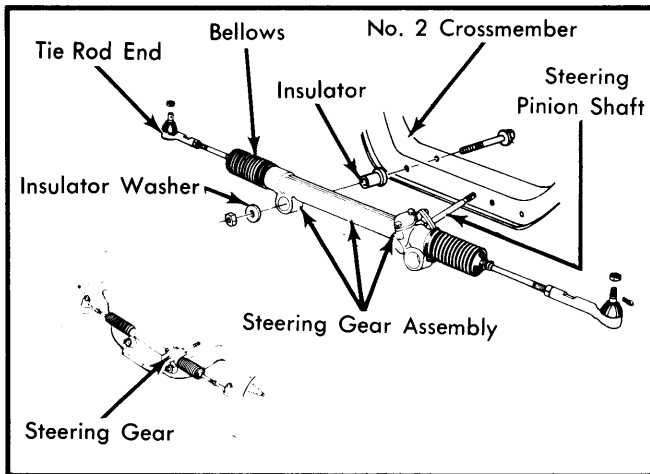


## FORD MOTOR CO. RACK & PINION

Capri, Mustang  
Cougar, Granada  
Escort, Lynx  
Fairmont, Zephyr

### DESCRIPTION

Steering is rack and pinion type, with input pinion shaft causing rack to move side to side when steering wheel is turned. On Escort and Lynx models, the input shaft is connected to the steering shaft by a double "U" joint shaft. On all other models, the input shaft is connected to the steering shaft by a "U" joint shaft and flexible coupling. Tie rods are attached at each end of the rack joint. The gear is sealed at each end with a rubber bellows. All models except Escort and Lynx require 5 ounces of lubricant. Escort and Lynx models require 3.2 ounces of lubricant. Refilling is not necessary unless gear is disassembled or leakage is evident.



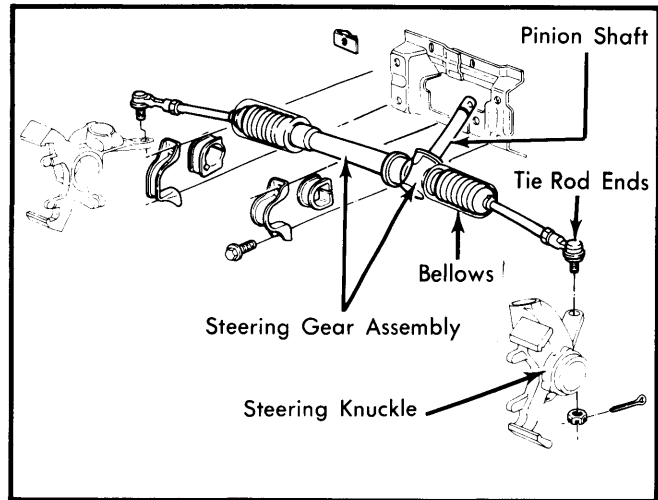
**Fig. 1** Rack and Pinion Steering Linkage  
(All Models Except Escort and Lynx)

### ADJUSTMENT

Rack and pinion gear provides two means of service adjustment. Steering gear must be removed from vehicle to perform these adjustments.

#### SUPPORT YOKE-TO-RACK CLEARANCE

- 1) Clean exterior of steering gear thoroughly and mount gear in a soft-jawed vise or suitable holding fixture.
- 2) Remove yoke cover, gasket, shims and yoke spring. Clean cover and housing flange areas thoroughly. Reinstall yoke and cover WITHOUT gasket, spring and shims. Tighten cover bolts lightly until cover just touches yoke.
- 3) Measure gap between cover and housing flange, then select shims which, together with cover gasket, are .005-.006" thicker than the measured gap.
- 4) Remove cover, assemble gasket on housing flange, then install shim pack, spring and cover. Install and tighten bolts evenly. Check steering gear for binding or looseness and smooth operation.



**Fig. 2** Rack and Pinion Steering Linkage  
(Escort and Lynx Models)

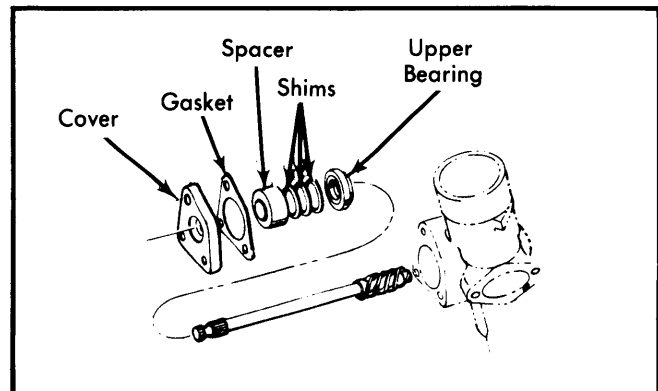
#### TIE ROD ARTICULATION EFFORT

Install hook end of pull scale through hole in tie rod end stud. Effort to move tie rod should be 1-5 lbs. DO NOT damage tie rod neck. Replace tie rod/ball joint assembly if effort falls outside this range. Save tie rod end for use on new assembly.

#### PINION BEARING PRELOAD

- 1) Clean exterior of steering gear thoroughly and mount gear in a soft-jawed vise or suitable holding fixture.
- 2) Loosen yoke cover bolts to relieve spring pressure on rack. Remove pinion cover and clean cover flange area thoroughly, then remove cover gasket, spacer and shims.
- 3) Install new gasket on pinion cover flange, fit shims between upper bearing and spacer until shim pack is flush with top surface of gasket (check with light pressure on straight-edge placed on gasket face), then add one .005" shim to preload bearings.

**NOTE** — Spacer must be assembled next to housing cover.



**Fig. 3** Pinion Bearing Preload Adjustment

## FORD MOTOR CO. RACK & PINION (Cont.)

4) On Escort and Lynx, remove oil seal from cover and install cover using centering tool (T81P-3504-Y). Install pinion oil seal. On all other models, install cover bolts and tighten evenly to specifications.

### STEERING WHEEL CHECK

With front suspension in good condition and steering gear properly adjusted, free play measured at steering wheel rim should be no more than  $\frac{3}{8}$ ". When turning steering wheel from one stop to the other with vehicle stationary, steering gear should not knock (a knock indicates that steering gear adjustment is required).

**NOTE** — Do not turn steering wheel forcefully from stop to stop with front wheels off ground. Build-up of pressure within gear could cause damage or blow off bellows.

### REMOVAL & INSTALLATION

**Removal (All Exc. Escort & Lynx)** — Disconnect negative battery cable. Remove bolt retaining flexible coupling to input shaft. Place ignition in on position, and raise vehicle on hoist. Remove tie rod cotter pins and nuts. Using suitable separator tool, separate studs from spindle arms. Support steering gear and remove nuts, washers and bolts holding gear to crossmember. Remove gear assembly from vehicle.

**Removal (Escort & Lynx) — 1)** Disconnect negative battery cable. Place ignition in on position. Remove access panel from dash below steering column. Remove intermediate shaft bolts at gear input shaft, and steering column shaft.

2) Using wide-blade screwdriver, spread slots enough to loosen intermediate shaft at both ends. Turn steering wheel to full left so tie rod will clear shift linkage.

3) From under vehicle, separate tie rod ends from steering knuckle with suitable removal tool. Turn right wheel to full left turn position. Remove left tie rod end from tie rod.

4) On automatic transmission models, disconnect speedometer cable at transmission. Disconnect secondary air tube at check valve. Disconnect exhaust system at exhaust manifold. Support exhaust system to allow enough clearance for gear removal.

5) Remove exhaust hanger bracket. Remove steering gear mounting brackets and insulators. Separate gear from intermediate shaft by having someone pull up on the shaft from inside the car. Rotate gear forward and down to clear input shaft through dash panel opening.

6) With input shaft in full left turn position, move gear through passenger side apron opening until left tie rod clears shift linkage. Lower left side of gear and remove from vehicle, taking care not to rip the rubber bellows.

**Installation (All Models)** — To install, reverse removal procedures, noting the following: On Escort and Lynx models, make sure the flat in the gear left mounting area is parallel to the dash panel. Tighten the left mounting bracket first to locate the gear properly. Check and adjust toe, if necessary.

### OVERHAUL

#### TIE ROD ENDS, BALL JOINT SOCKETS & BELLOWES

**Disassembly — 1)** Clean exterior of gear thoroughly, then mount in suitable holding fixture. Loosen jam nuts on outer ends of tie rods. Remove tie rod ends and jam nuts.

2) Loosen clamps retaining bellows to gear housing and tie rods. Drain lubricant and remove bellows. On Escort and Lynx models, remove set screw from ball housing with Allen wrench. On all other models, remove spiral pin from ball housing with suitable tool.

3) Install ball housing torque adapter tool (T78P-3504-AA) on ball housing. Locate the point of the locking screw in large hole midway along length of housing and tighten firmly.

**NOTE** — Use care not to place point of locking screw into tapped set screw hole.

4) Attach a  $\frac{1}{2}$ " drive ratchet handle to tool. Expose enough rack teeth to install an adjustable wrench over the flat formed by the tops of rack teeth. Loosen ball housing tie-rod assembly by holding adjustable wrench and turning ball housing torque adapter tool.

**CAUTION** — If rack is not restrained by adjustable wrench, the pinion will be damaged.

**Reassembly — 1)** Clean and inspect threads on rack and in ball housing socket. On Escort and Lynx models, lubricate inner seat with multi-purpose lubricant.

**NOTE** — On Escort and Lynx models, ensure ball housing is seated firmly in housing socket and on tie rod ball. Back of inner seat face of rack must be wiped clean of any grease to avoid a hydraulic lock and improper assembly.

2) Thread tie rod assembly onto end of rack. Install ball housing torque adapter tool on ball housing. Locate point of locking screw in large hole midway along housing and tighten firmly.

**NOTE** — Use care not to place point into tapped set screw hole.

3) Hold rack with adjustable wrench on flat of rack teeth, as near the end as possible. If pinion has not been removed, use care not to load pinion during tightening.

4) Tighten ball housing by turning adapter tool with a  $\frac{1}{2}$ " drive torque wrench. Rotate tie rod at least 10 times before measuring articulation effort.

**NOTE** — Do not force tie rod against limits of articulation travel.

5) If articulation effort is not to specifications, replace with a new tie rod assembly. On Escort and Lynx models, install set screw in ball housing and tighten.

6) On all models except Escort and Lynx, insert spiral retaining pin in small hole in ball housing and tap lightly with hammer until it is seated. Do not tap too hard.

## FORD MOTOR CO. RACK & PINION (Cont.)

7) On all models, apply lubricant to undercut in tie rod where bellows will be clamped. Install small bellows clamp. Install large bellows clamp on right side only.

8) Place gear in vertical position with pinion end up. Fill housing with proper amount of lubricant. Install large bellows clamp on left side. Install jam nuts and tie rod ends on tie rods.

### INPUT SHAFT SEAL

**Removal & Installation** — Thoroughly clean input shaft and seal area, then pry pinion seal from bore taking care not to damage shaft. On Escort and Lynx models, make sure pinion cover is centered. Lubricate new seal with suitable lubricant, then install over shaft. Using a piece of tubing, press or tap seal into bore until flange is flush with shoulder of bore.

### PINION ASSEMBLY, BEARINGS, RACK & HOUSING

**Disassembly** — 1) Clean exterior of gear thoroughly and place in suitable holding fixture. Remove yoke cover, shims, spring and yoke. Remove right hand ball housing/tie rod assembly and position rack to right hand stop.

2) Note position of flat on input shaft (Escort and Lynx), or "D" shaped groove (all other models), for proper reassembly. Remove pinion cover, gasket, shaft, spacer, shims and upper bearing. Remove pinion seal and discard. Remove rack from housing. Remove lower bearing.

**NOTE** — Flat or "D" shaped groove must be in same position upon assembly so that steering wheel will be in straight ahead position.

**Reassembly** — 1) Install lower bearing in pocket at bottom of housing. On Escort and Lynx models, coat the entire rack length with grease. Install rack in housing.

2) With rack moved to right stop, install pinion shaft. Make sure pinion shaft end is engaged in lower bearing inside diameter. Install upper bearing.

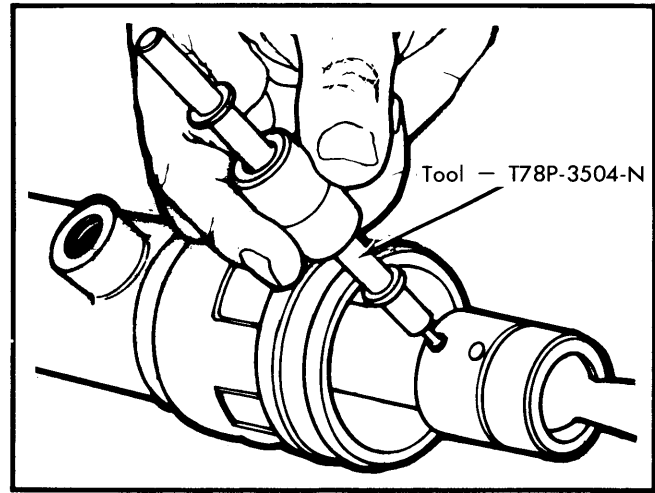
3) On all models except Escort and Lynx, install shims, spacer, gasket, pinion cover and bolts. Adjust bearing preload if necessary.

4) On Escort and Lynx models, turn pinion from lock to lock, counting the turns. Turn pinion back half the total turns. The flat on gear must be in 3 o'clock position as viewed from driver's position. If not, adjust pinion position to rack by rotating pinion 1 tooth in proper position.

5) Install shims, spacer, gasket, pinion cover and bolts. Center pinion cover and check bearing preload. Adjust if necessary. Install new pinion seal in cover.

6) On all models, install right ball housing/tie rod assembly on end of rack. Install support yoke, spring, shims, gaskets, yoke cover and bolts. Adjust yoke preload.

**NOTE** — On Escort and Lynx models, be sure rack is restrained with adjustable wrench during tightening, or damage to pinion could result.



**Fig. 4 Removing Spiral Pin (All Models Except Escort & Lynx)**

### TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
<b>Escort and Lynx</b>	
Support Yoke Cover-to-Cover Housing .....	5-8
Pinion Cover-to-Gear Housing .....	12-18
Steering Gear Mounting Bolts .....	35-50
Connecting Rod End-to-Spindle Arm .....	①23-35
Connecting Rod End-to-Tie Rod Jam Nut .....	35-50
Pinion Shaft-to-Flex Coupling .....	20-37
Ball Housing-to-Rack .....	40-51
<b>All Other Models</b>	
Support Yoke Cover-to-Cover Housing .....	12-22
Pinion Cover-to-Gear Housing .....	12-22
Steering Gear-to-Crossmember .....	90-100
Tie Rod End-to-Spindle Arm .....	①41-47
Tie Rod End-to-Tie Rod Jam Nut .....	41-50
Pinion Shaft-to-Flex Coupling .....	20-37
Ball Housing-to-Rack .....	40-60

① — Tighten to nearest cotter pin slot after torquing to specification.