GENERAL MOTORS RACK & PINION

Buick	**Oldsmobile**
Century	**Cutlass Ciera**
Skylark	**Omega**
Chevrolet	**Pontiac**
Celebrity	**6000**
Chevette	**Phoenix**
Citation	**T1000**

NOTE — *For the purpose of this article 6000, Celebrity, Century and Cutlass Ciera will be referred to as "A" Body. Chevette and T1000 will be referred to as "T" Body. Citation, Omega, Phoenix and Skylark will be referred to as "X" Body.*

DESCRIPTION

Steering gear is a rack and pinion design with integral steering linkage. Steering gear consists of tube and housing assembly containing pinion shaft and steering rack. Pinion is supported by and rotates within a sealed ball bearing (upper) and a pressed in roller bearing (lower). Wear take-up is provided by an adjuster spring which forces engagement of rack to pinion teeth. Inner tie rod ends are threaded and staked to the rack. These assemblies contain a Belleville spring loaded spherical joint, which permits both rocking and rotating tie rod movement.

REMOVAL & INSTALLATION

STEERING GEAR

Removal ("T" Body) — Raise and support vehicle. Remove any shields or guards that may interfere with steering gear removal. Disengage tie rods from steering knuckles. Remove flexible coupling pinch bolt. Remove 4 bolts securing steering gear. Remove steering gear from vehicle.

Removal ("A" & "X" Body) — **1)** Raise intermediate shaft seal. Remove flexible coupling pinch bolts. Raise and support vehicle. Remove front wheels. Disconnect tie rod ends from steering knuckles.

2) Remove any pipes, tubes and wire retaining brackets that may interfere with steering gear removal. Remove 2 rear cradle mount bolts. Lower rear of cradle 4-5".

NOTE — *Do not lower cradle too far as engine components near the cowl may be damaged.*

3) Remove rack and pinion heat shield. Remove 2 rack and pinion mounting bolts. Remove rack and pinion assembly through left wheel well.

Installation ("A", "T" & "X" Body) — To install, reverse removal procedure and adjust toe-in.

OVERHAUL

NOTE — *When disassembling or assembling steering gear, hold rack with adjustable wrench on flat of teeth to prevent rotation and subsequent damage to internal components.*

DISASSEMBLY

1) Position assembly in soft-jaw vise, clamping near center of housing. Loosen jam nuts and outer tie rod. Remove inner boot clamp by cutting off clamp. Remove outer spring boot clamp and pull boot off assembly. Repeat procedure for other boot.

2) Move rack to extreme end of travel and position in soft-jaw vise. Remove both inner tie rod assemblies. Remove adjuster plug lock nut, adjuster plug, spring and rack bearing from housing. Clean seal surface and pierce seal at one of the 2 round spots on seal surface. Pry out seal, then remove retaining ring from housing bore.

3) Position end of pinion shaft in soft-jaw vise and tap housing to separate pinion assembly from housing. Remove rack from housing. Clean all components except inner tie rod assemblies with suitable solvent. Air dry and inspect all components. Replace any seals which are cut or badly worn. If pinion seal is removed, it must be replaced.

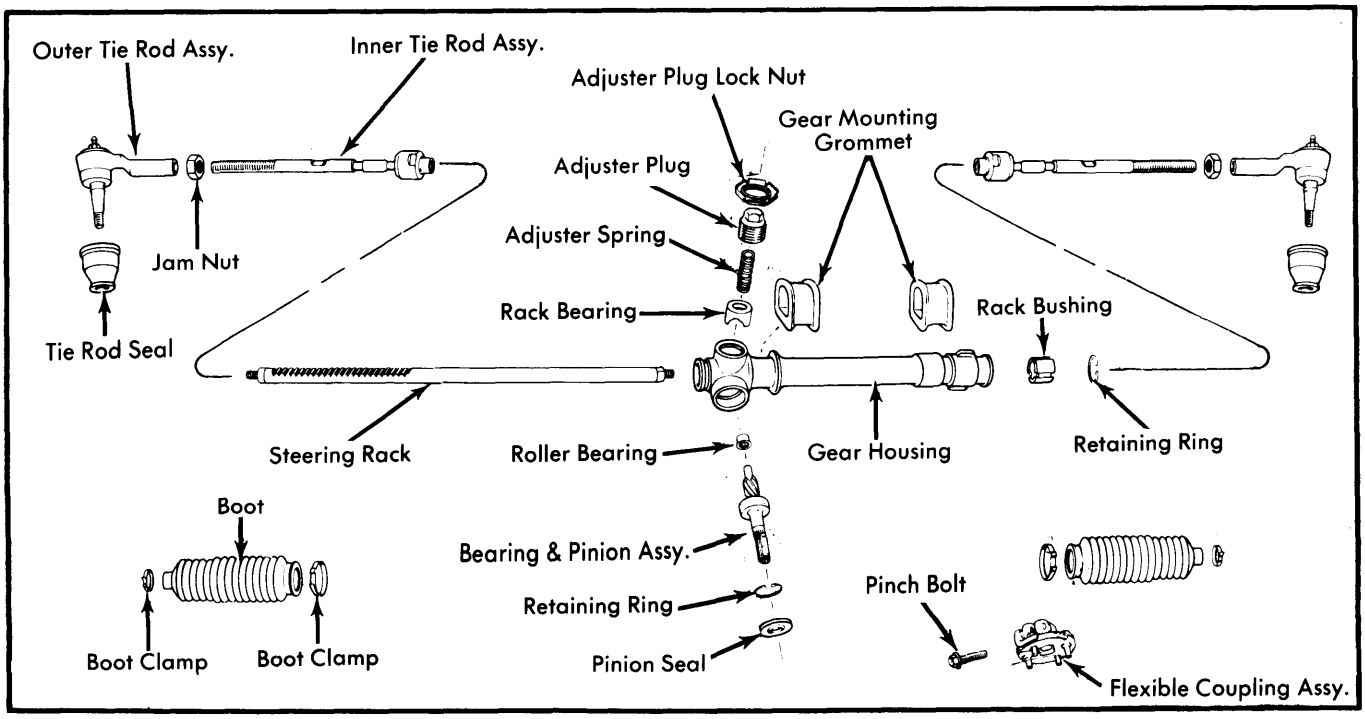

Fig. 1 Steering Gear and Linkage Assembly (Chevette Shown, Others Similar)

GENERAL MOTORS RACK & PINION (Cont.)

CAUTION — *With pinion removed, rack can slide from housing and be damaged.*

INDIVIDUAL COMPONENT SERVICING

Mounting Grommets ("T" Body) — Do not remove grommets unless replacement is required. Replace both grommets if either grommet is ripped or worn. To remove grommets, cut through grommet and remove from housing. Lube inside of new grommet with chassis lube. Force left side grommet past right side boss and into left side groove. Push right side grommet onto mounting boss.

Guide Bushings ("T" Body) — Do not attempt to replace guide bushing. If bushing is damaged or badly worn, replace entire housing.

Rack Bushing — Rack bushing should only be replaced if evidence of heavy wear is noted. To remove bushing, remove retaining ring. Position puller fingers behind bushing and remove using a slide hammer. To install bushing, press in using a suitable size socket until bushing bottoms in housing. Install retaining ring.

Roller Bearing Assembly — Check condition of pinion shaft. If scored or badly worn, replace pinion and roller bearing assembly. To remove bearing, press out using drift and press or hammer. Install new bearing using suitable size socket to press or drive bearing in until it bottoms.

Bearing & Pinion Assembly — Inspect pinion shaft, teeth, and rotor bearing assembly. If shaft is scored, teeth are chipped, or bearing is loose on shaft, bearing and pinion assembly should be replaced.

Inner Tie Rods — Inner tie rods are serviced as an assembly only. Tie rod must rock freely without play. If pivot is loose or turning torque is excessive, replace inner tie rod assemblies. To remove, hold rack in soft-jaw vise and loosen retaining nut. To install, tighten nut to 70 ft. lbs. and stake in position on both sides of nut. Check that a .010" feeler gauge will not pass between rack and stake.

NOTE — *Make sure that tie rod rocks freely in housing before staking.*

REASSEMBLY

1) Install rack gear with teeth facing pinion bore. The flat side of the rack gear should be parallel with the pinion shaft. Position rack gear so that teeth extend proper distance. See *Fig. 2*.

NOTE — *Rack must be centered as described. If not, steering wheel cannot travel fully causing unequal turning radii.*

2) Insert pinion gear into housing with flat side of input shaft oriented as shown in *Fig. 2*. Tap pinion into housing until seated. Reset rack gear to proper position. If flat side of input shaft is more than 30° away from finished position shown, remove pinion and restart procedure.

3) Install pinion retaining ring. Beveled edge of ring should face upward. Liberally coat top of pinion bearing with anhydrous calcium grease, then seat pinion seal flush with housing. Coat rack bearing with lithium grease and install.

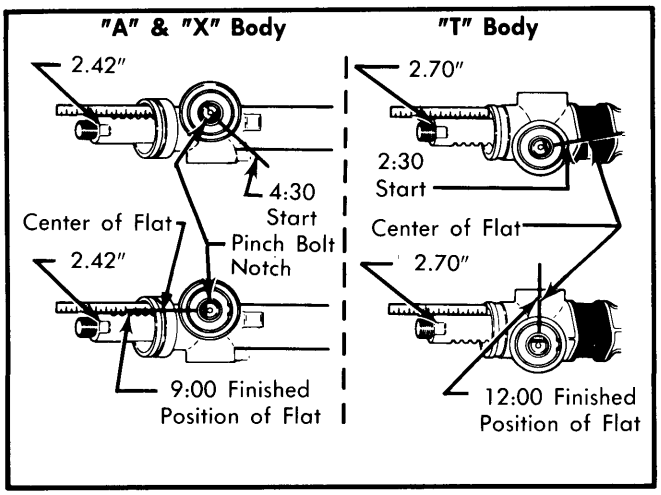

Fig. 2 Pinion Gear Installation Position. If Flat Side of Pinion is More Than 30° From Finished Position, Remove Pinion, Rotate One Tooth and Reinstall.

4) Coat both ends of preload spring and threads of adjuster plug with lithium grease. Assemble spring and plug into housing. Turn adjuster plug clockwise until it bottoms, then back off 50-60°. Torque required to turn pinion should be 8-10 INCH Lbs. Turn adjuster plug in or out to adjust preload as required. Tighten plug lock nut.

5) Lubricate both ends of rack and rack teeth with lithium grease. Move rack back and forth several times by turning pinion shaft, adding grease to rack teeth each time. Install inner tie rod assemblies on rack as previously described, using a wood block or vise for support while staking.

6) Position 1 large boot clamp on housing and place boot lip into position in undercut. Position clamp over boot at undercut and secure. Slip other end of boot into tie rod undercut, but do not tighten clamp until toe-in adjustment is complete. Repeat procedure for other boot and ensure that boots are not twisted.

7) Thread jam nuts onto both tie rods and then thread on tie rod ends. Align and install flexible coupling onto input shaft. Install pinch bolt, but do not tighten. Reinstall gear in vehicle as previously described.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N·m)
Adjuster Plug Lock Nut	50 (68)
Inner Tie Rod Housing-to-Rack	70 (95)
Outer Tie Rod Jam Nut	50 (68)
Steering Gear Mounting Nuts	
"A" & "X" Body	70 (95)
"T" Body	14 (19)
Tie Rod-to-Steering Knuckle	30 (41)
Intermediate Shaft Pinch Bolt	
"A" & "X" Body	45 (61)
"T" Body	18 (24)
Flexible Coupling Bolt ("T" Body)	30 (41)