

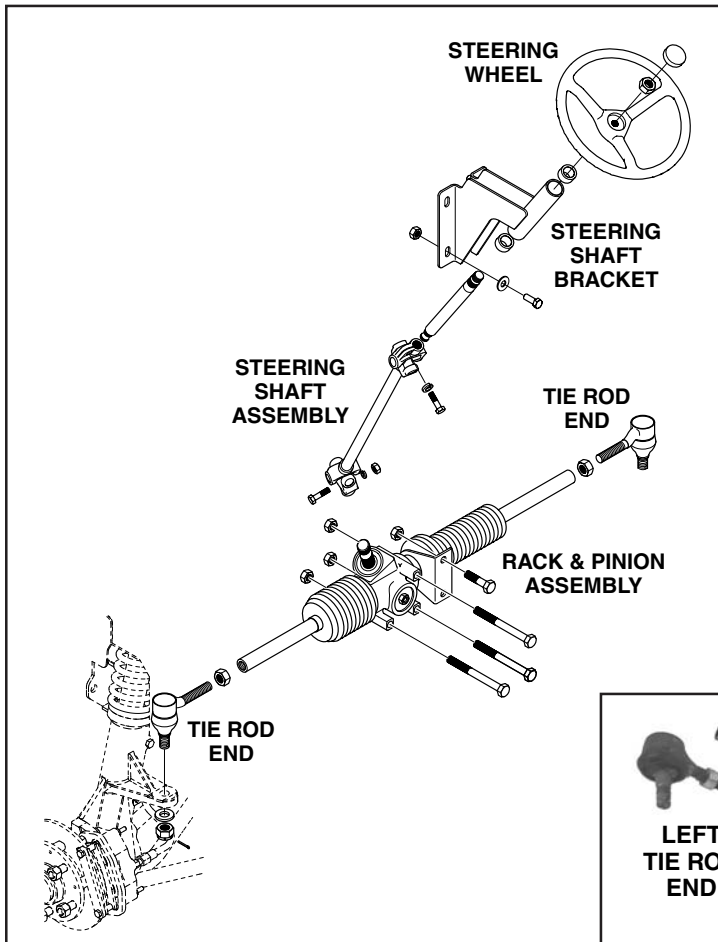
SECTION 7: STEERING SYSTEM

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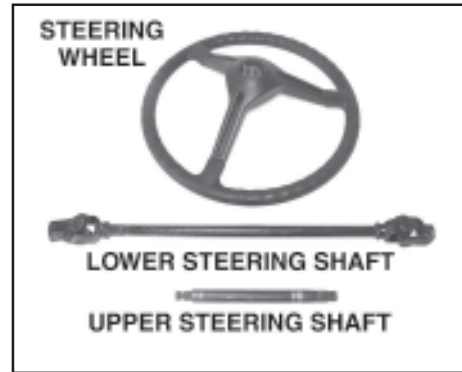
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SPECIFICATIONS

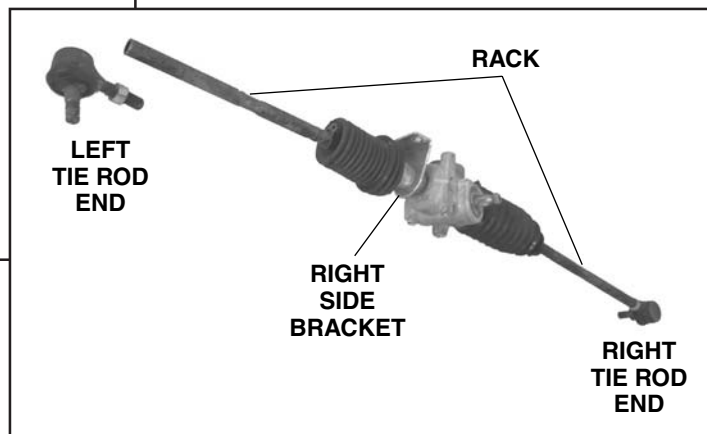
TYPE: RACK AND PINION



Steering Assembly



Steering Wheel and Shaft



Rack, Pinion and Tie Rod Ends

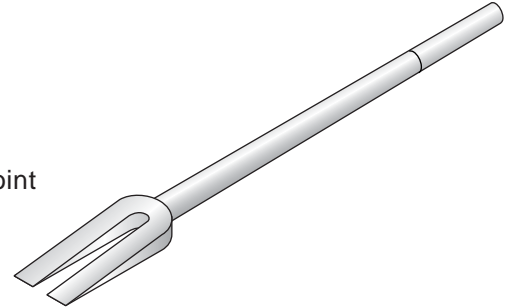
TORQUE SPECIFICATIONS:

COMPONENT	TORQUE
Tie Rod End Slotted Nut	30 lbs. ft. (41 Nm)
Lug Nuts	50 lbs. ft. (68 Nm)

TOOLS

Common hand and shop tools can be used to remove and install steering system components serviced in the section. All special tools are listed below.

Ball Joint Removal Tool (1.0-1.5" (25.4-38.1mm)): Needed for removal of tie rod ends from the strut casting steering arm. Ball joint removal tools are commercially available in various sizes.



SAFETY FIRST

⚠ CAUTION

Never work underneath a raised vehicle without adequate support. Use jack stands to prevent the vehicle from falling. A falling vehicle can cause severe personal injury or death.

⚠ CAUTION

When lifting a vehicle chock the wheels left on the ground to prevent the vehicle from rolling or sliding backward.

DESCRIPTION

STEERING

The UTV rack and pinion steering (Figure 1) is common in many automotive systems. The rack is a flat gear that extends outward from both ends of the assembly. A tie rod end connects the rack to the suspension strut assembly.

NOTICE: *The suspension struts are described in the Suspension Section of this manual.*

The pinion is a rotary gear attached to the steering shaft assembly. When the operator rotates the steering wheel the steering shaft turns the pinion gear which drives the rack in a back and forth movement.

The rack and pinion gear set converts rotary steering wheel motion into linear motion needed to turn the wheels. The rack and pinion also provides gear reduction making it easier to steer the machine.

The tie rods connect to a steering arm on the struts used for turning the strut. The wheels and hubs are mounted to the strut. See the section entitled Suspension for a description of the strut assemblies.

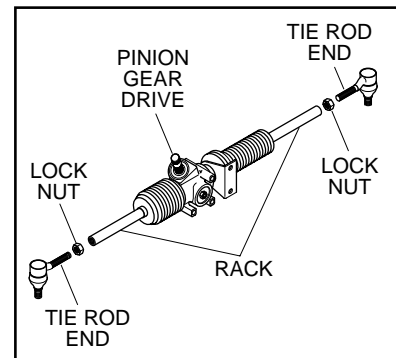


Figure 1
Rack and Pinion Assembly

REPAIR

INSPECTION

See the operator's manual for recommendations on inspecting the steering system.

Complaints of steering wheel hard to turn, hard steering, or loose steering can be a result of a bad pinion gear, bad rack, or bad tie rod ends.

Use the recommendations in the operator's manual for initial testing. Inspect the rack and pinion and tie rods for worn, loose, or damaged parts.

Check for excessive wear in the steering bracket and upper steering shaft. Inspect the upper and lower steering shaft U-joints for excessive wear and damage. Replace the steering bracket bushings, steering bracket, upper and lower steering shafts as needed.

REMOVAL

CAUTION

When working underneath a raised vehicle, always support the vehicle with jack stands to prevent the vehicle from falling. A falling vehicle can cause severe personal injury or death.

RACK AND PINION REMOVAL

1. Using a floor jack, lift the machine and support with jack stands.
2. Turn the steering tires all the way right.
3. Remove the cotter pin from both tie rod end slotted hex nuts. Discard cotter pins.
4. Remove both tie rod slotted hex nuts (Figure 2).

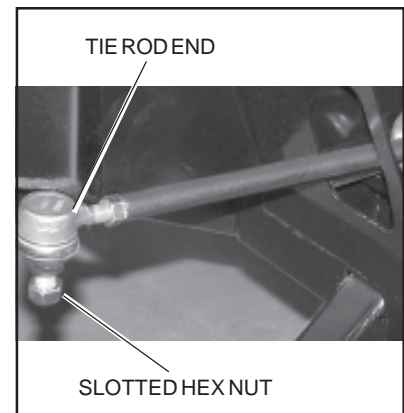


Figure 2
Tie Rod End

NOTICE: Place the ball joint tool between the tie rod end rubber boot and the low side of the steering arm. Drive the tool into the joint breaking the tie rod end loose from the steering arm.

5. Using a ball joint tool (Figure 3) remove tie rod ends from the struts.



Figure 3
Ball Joint Removal Tool

6. Loosen the tie rod end lock nuts (Figure 4).

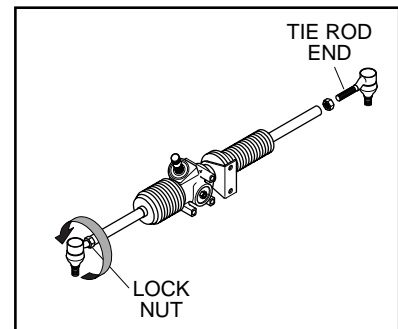


Figure 4
Tie Rod End Removal

7. Unscrew the tie rod ends (Figure 5) while counting each revolution of the tie rod end. Note the total number of revolutions required to remove the tie rod end from the rack.

8. Remove the hex head capscrew (Figure 5), nut, and lock washer securing the lower steering shaft U-joint to the rack and pinion assembly.

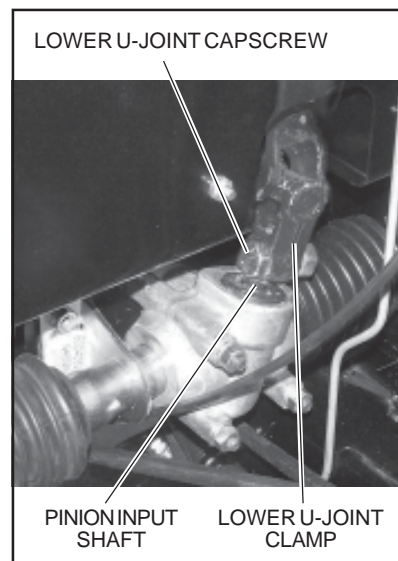


Figure 5
Rack and Pinion Assembly

9. Remove three capscrews and hex nuts securing the rack and pinion assembly (Figure 6) to the frame support.

10. Remove two capscrews and lock nuts securing the right side rack bracket (Figure 6) to the machine frame.

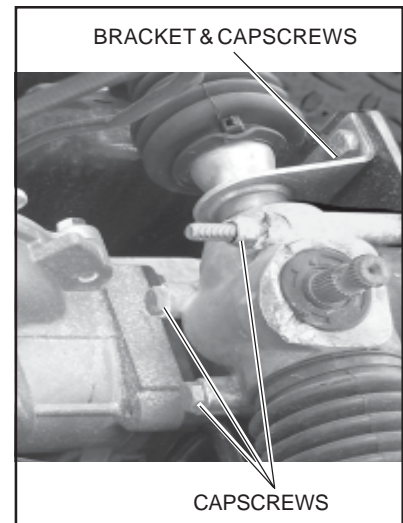


Figure 6
Rack and Pinion Assembly

11. Disconnect the shifting cable from the shifting arm (Figure 7).

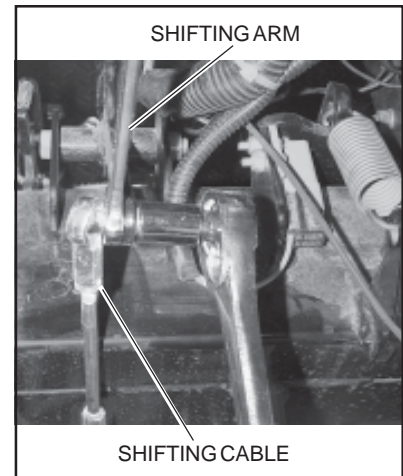


Figure 7
Shifting Cable Linkage

12. Loosen the shifting cable housing lock nuts just enough to remove the housing from the bracket (Figure 8).

13. Carefully remove the rack and pinion from machine.

14. Place the rack and pinion assembly on a work bench.

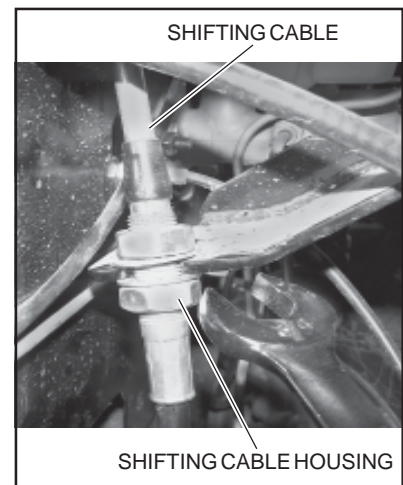


Figure 8
Shifting Cable Housing

STEERING WHEEL REMOVAL

1. Turn the steering wheel for access to the upper steering shaft U-joint capscrew (Figure 9).
2. Remove capscrew and lock washer from the upper U-joint clamp.
3. Pull the steering wheel and upper steering shaft out from the top.
4. Remove the hub from the center of the steering wheel.
5. Remove the hex nut securing the steering wheel to the upper shaft.
6. Using a press with a brass insert, press the upper shaft free from the steering wheel.

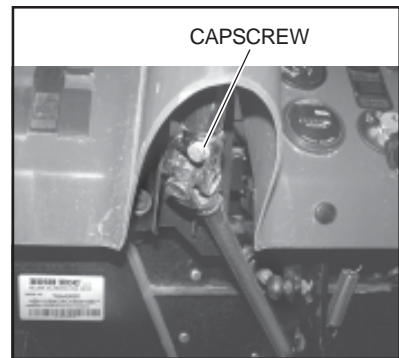


Figure 9
Upper Steering Shaft U-joint

STEERING SHAFT REMOVAL

1. Turn the steering shaft for access to the upper steering shaft U-joint (Figure 10).
2. Using the section entitled Removal – Steering Wheel, remove the steering wheel.



Figure 10
Upper Steering Shaft U-joint

3. Remove two capscrews and lock nuts securing the steering joint cover to the firewall (Figure 11).
4. Remove the steering joint cover.
5. Remove the capscrew, lock washer, and nut securing the lower steering shaft U-joint to the rack and pinion assembly.
6. Remove the lower steering shaft from the rack and pinion assembly.

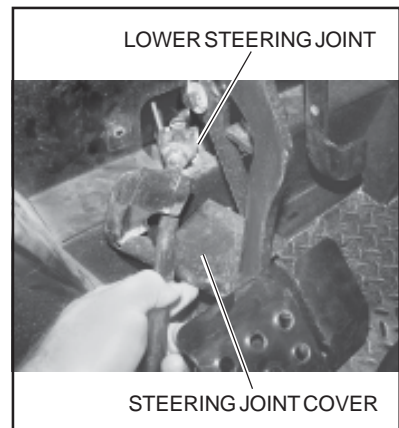


Figure 11
Steering Joint Cover

INSTALLATION

CAUTION

When working underneath a raised vehicle, always support the vehicle with jack stands to prevent the vehicle from falling. A falling vehicle can cause severe personal injury or death.

RACK AND PINION INSTALLATION

1. Position the rack and pinion assembly against the firewall for installation.
2. Using the note indicating the number of turns required to unscrew the tie rod ends; install the tie rod ends the same number of revolutions (Figure 12).
3. Securely tighten the tie rod end lock nuts.
4. Position the rack and pinion assembly with the tie rod ends resting in the strut steering arms.

NOTICE: *The rack and pinion shaft can only be installed in one position, one spline on the shaft is wider than the others and must be aligned with the wider slot in the U-joint.*

5. Install the pinion assembly into the lower steering shaft U-joint. Secure the U-joint and pinion input shaft with a capscrew, lock washer and hex nut. Tighten nut securely.
6. Install three capscrews and hex nuts securing the rack and pinion assembly to the fire wall (Figure 13). Tighten securely.
7. Install two capscrews through the right side rack extension bracket and frame support. Secure the bracket with two hex nuts. Tighten securely.
8. Install a slotted nut on both tie rod ends. Tighten the nuts to **30 lbs. ft. (41 Nm)** then back off to the first through slot.
9. Install and lock a new cotter pin in each slotted nut and tie rod end.

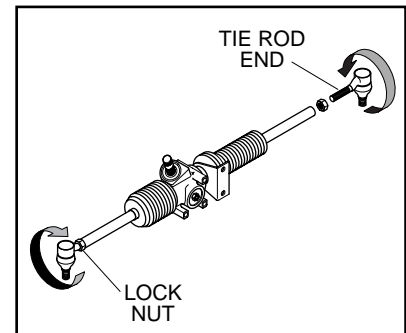


Figure 12
Tie Rod Installation

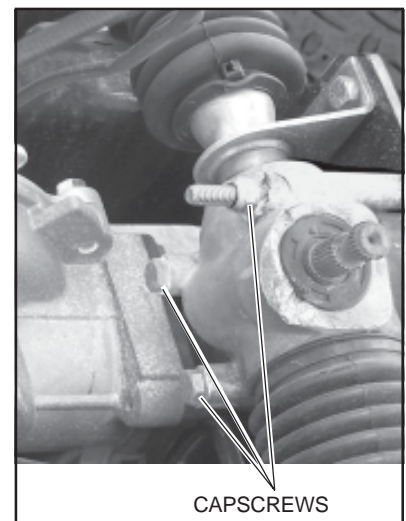


Figure 13
Rack and Pinion

10. Place the shifting cable housing on the mounting bracket with a lock washer on each side of the bracket (Figure 14).
11. Tighten shifting cable housing nuts (Figure 14) securely.
12. Connect the shifting cable to the shifting arm. Tighten nut to general torque specifications.

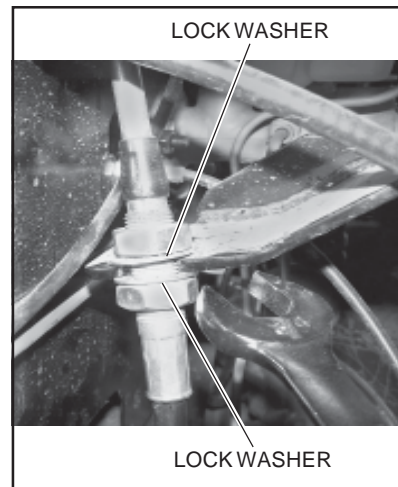


Figure 14
Shifting Cable Housing

STEERING SHAFT INSTALLATION

NOTICE: *The rack and pinion shaft can only be installed in one position, one spline on the shaft is wider than the others and must be aligned with the wider slot in the U-joint.*

1. Position the lower steering shaft with the lower U-joint installed on the pinion input shaft. Secure with a capscrew, lock washer and hex nut. Tighten hex nut securely.
2. Install the steering joint cover over the bottom of the lower steering shaft and align with mounting holes on the firewall. Secure joint cover with two capscrews and lock nuts. Tighten lock nuts securely.
3. Using the section entitled Installation – Steering Wheel install the steering wheel on the end of the upper steering shaft.

STEERING WHEEL INSTALLATION

1. Install the upper steering shaft through the steering bracket and into the top of the upper steering shaft U-joint (Figure 15).
2. Install a capscrew and lock washer through the upper U-joint clamp. Tighten securely.
3. Position the steering wheel on the end of the upper steering shaft in the desired position. Secure steering wheel with hex nut. Tighten hex nut securely.
4. Install hub in the center of the steering wheel.



Figure 15
Upper U-joint

ADJUSTMENT

The UTV steering alignment can be checked for proper forward travel by measuring (Figure 16) between the front center of the right steering tire and left steering tire.

- Make note of the distance.
- Next measure between the rear center of the right steering tire and the rear left steering tire. Make note of the distance.
- Compare the measurements of the center tire spread front and rear. The measurement should be within 1/4".

CAUTION

When adjusting steering, compensation should not be made for tire or rim deformities. Deformed tires or wheels should be replaced to provide safe steering and vehicle operation.

Adjustment can be made by removing the tie rod ends from the strut steering arms.

1. Remove the tie rod ends slotted nut and cotter pin. Discard cotter pin.
2. Use a ball joint removal tool to remove the tie rod end from the strut. See the section entitled Removal – RACK AND PINION.
3. Loosen the tie rod end lock nuts.
4. Tighten or loosen the tie rod ends (Figure 17) in the rack to align the steering tires. Secure the tie rod ends by tightening the lock nuts.
5. Position tie rod ends in the strut steering arms. Secure tie rod ends with slotted nuts. Tighten nuts securely and back off to first through hole in the nut and tie rod end. Install and lock new cotter pins in each tie rod end.
6. Remove jack stands and lower vehicle. Perform steering inspection as outlined in the operator's manual.

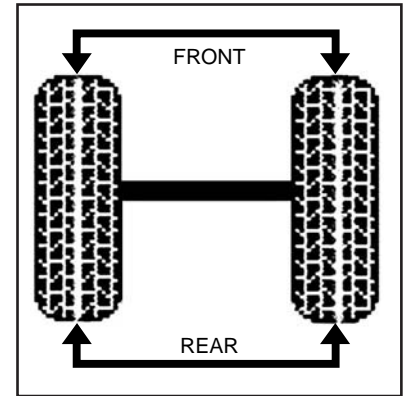


Figure 16
Steering Tire Alignment



Figure 17
Strut and Tie Rod End

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