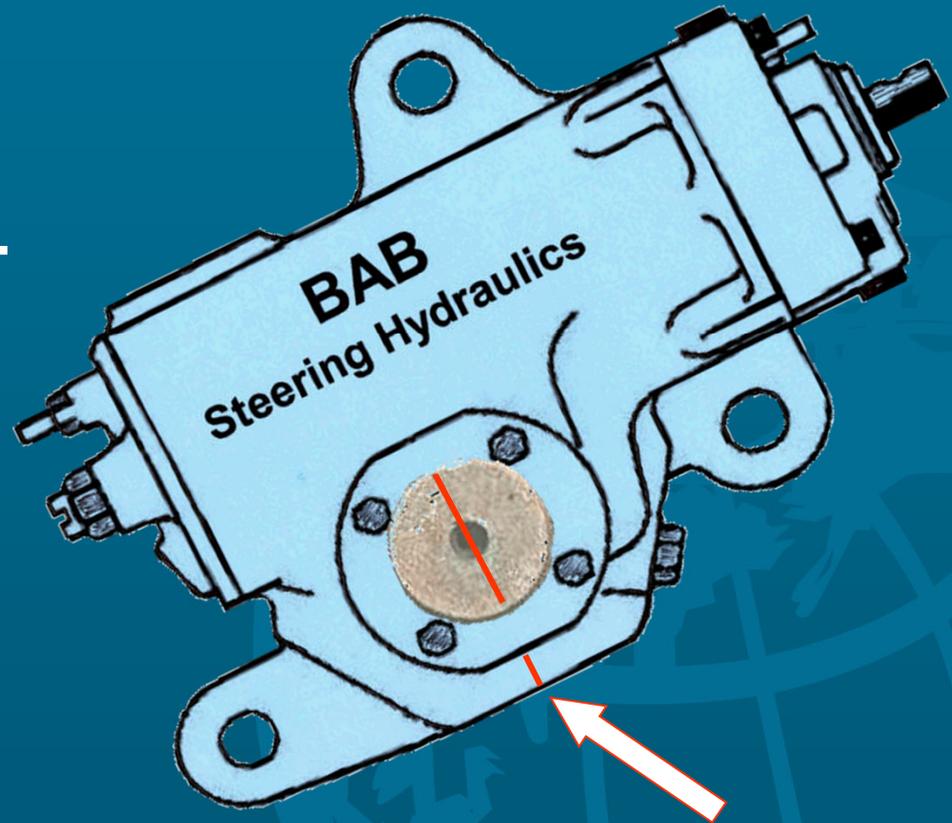


Identify the Gear

- You could have one of the following
 - Ross HF
 - Ross HFB
 - Ross TAS (out since 1987)
 - Ross THP (new for 2007)
 - Sheppard 292 to 592 (early style)
 - Sheppard M series
 - Bendix

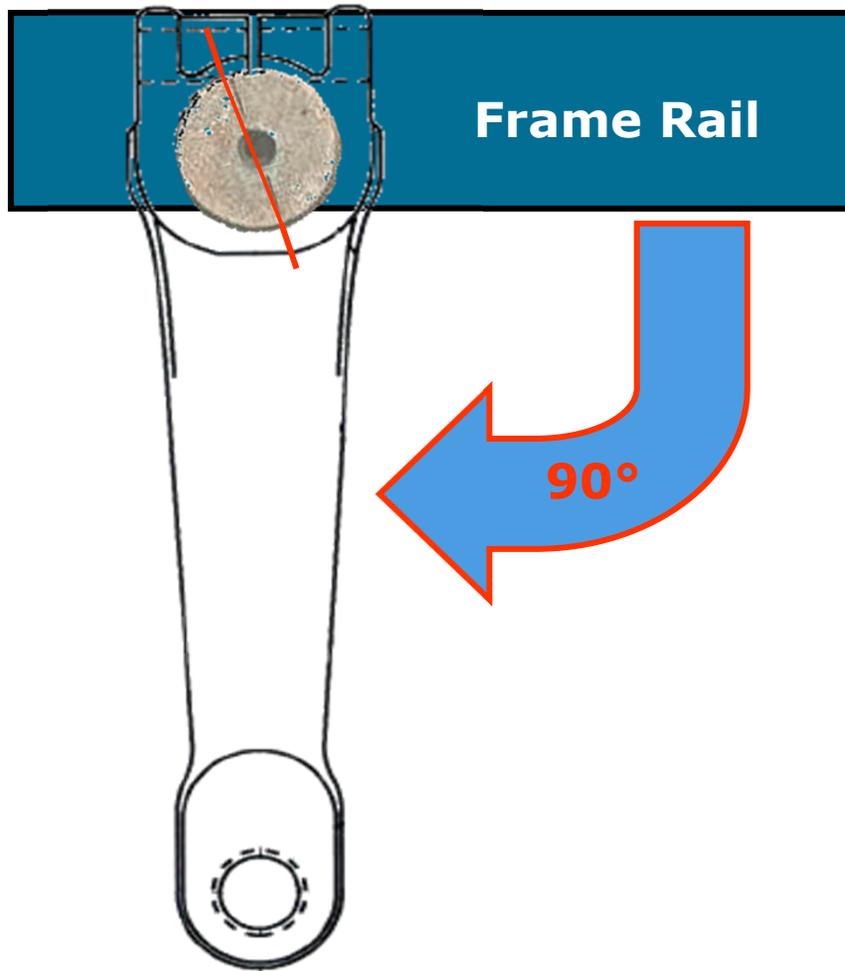
Check the Timing Marks

- The Ross TAS gear has a timing mark on the case.
- You should not have to turn the input shaft more than 1 ½ turns to align the marks.



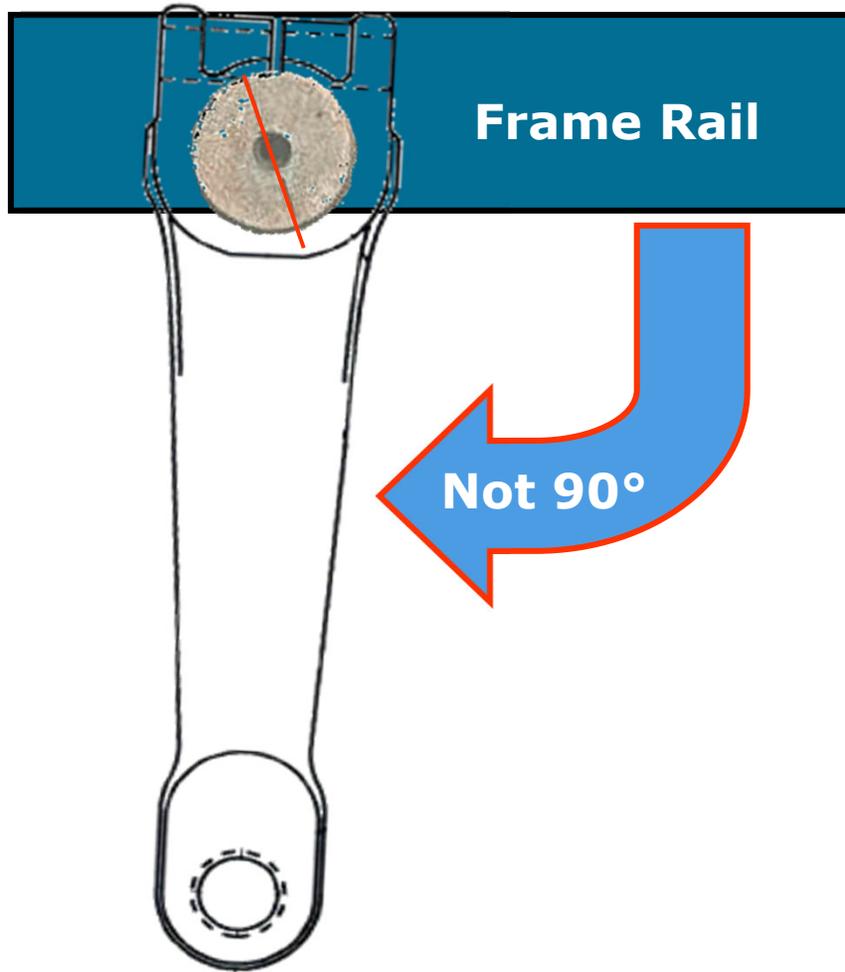
To this point we have:

- Driven the vehicle straight into the stall with the tires parallel to the frame
- Painted and scribed both front tires
- Disconnected the draglink
- Performed the geometric setup, squaring the tire to the frame
- Identified and timed the steering gear



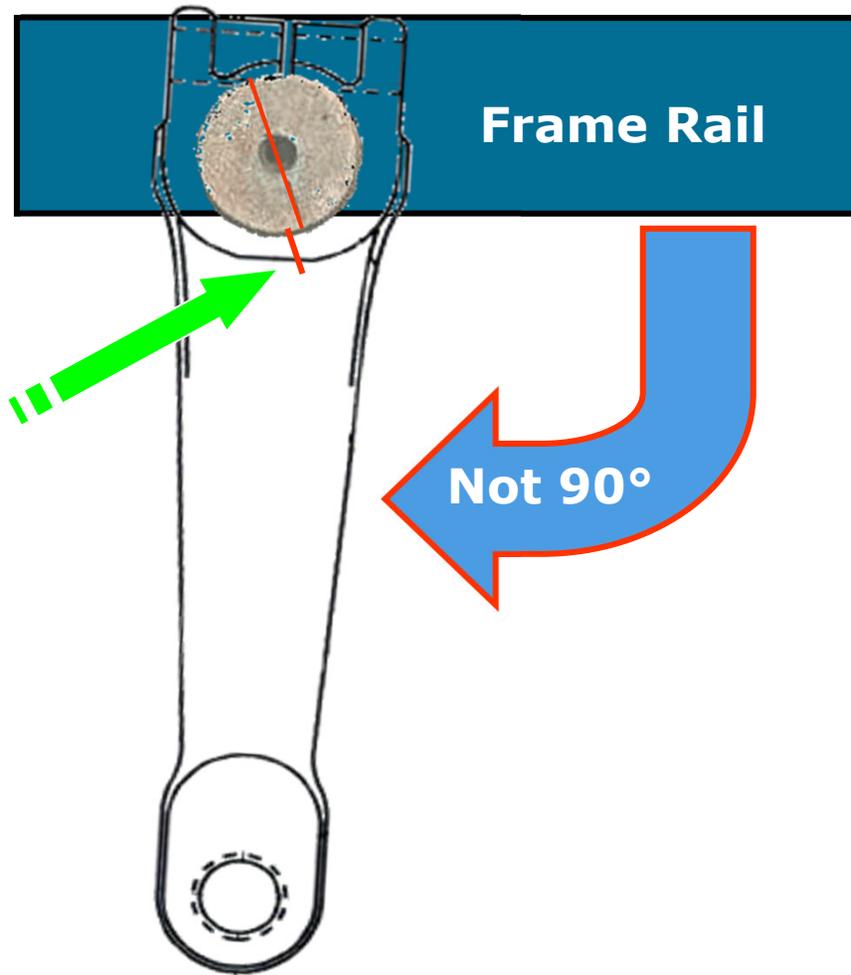
- **At this point as a general rule the pitman arm should be at 90° to the frame rail.**





- Remember if the gear is not centered correctly we open the spool valve at the top of the gear

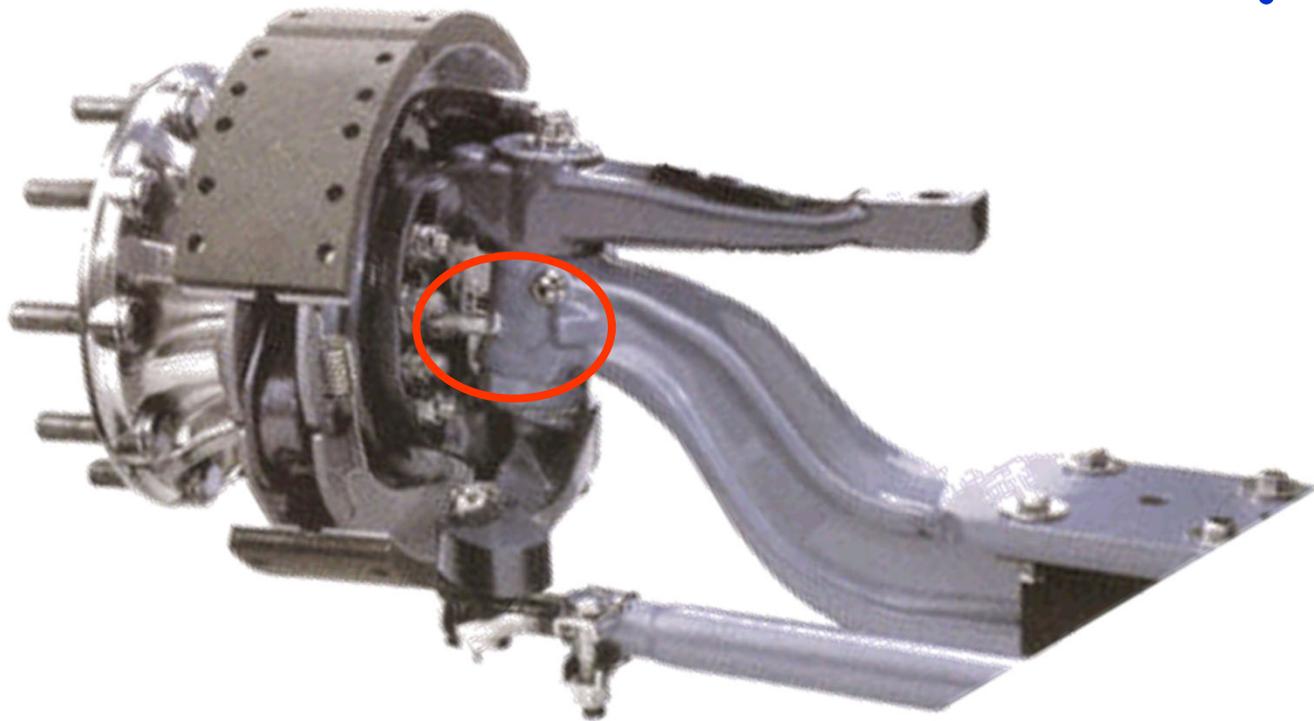




- If we miss time the pitman arm to the sector shaft we will have more turns in one directions



Bent Axle Stops



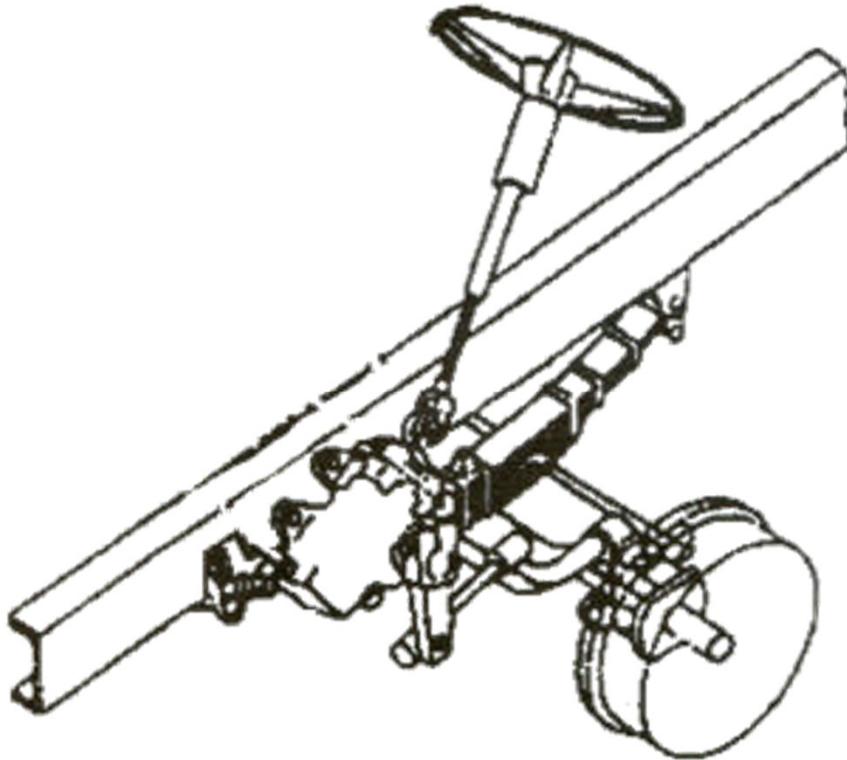
- Improper adjustment or failure to adjust the poppet valves creates a pressure equal to **66,000** pounds PSI at the axle stops.



Important Info on Poppet Valves

- Every Ross and Sheppard steering gear has poppet valves and they must be adjusted.
- Those responsible for the adjustment:
 - On New Vehicles - the Selling Dealership
 - On Replacement units - the installing technician.

Spring Deflection



- The system works on spring deflection.



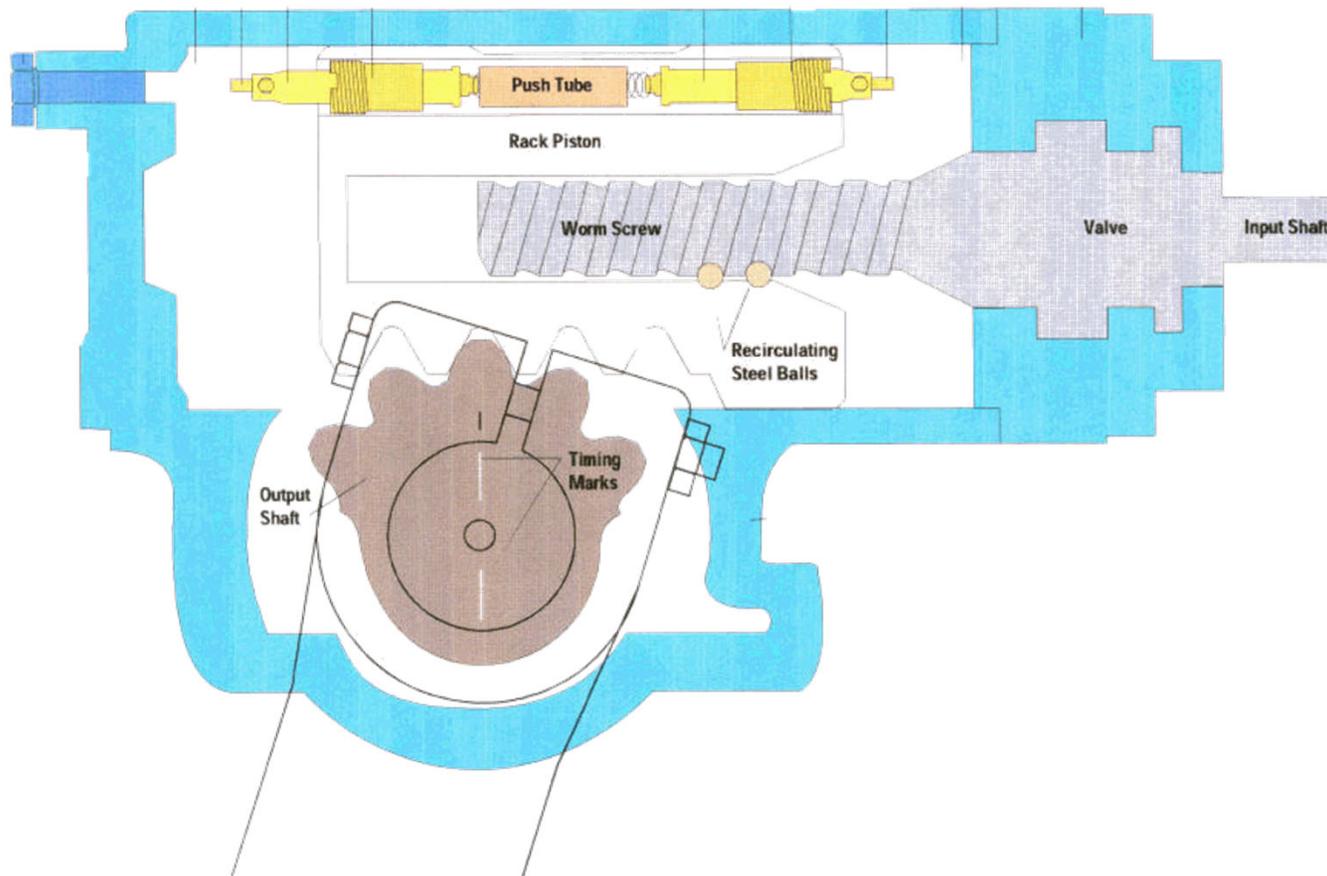
Frame Flex

Frame Rail

- **When you turn in either direction against the axle stops does the frame flex?**



Ross TAS



Things to consider

- **Approximately 70%** of steering gears with *auto poppets* fail due to suspension problems.
- A suspension problem can be anything from a completely worn out front end to the steering stops being out of adjustment.

and that

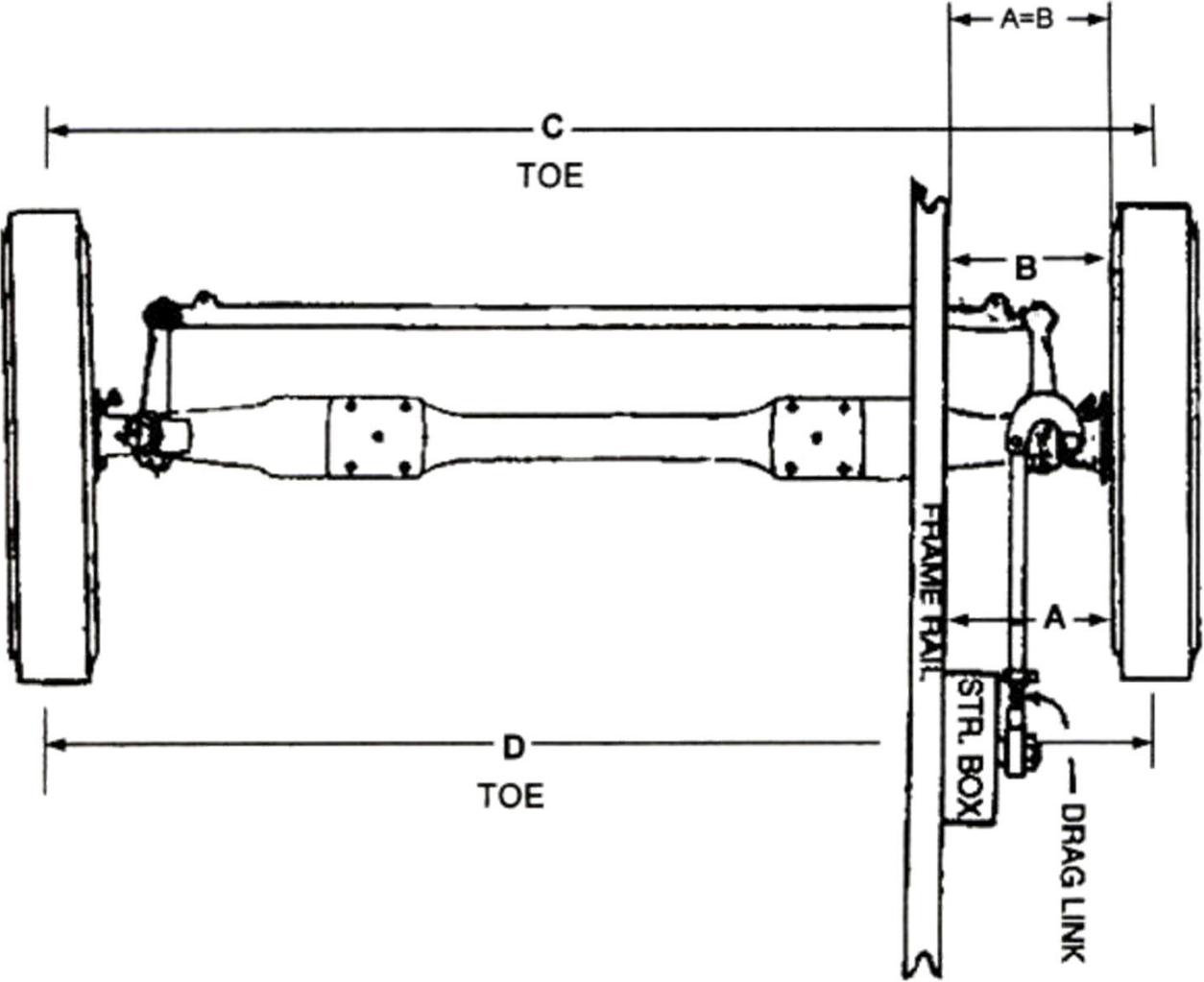
- **Approximately 20%-25%** of steering gears fail due to a hydraulic problem or steering column problem.

and finally that

- **approximately 5%-10%** of steering gear failures are component failures due to natural causes (the unit is just old and tired).



TOE - IN



Additional Tips

- **The following tips apply to all steering systems.**
 - every system (except Saginaw) has a filter
 - replace the filter at least 2x a year
 - replace hoses that are hard and brittle. Replace one replace all
 - use the correct hose clamps
 - be sure to use the correct power steering pump

Additional Tips

- **The following tips apply to all steering systems.**
 - keep the vent open and clean
 - always flush the system
 - use only approved fluids
 - do not mix fluids
 - always bleed the system
 - always adjust the poppet valves on gear so equipped

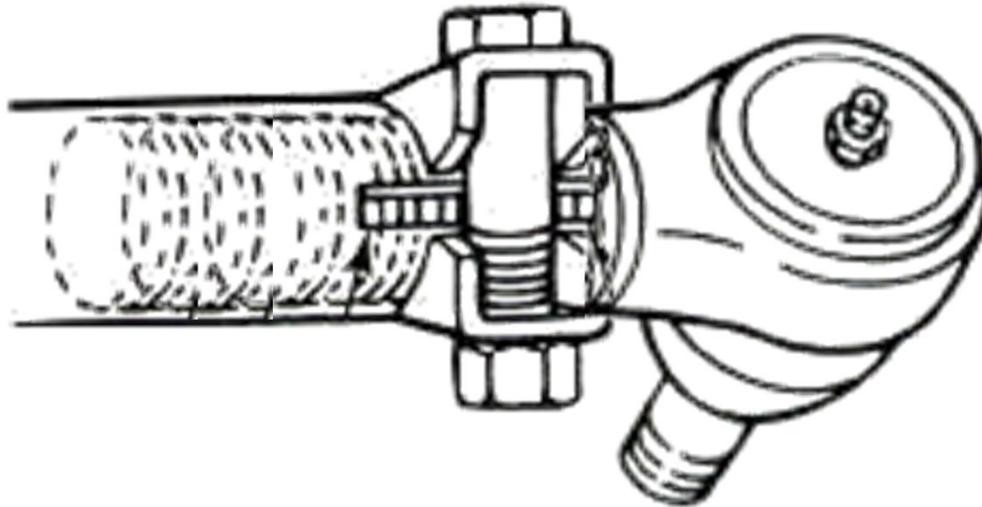
The Third Visual

- Is the oil discolored?
 - Brown
 - Black

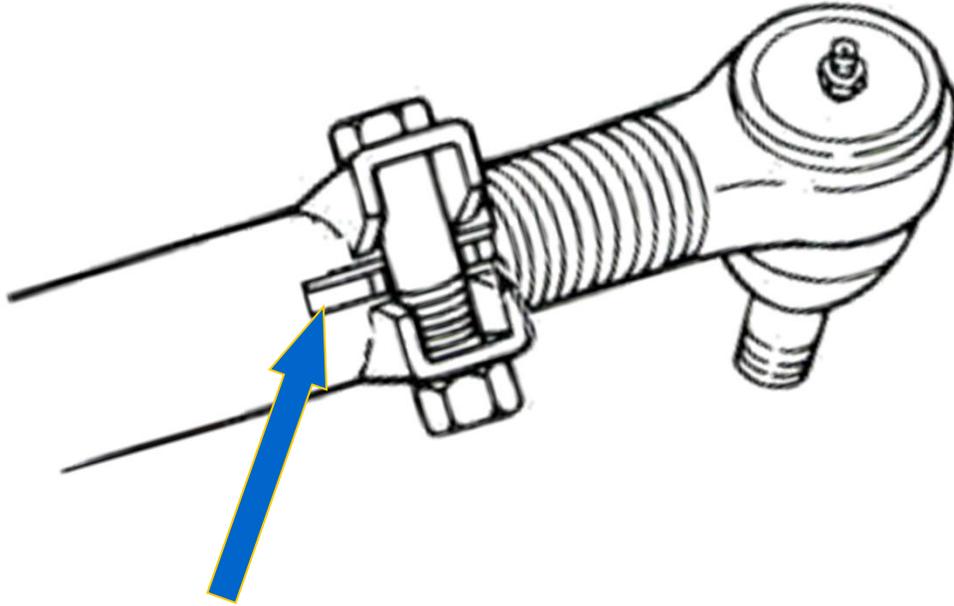


Fourth Visual

- Check the threaded area of all threaded parts.



Fourth Visual



- Are any of the threaded ends screwed all the way in or out?

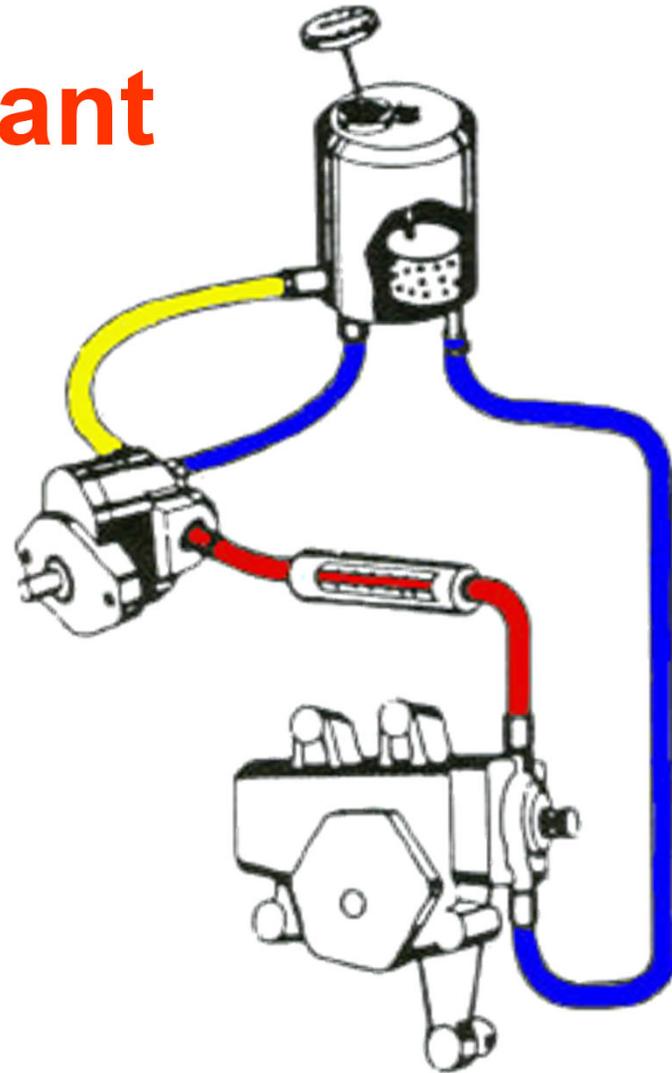


Hoses are Important

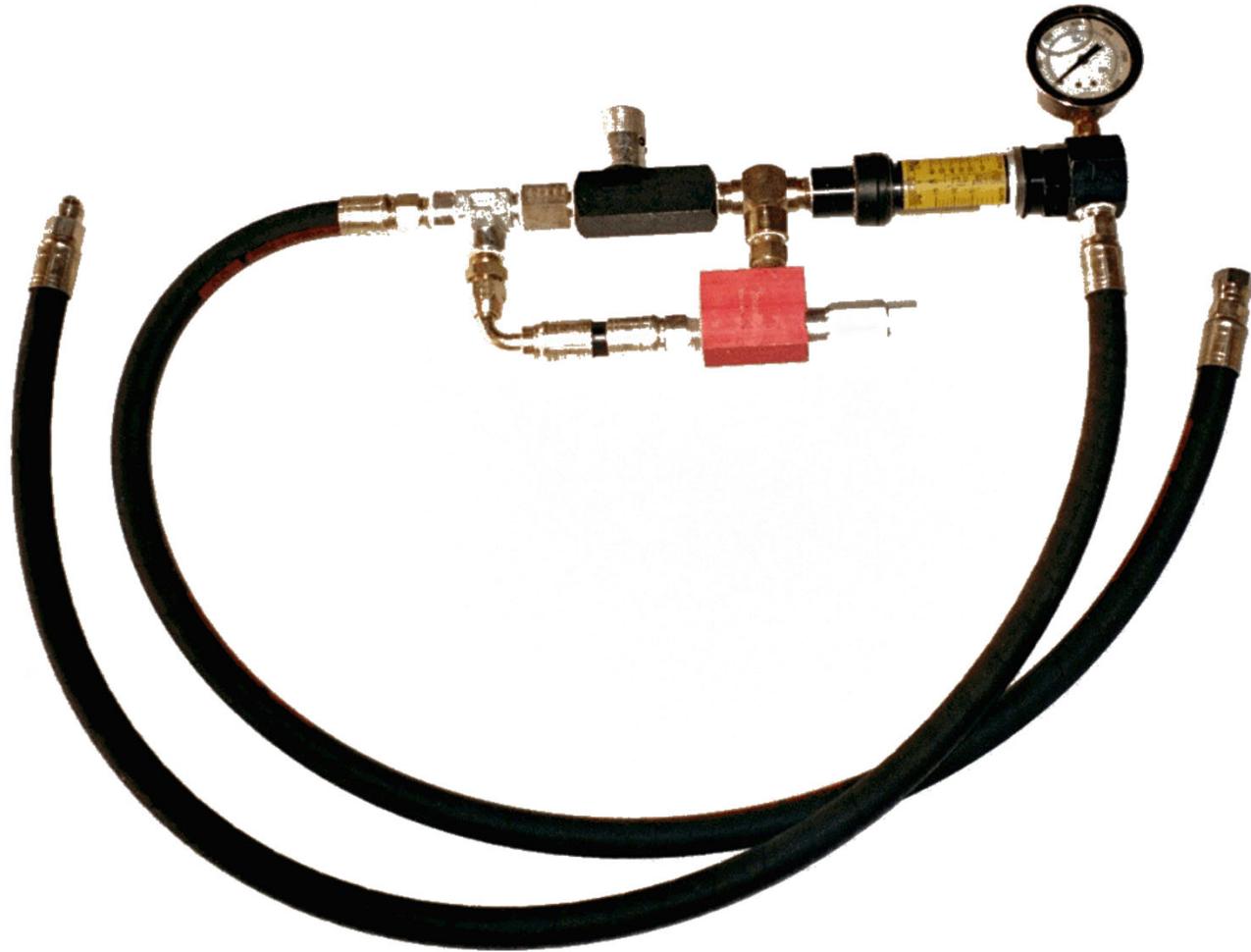
Pressure

Suction

Return



Test Loop



TC-2002

- **Necessary for adjusting the poppet valves**

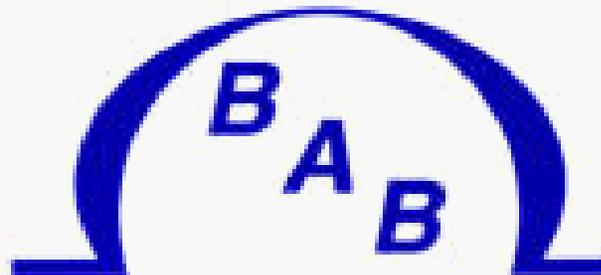


Technical Assistance

"Installers Only"

Technical Assistance HOTLINE

800.783.3748



STEERING HYDRAULICS, INC.