

# Front Drive Axle

## **Outer CV-joint**

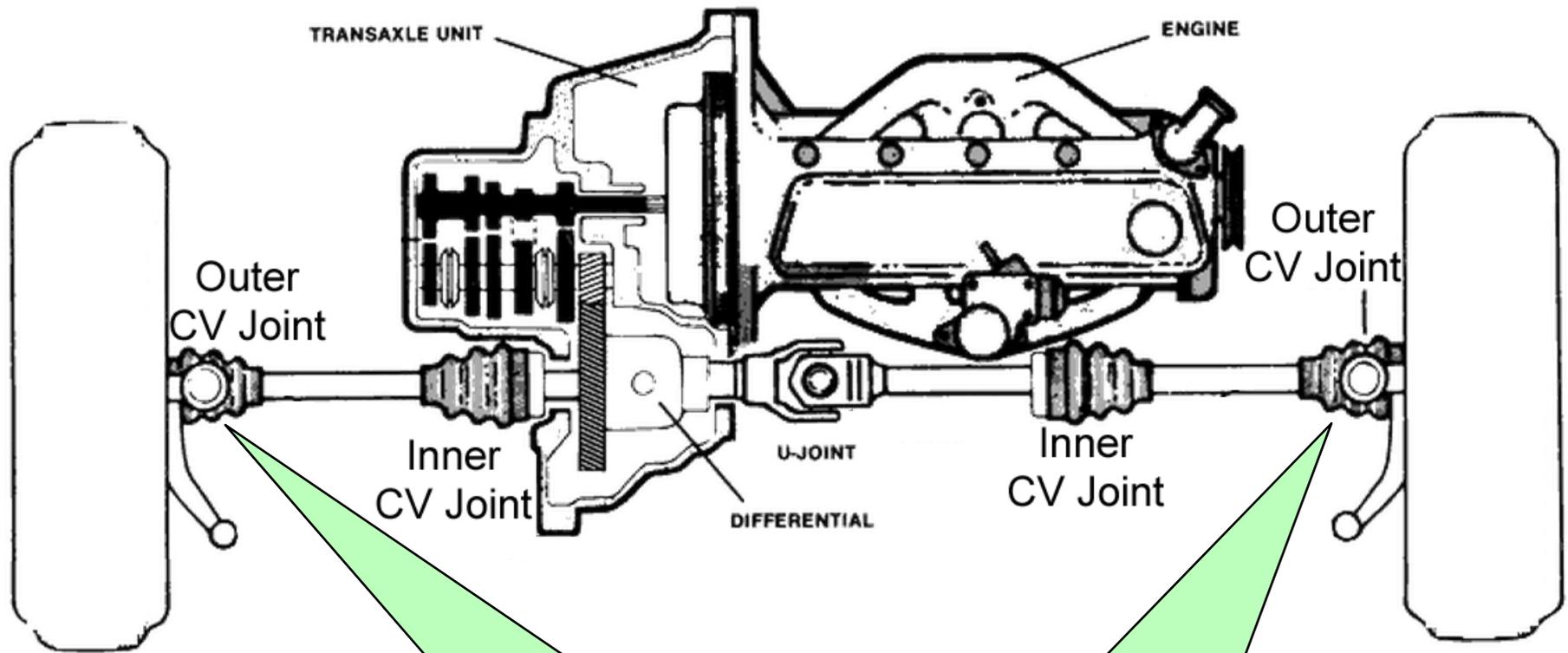
Allows wheels to steer while axle is rotating

## **Inner CV-joint**

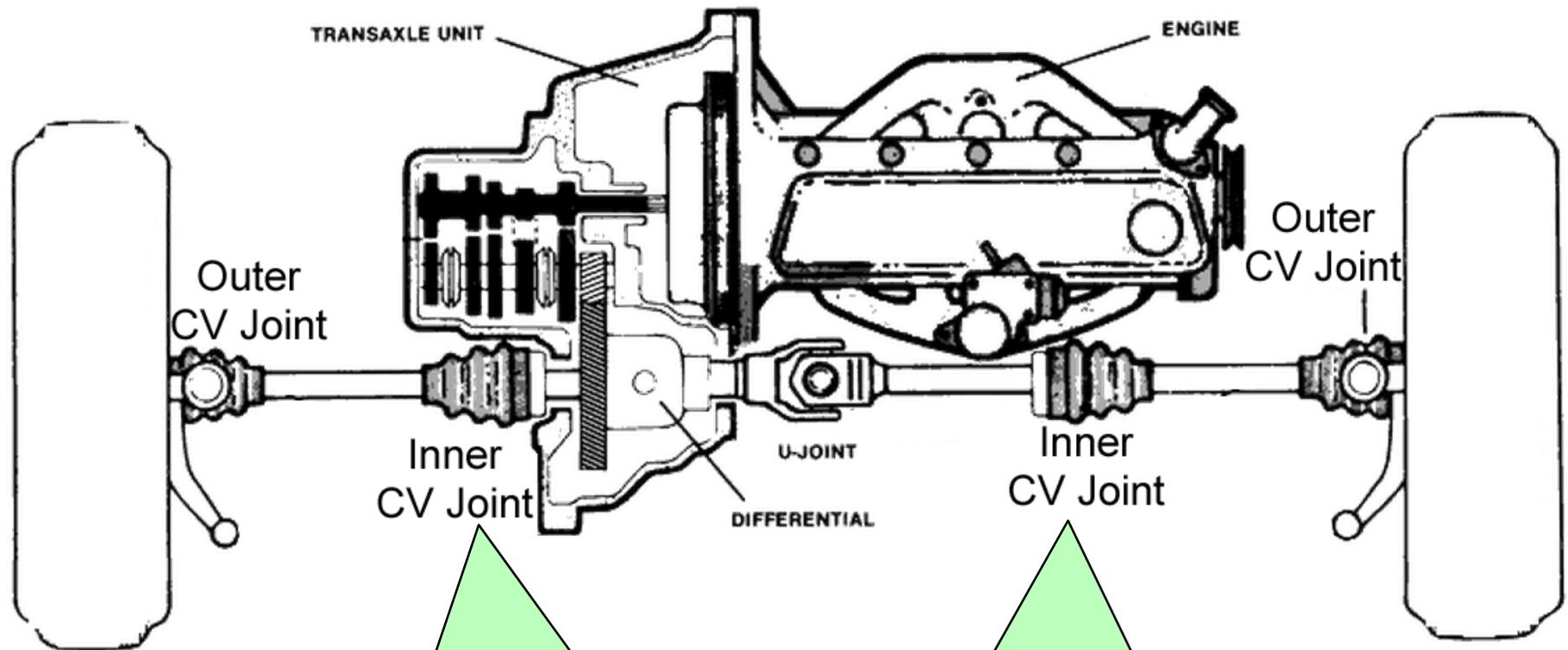
Allows axle shaft to change length while axle is rotating

## **Axle shaft**

Transmits power from inner to outer CV-joint



Outer Joints must operate at extreme steering angles



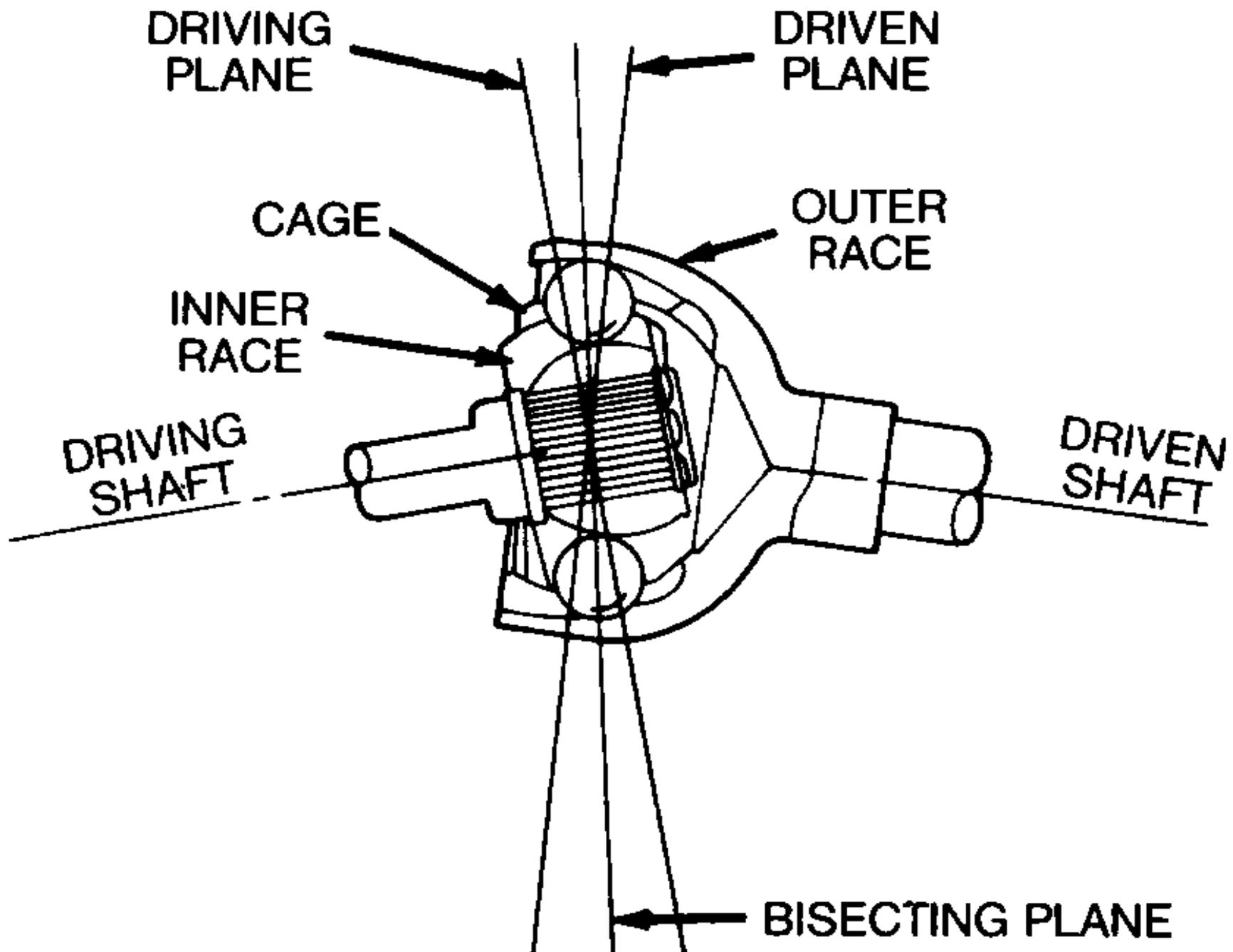
Inner Joints “plunge” to change length on Jounce & Rebound

# CV-Joint = Constant Velocity

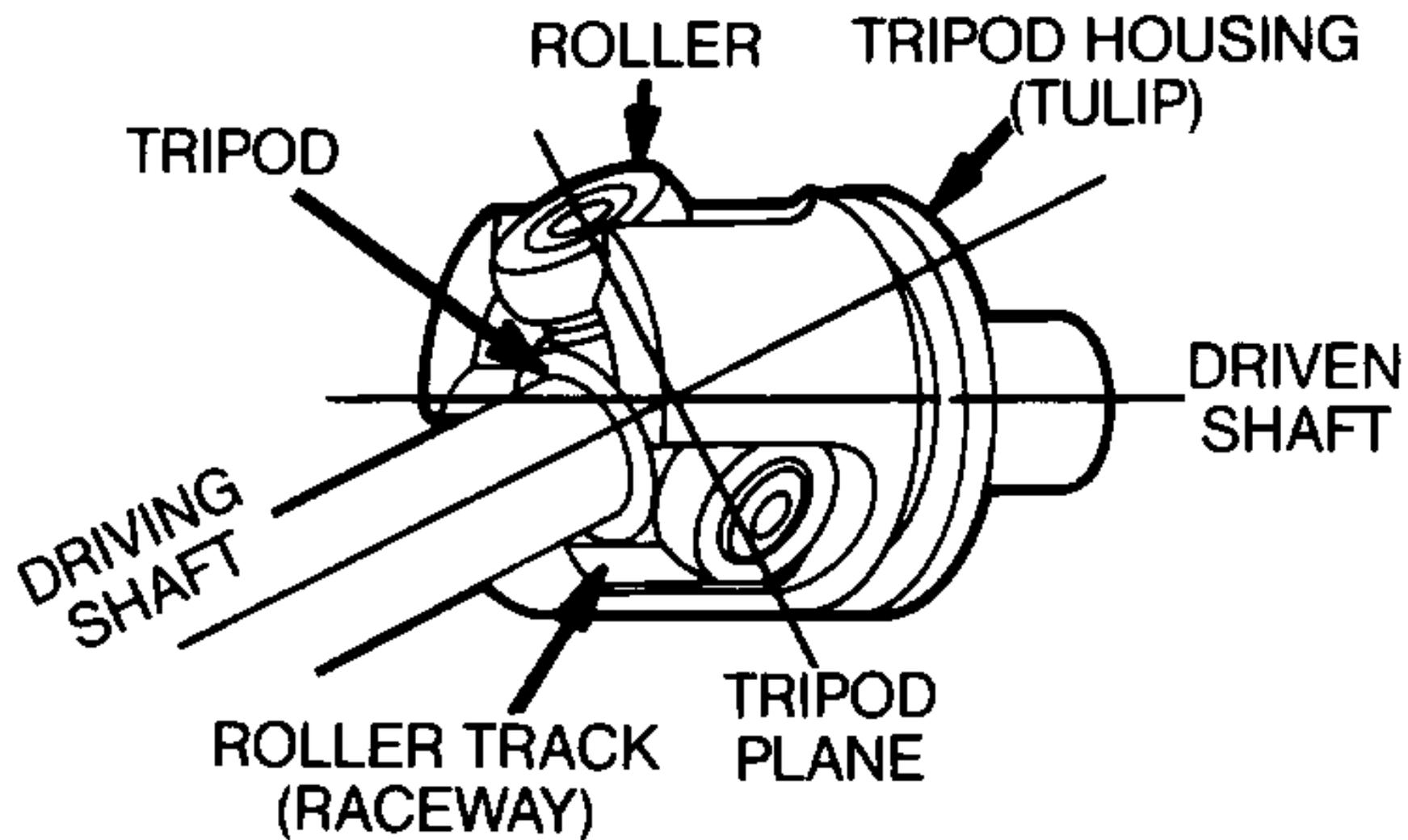
Transfers torque at the center of the driving and driven shaft.

RPM of both shafts operate at constant velocity

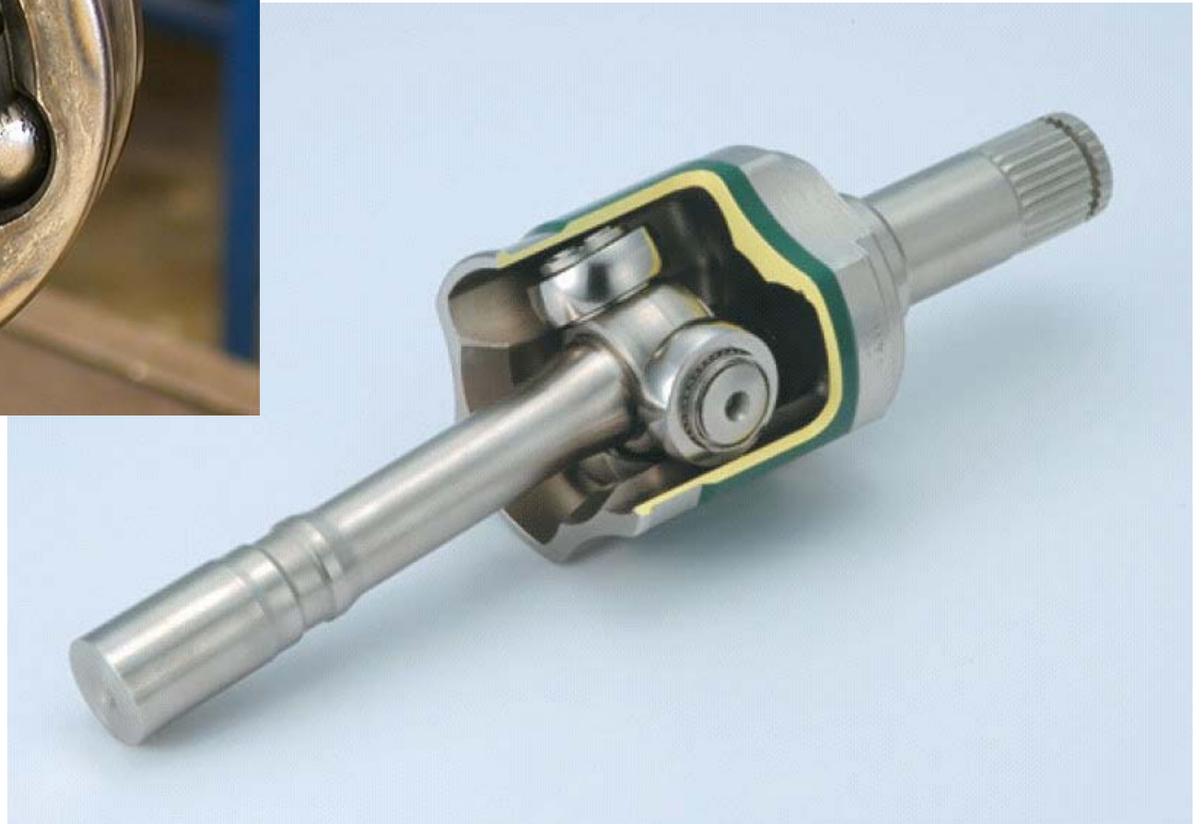
(U-joints speed up and slow down twice per revolution)



# Tripod joint operation.



# CV-Joints are Ball Type or Tripod



# CV-Joints are Fixed or Plunging

Fixed joint

Can be Ball type or Tripod

Does not move in or out

Operates at sharp steering angles

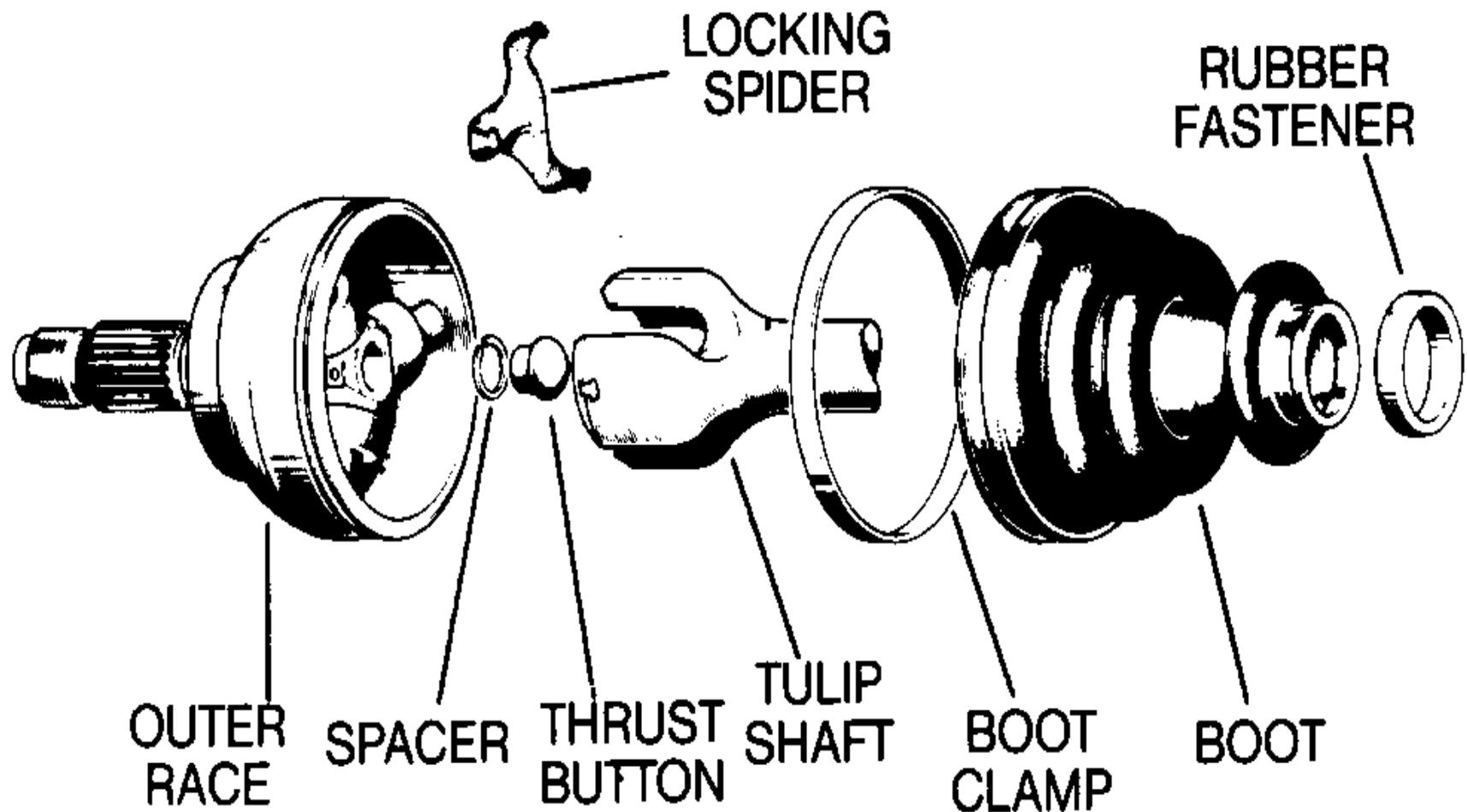
Fixed are used for the *outboard* joint

# Rzeppa CV-Joint

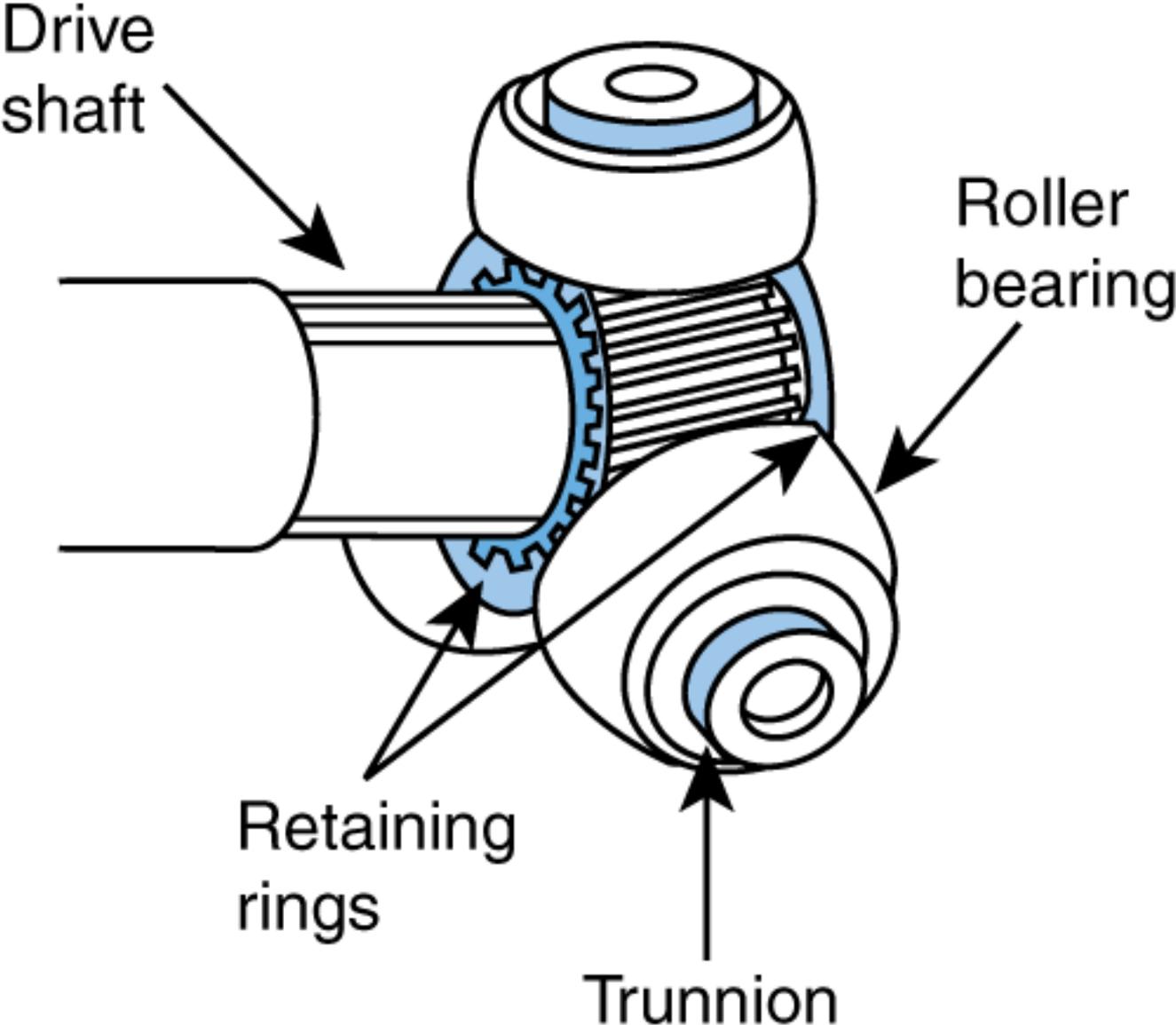
Most common type of Fixed outboard CV-joint



# Outer tripod fixed CV joint.



# Tri-pod assembly



# CV-Joints are Fixed or Plunging

Plunging joint

Can be Ball type or Tripod

Change length during Jounce

and Rebound of the suspension

Plunging used for the *inboard* joint

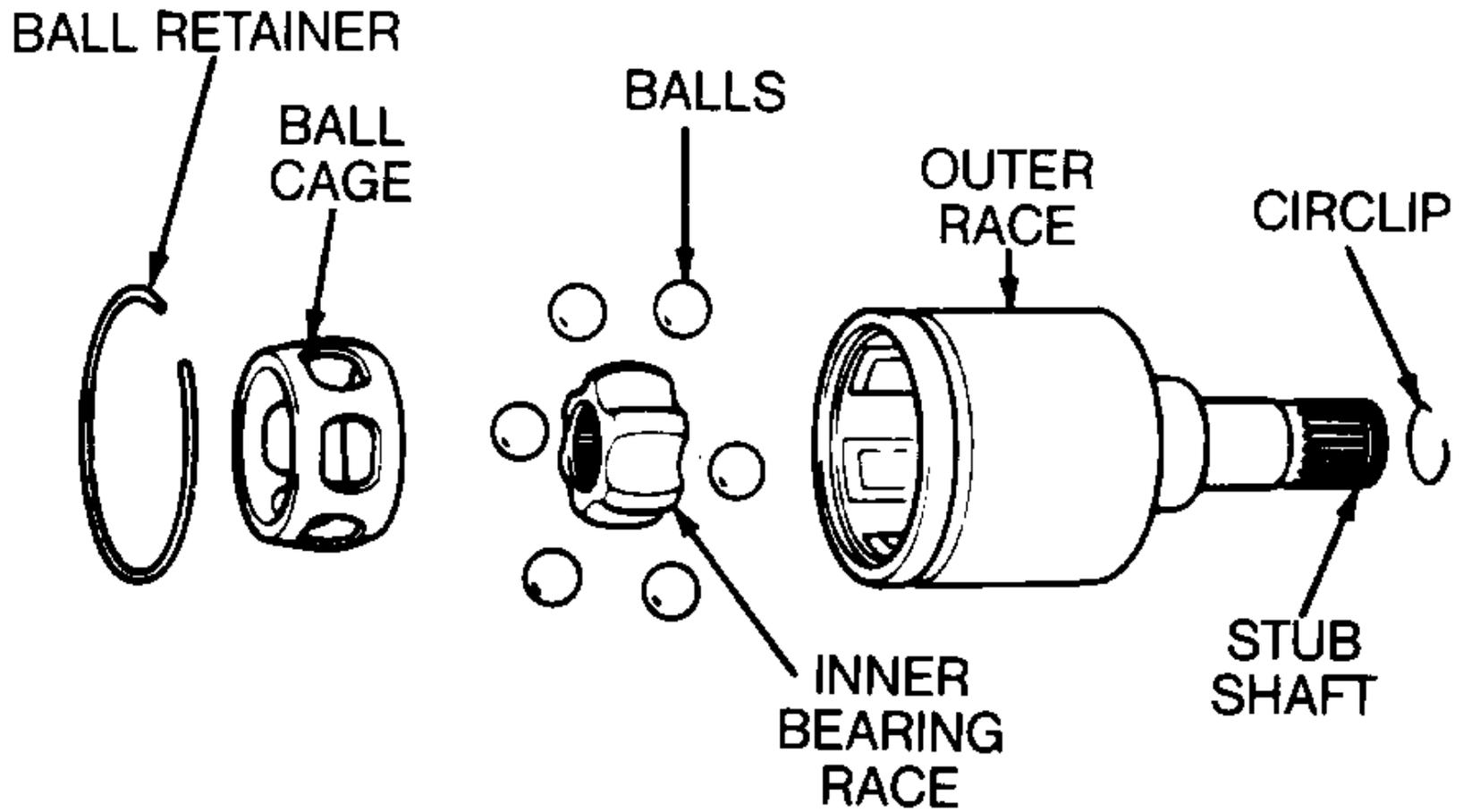
# Double Offset CV-Joint

## Plunging Inboard CV-joint



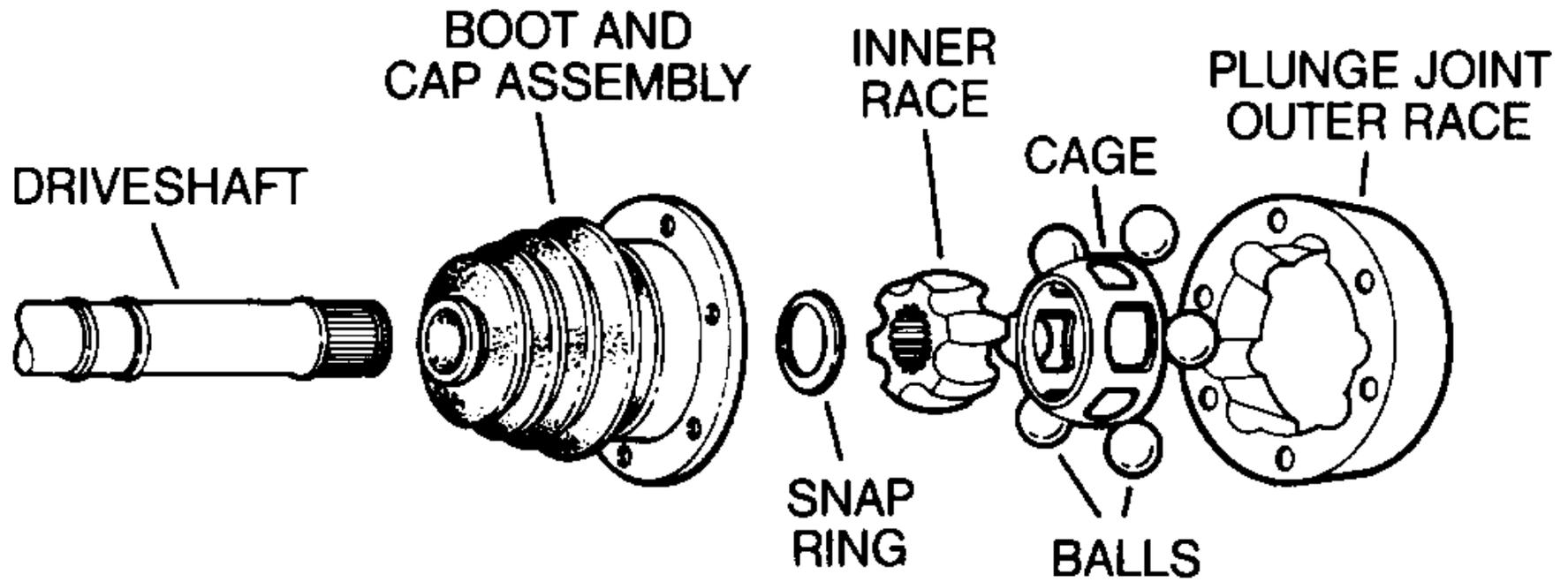
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Double-Offset CV joint.



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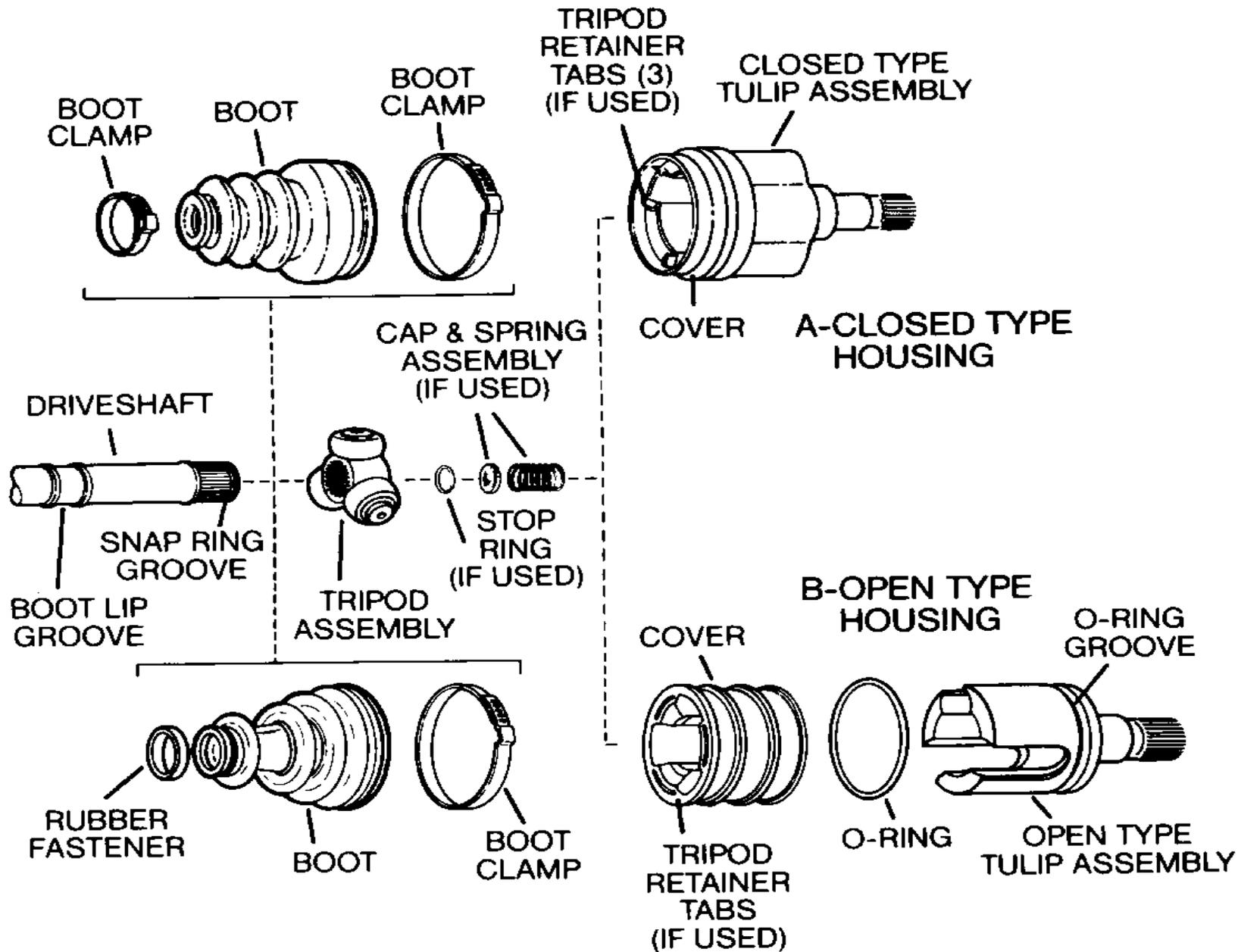
Cross Groove CV joint.



# Tripod CV-Joint



# Inner tripod plunge CV joint.



# Replacing CV-joint Boots



# Replacing CV-joint Boots

Ripped boots allow contamination that accelerate wear in the CV-joint

Replace CV-Joint AND CV Boot

Replacing entire drive axle shaft is the Most Reliable repair

Split replacement boot  
is **NOT RECOMMENDED**



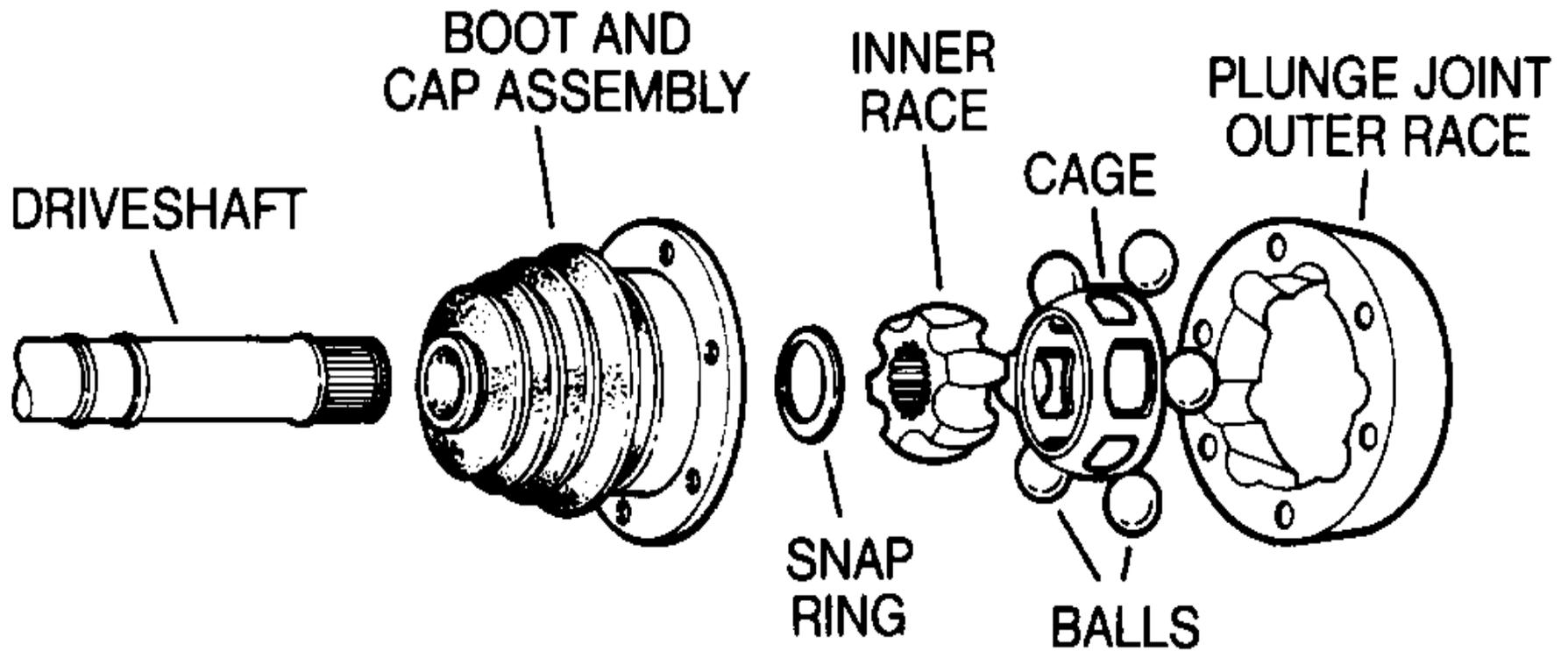
# Replacing CV-joint Boots

All old grease must be completely removed

Leave no trace of cleaning solvent.

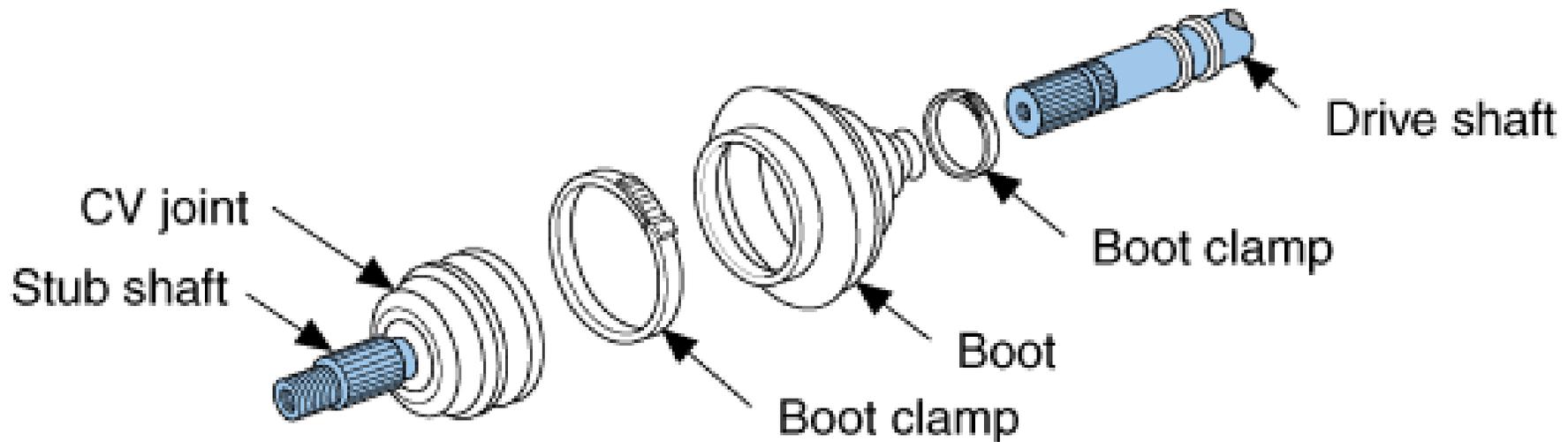
Balls, rollers, cages, races are wear mated.

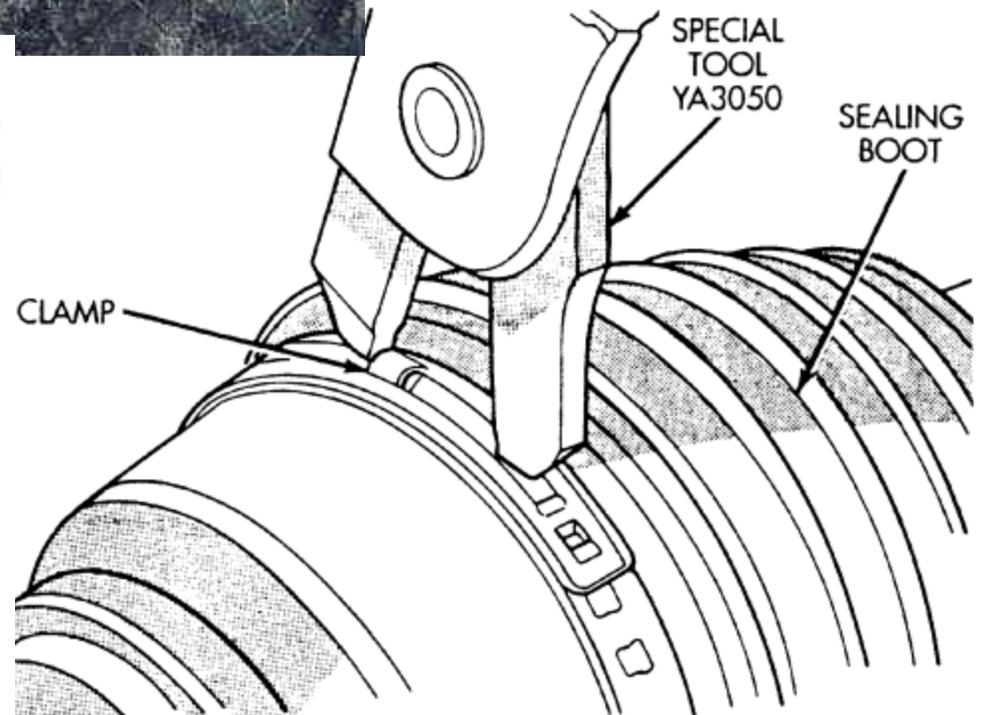
Easy to switch positions of ball, roller and race causing accelerated wear/vibration



Each ball must stay in original position  
for cage AND inner race AND outer race

If a CV joint boot is to be replaced...  
Boot must be properly located,  
Specified amount of special lubricant used  
Clamp secured with a special tool





New 1/2 shaft is more reliable  
and cheaper in long run



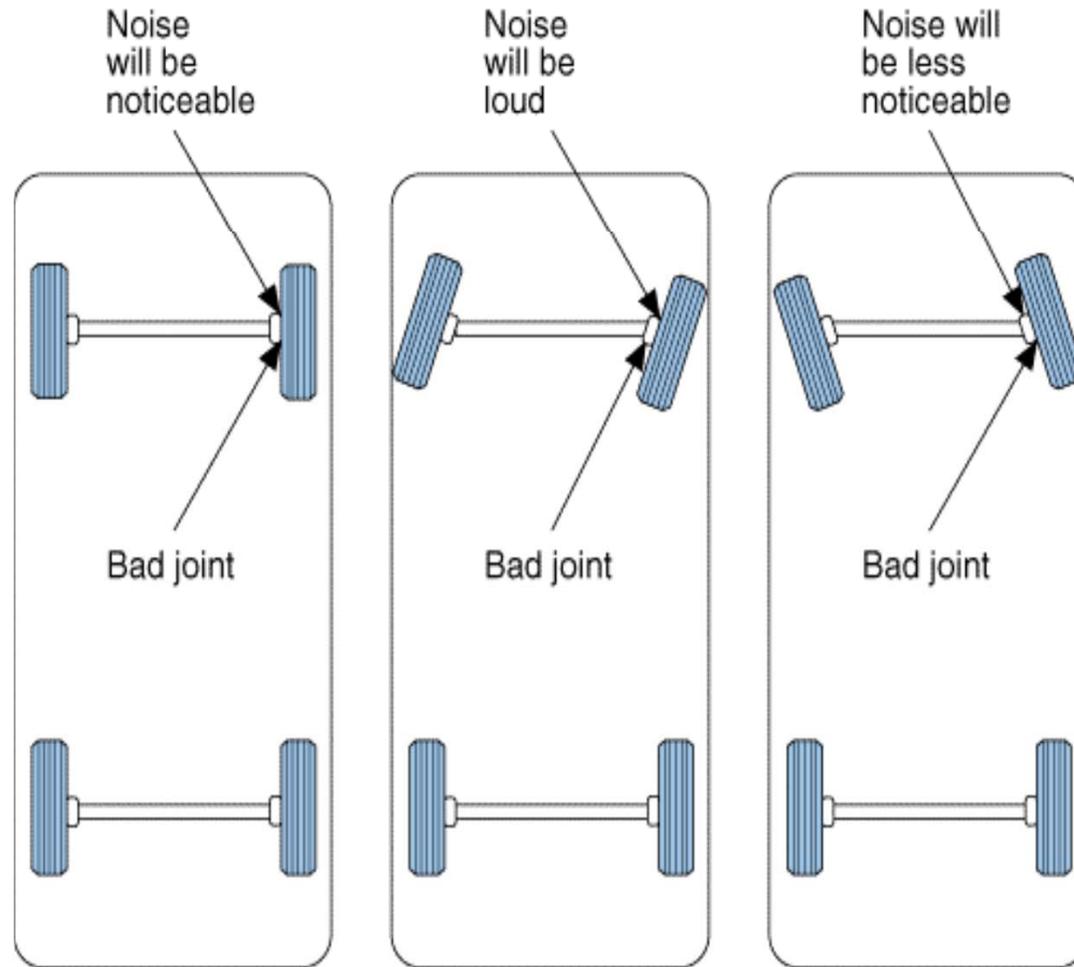
# Diagnose Front Drive Axles

Check suspension and wheel balance before assuming that the problem is the axle assembly

Outer C/V joint most likely to fail

Clicking or Popping on sharp corners is worn Rzeppa style CV-joint

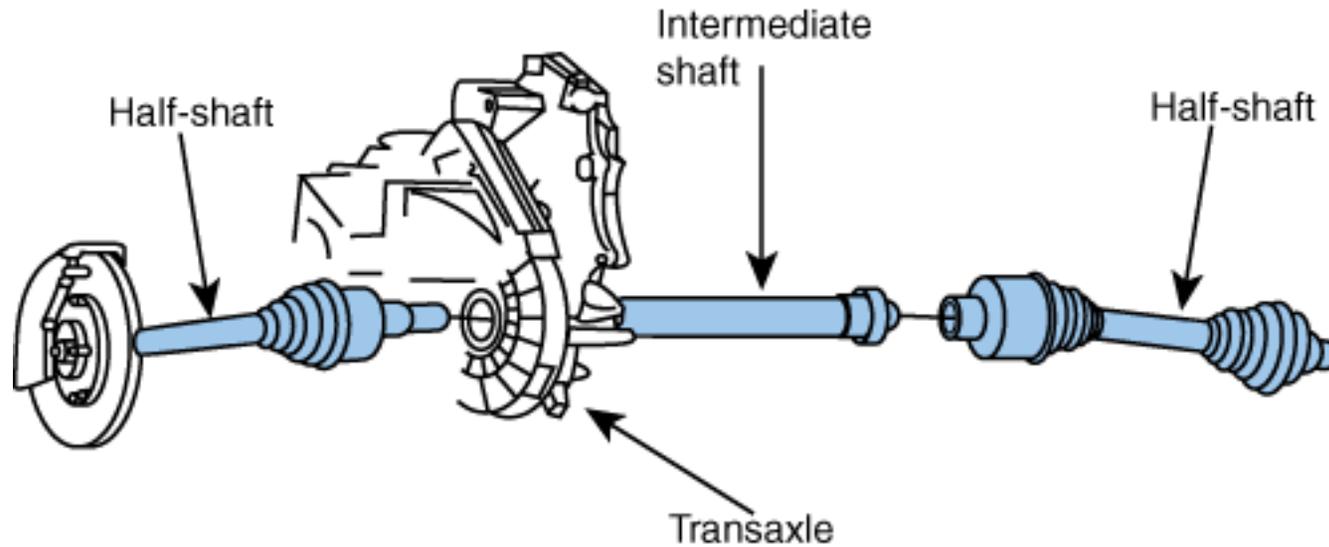
Worn outer cv joint may cause a clicking or popping noise when turning.



# Diagnose Front Drive Axles

Vibrations can be a worn inner CV joint

A clunking noise during acceleration and deceleration (torque changes) can be worn out Inner CV-joint



Torque steer is created when halfshaft operating angles are unequal.

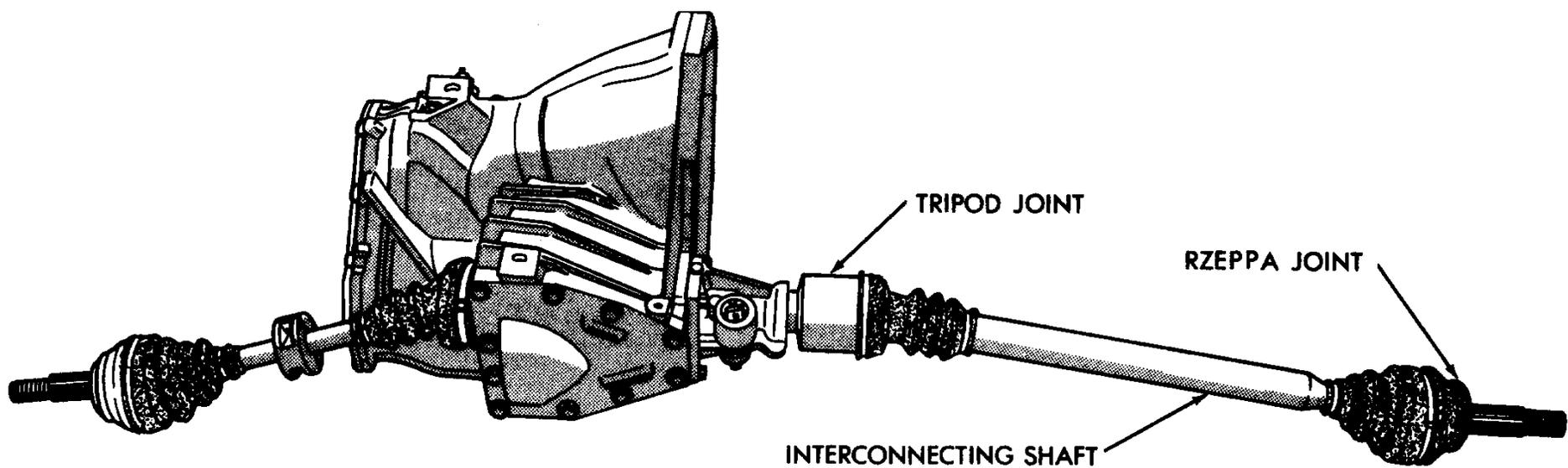
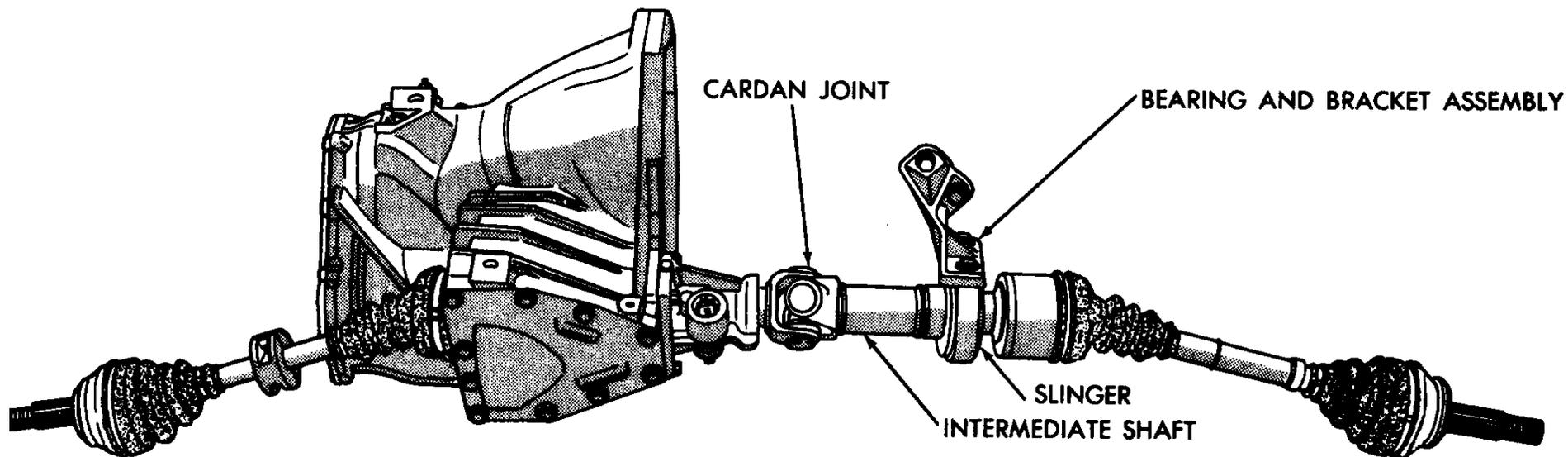
The shaft with the least operating angle will require less effort to turn leading to quicker acceleration and torque steer

# Torque Steer

Torque steer occurs when vehicle pulls or steers to one side upon hard acceleration

Torque Steer is caused by unequal CV-Joint angles from left to right side of vehicle

Two designs used to minimize torque steer



[http://www.agcoauto.com/content/news/p2\\_articleid/249](http://www.agcoauto.com/content/news/p2_articleid/249)

Above is link to good article on causes of Torque Steer

Torque Steer caused by any shift in position of transaxle to drive wheels

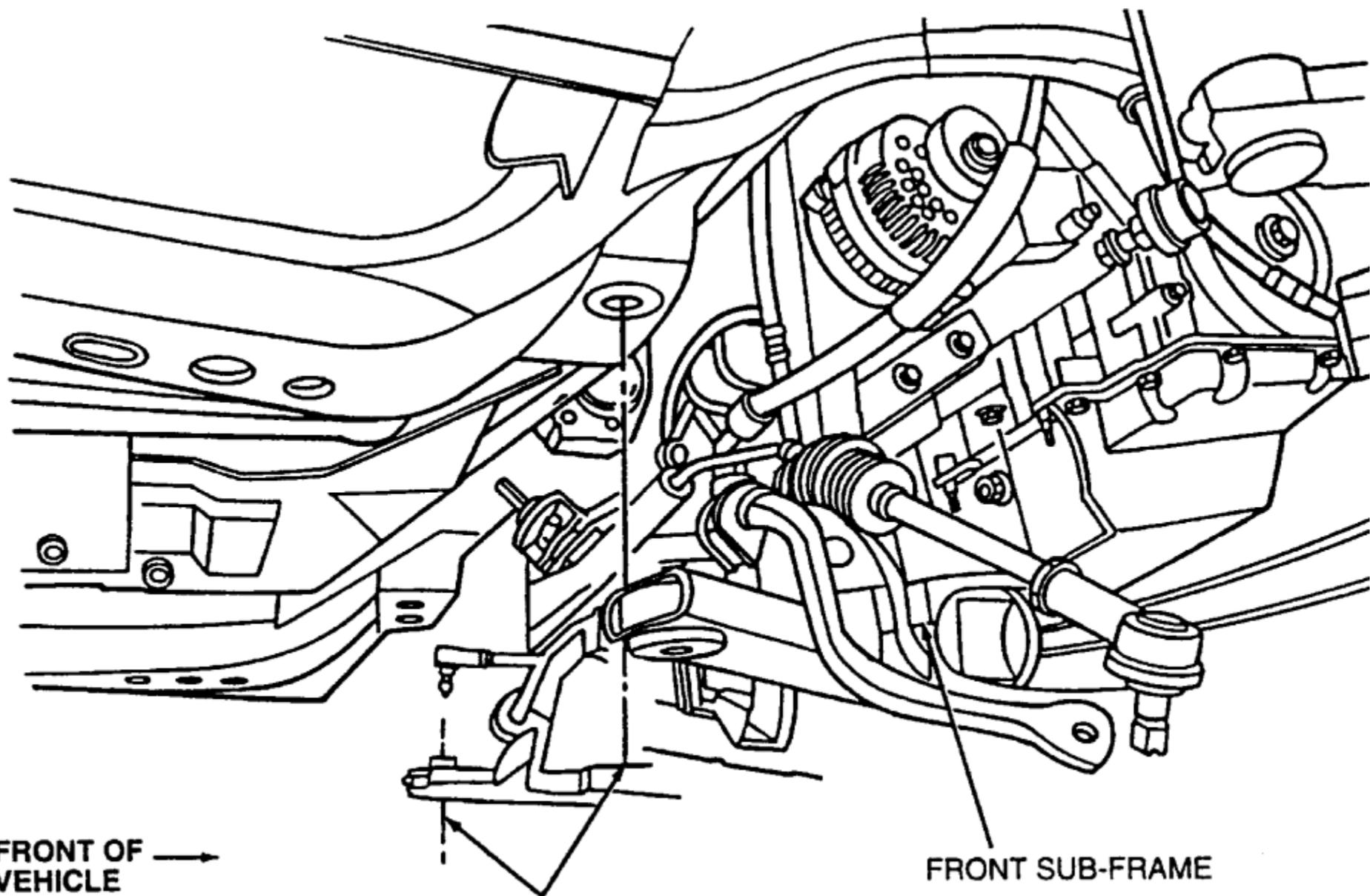
....Worn tie rod ends

....Worn Ball Joints

....Worn Suspension Bushings

.....Worn Motor Mounts

.....Improper Alignment of Sub frame



— FRONT OF VEHICLE →

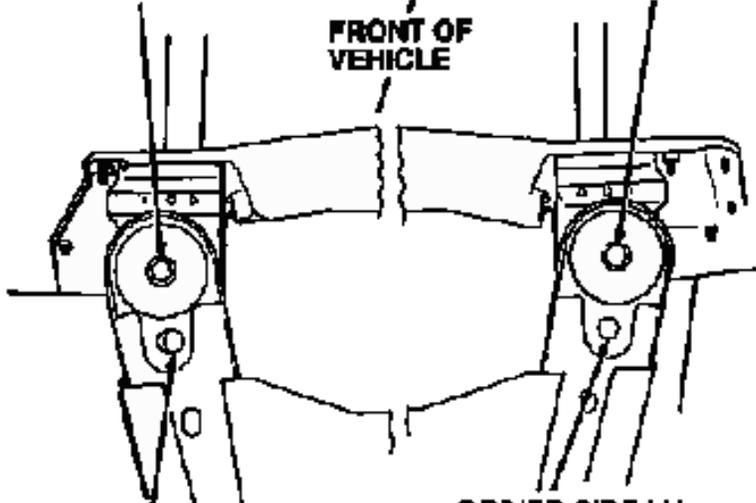
SUB-FRAME  
ALIGNMENT  
HOLES

FRONT SUB-FRAME

FRONT SUB-FRAME RH  
FRONT RETAINING BOLT

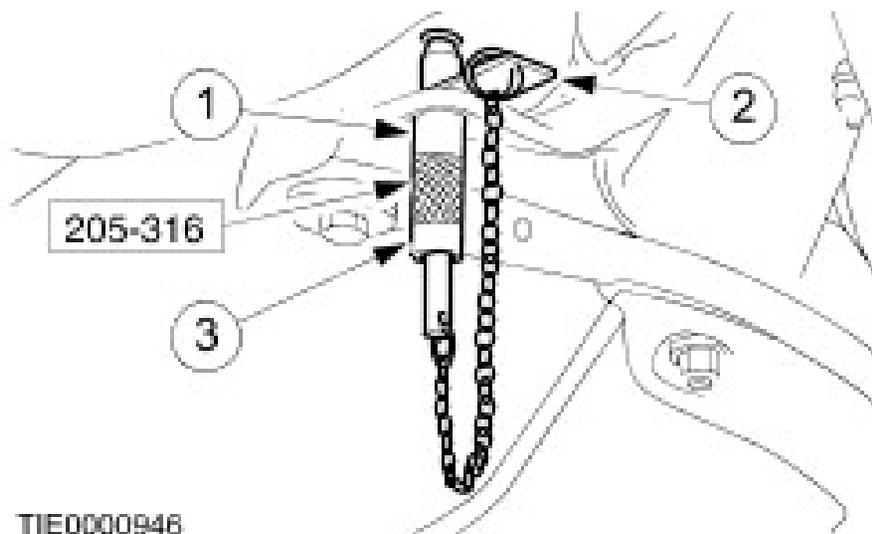
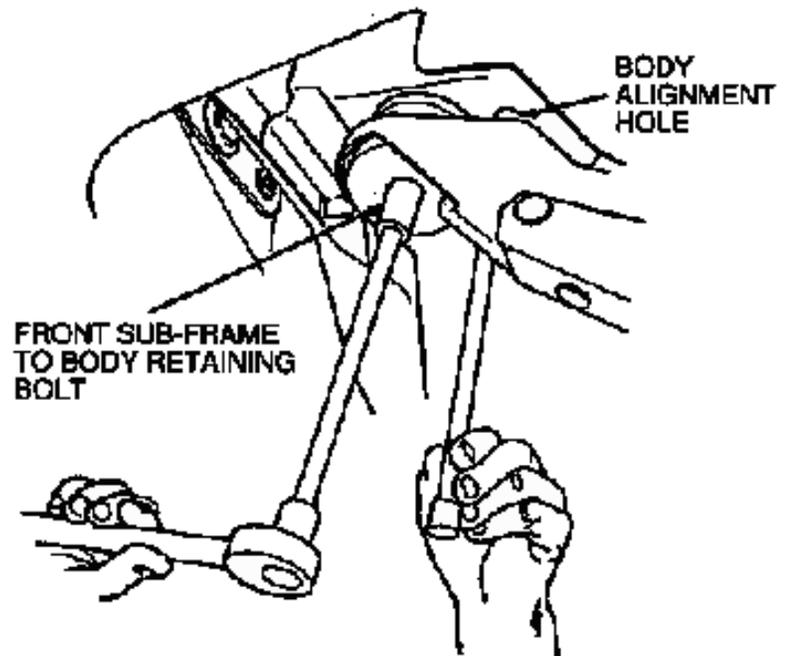
FRONT SUB-FRAME LH  
FRONT RETAINING BOLT

FRONT OF  
VEHICLE



PASSENGER SIDE RH  
FRONT SUB-FRAME TO  
BODY ALIGNMENT HOLES  
(FRONT ONLY) FORE/AFT  
ALIGNMENT ONLY

DRIVER SIDE LH  
FRONT SUB-FRAME  
TO BODY ALIGNMENT  
HOLES (FRONT ONLY)  
FORE/AFT AND  
SIDE-TO-SIDE ALIGNMENT



TIE0000946

# Replace CV drive axle

Never use Impact wrench to remove Axle Nut  
(Damage to bearing and CV-joint)

Many suspension components are removed  
and wheel alignment often required after  
replacing 1/2 shafts (C/V drive axle)

Do not pull on axle shaft to remove  
inner C/V-joint from transaxle



# Replace CV drive axle

Do not use impact wrench to install drive axle hub nut

Use new cotter pin or NEW self locking nut when replacing drive axle

Recheck alignment angles if front strut is removed from spindle during repair

Any hub nut that has been staked  
**MUST** be **REPLACED**

**DO NOT RE-INSTALL**

