

**CHAPTER 10****STEERING / SUSPENSION**

GENERAL SPECIFICATIONS .....	10.2
HANDLEBAR .....	10.2
REMOVAL / REPLACEMENT .....	10.2
INSTALLATION .....	10.3
STEERING (NON-EPS MODELS) .....	10.3
STEERING POST REMOVAL .....	10.3
STEERING POST INSTALLATION .....	10.4
STEERING EXPLODED VIEW (NON-EPS MODELS) .....	10.5
STEERING (EPS MODELS) .....	10.6
UPPER STEERING POST REMOVAL / INSTALLATION .....	10.6
EPS UNIT REMOVAL .....	10.7
EPS UNIT INSTALLATION .....	10.8
STEERING EXPLODED VIEW (EPS MODELS) .....	10.10
STEERING TIE ROD .....	10.11
TIE ROD / TIE ROD END REPLACEMENT .....	10.11
FRONT A-ARMS .....	10.12
EXPLODED VIEW .....	10.12
REMOVAL / REPLACEMENT .....	10.13
BALL JOINT SERVICE .....	10.14
REMOVAL .....	10.14
INSTALLATION .....	10.15
REAR A-ARMS .....	10.16
EXPLODED VIEW .....	10.16
REMOVAL / INSTALLATION .....	10.17
REAR STABILIZER BAR .....	10.18
EXPLODED VIEW .....	10.18
LINKAGE REMOVAL / INSTALLATION .....	10.19
STABILIZER BAR REMOVAL / INSTALLATION .....	10.19
SHOCKS / SPRINGS .....	10.20
EXPLODED VIEW .....	10.20
SHOCK REMOVAL / INSTALLATION .....	10.20
SHOCK / SPRING REPLACEMENT .....	10.20

# STEERING / SUSPENSION

## GENERAL SPECIFICATIONS

### Torque Specifications

Item	Specification
Aluminum Wheels	75 ft. lbs. (102 Nm)
Steel Wheels	45 ft. lbs. (61 Nm)
Wheel Hub Retaining Nuts (front and rear)	80 ft. lbs. (108 Nm)
Steering Post to Bulkhead	20 ft. lbs. (27 Nm)
Steering Post to Gearcase	22 ft. lbs. (30 Nm)
Tie Rod Jam Nuts	12 ft. lbs. (16 Nm)
Tie Rod to Bearing Carrier Tie Rod to Steering Frog	44 ft. lbs. (60 Nm)
Handlebar Block Bolts	14 ft. lbs. (19 Nm)
Shock Mounting Bolts	37 ft. lbs. (50 Nm)
Front Ball Joint Pinch Bolts (upper and lower) <u>Replace fasteners if loosened</u>	17 ft. lbs. (23 Nm) + 1/4 Turn or (90°)
Front A-arm to Frame Bolts (upper and lower)	40 ft. lbs. (54 Nm)
Rear A-arm to Frame Bolts (upper and lower)	45 ft. lbs. (61 Nm)
Rear Upper A-Arm to Bearing Carrier Bolts	40 ft. lbs. (54 Nm)
Rear Lower A-Arm to Bearing Carrier Bolts	45 ft. lbs. (61 Nm)

 **CAUTION**

Locking nuts, and bolts with pre-applied locking agent should be replaced if removed.  
The self-locking properties of the nut or bolt are reduced or destroyed during removal

**NOTE:** Refer to exploded views throughout this chapter for more torque specifications, component identification, and location of components.

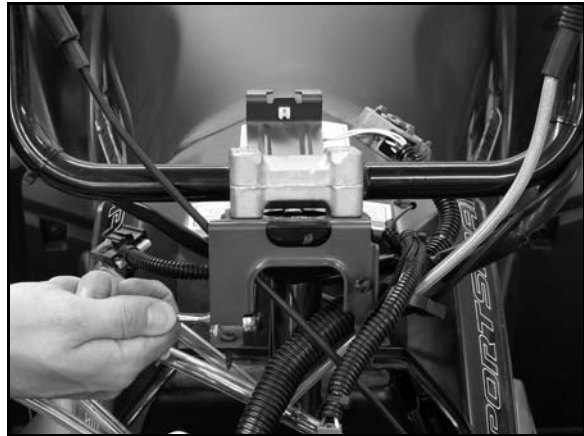
## HANDLEBAR

### Removal / Replacement

1. Remove the upper and lower headlight pods from the handlebar bracket (see Chapter 9).

**IMPORTANT:** Take note of all vent line, wire harness and throttle cable routing for reassembly purposes.

2. Remove the (4) fasteners retaining the handlebar bracket and block to the steering post.



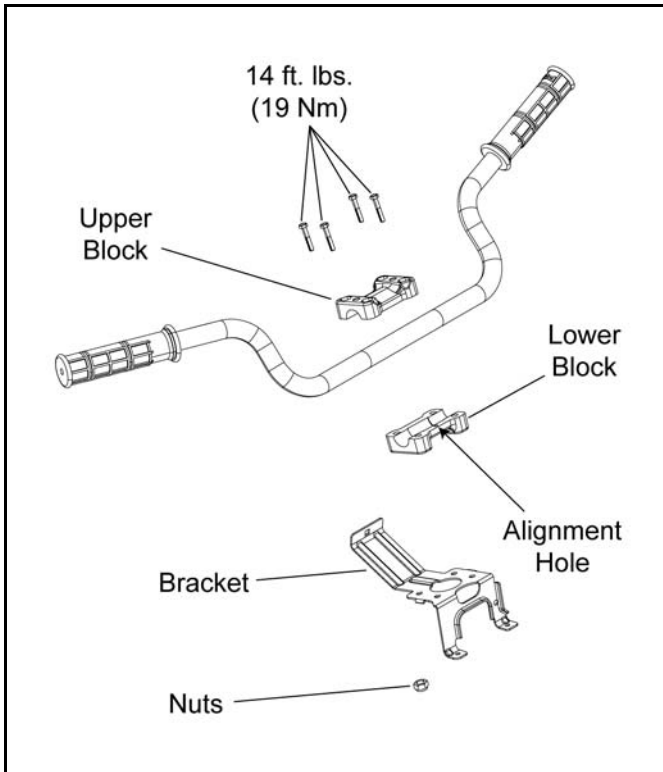
3. Remove the handlebar assembly from the steering post.

**IMPORTANT:** Take care not to bend the throttle cable or brake line while the handlebar is removed.

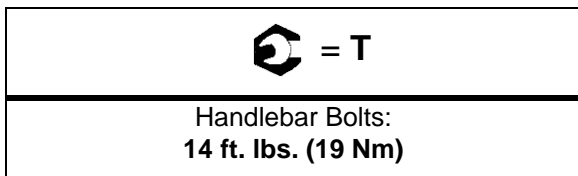
4. If replacing the handlebar:
  - Remove the RH and LH controls
  - Remove the hand grips
  - Pry open the upper and lower handlebar blocks and remove them from the handlebar

## Installation

1. Locate the alignment pin on the bottom side of the upper block. The pin should line up with the alignment hole in the lower block and should face the front.



2. Position the handlebar properly and install the (4) bolts.
3. Evenly tighten the pin side (front) bolts first. Torque the (2) front bolts to specification.



4. Install the rear bolts and tighten evenly. Torque the (2) rear bolts to specification.

**NOTE: There will be a slight gap on the backside of the handlebar blocks after installation.**

5. If handlebar was replaced:
  - Install the hand grips
  - Install the RH and LH controls
6. Reassemble the headlight pod (see Chapter 9).

**NOTE: Make sure to route all vent lines, wire harness and throttle cable correctly into the lower headlight pod.**

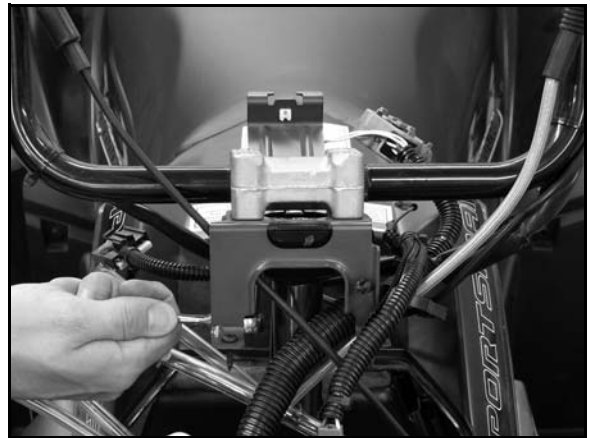
## STEERING (NON-EPS MODELS)

### Steering Post Removal

1. Remove the front rack and front cover (see Chapter 9).
2. Remove the upper and lower headlight pods from the handlebar bracket (see Chapter 9).

**IMPORTANT: Take note of all vent line, wire harness and throttle cable routing for reassembly purposes.**

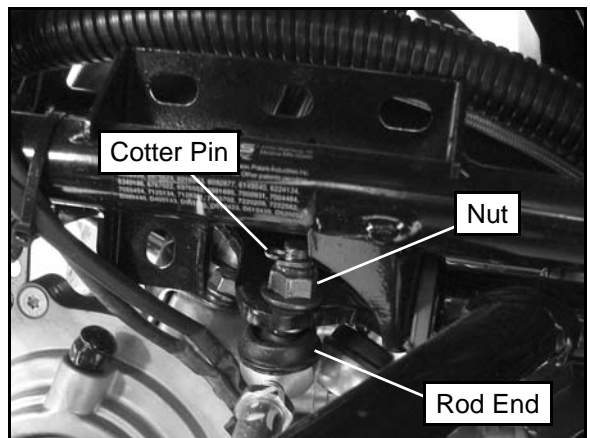
3. Remove the (4) fasteners retaining the handlebar bracket and block to the steering post.



4. Carefully remove the handlebar assembly from the steering post and place it on the front cab.

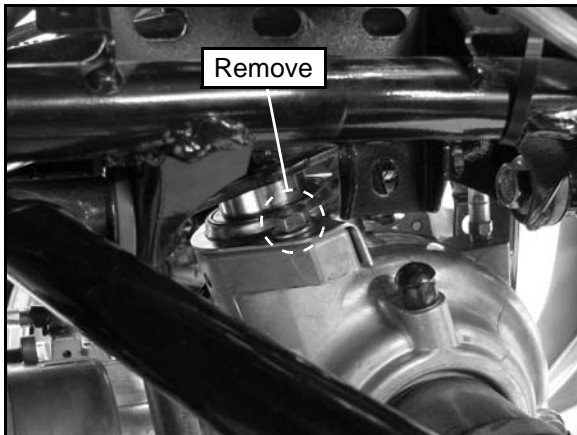
**IMPORTANT: Take care not to bend the throttle cable or brake line while the handlebar is removed.**

5. Remove the cotter pin and nut from each tie rod end at the steering post frog.

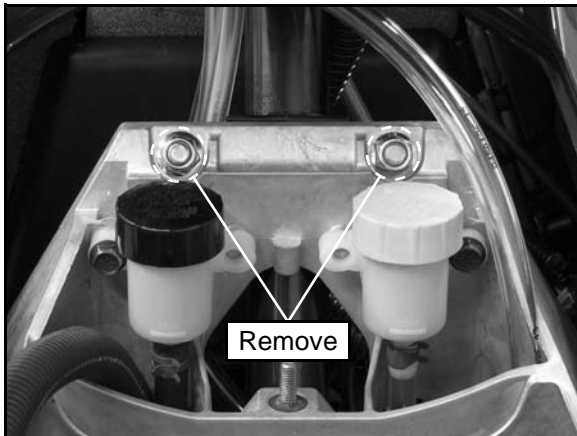


## STEERING / SUSPENSION

6. Remove the (2) bolts retaining the lower steering post bracket to the front gearcase.



7. Remove the (2) fasteners retaining the upper steering post bushing bracket.



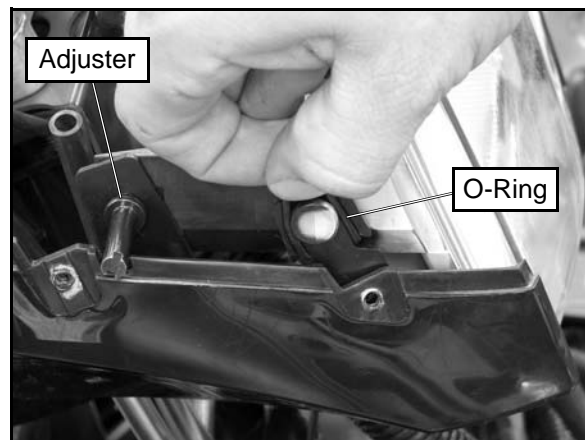
8. Lift the steering post assembly up from the front gearcase and carefully remove it from the chassis.

### Steering Post Installation

1. Reverse the "Steering Post Removal" procedure to reinstall the steering post. Refer to the "Steering Exploded View" for torque values.

**NOTE: Make sure to route all vent lines, wire harness and throttle cable correctly into the lower headlight pod.**

2. When installing the headlight into the lower pod, be sure to install the O-rings prior to installing the headlight.
3. Place the headlight into the lower pod mounting tabs and press firmly until the headlight snaps into place.
4. Lift the O-ring up and over the headlight mounting tab to secure it.



5. Reinstall the adjustment screw and be sure to adjust the upper headlight after reassembly.

**NOTE: Refer to Chapter 9 when reassembling the upper and lower headlight pods.**



# STEERING / SUSPENSION

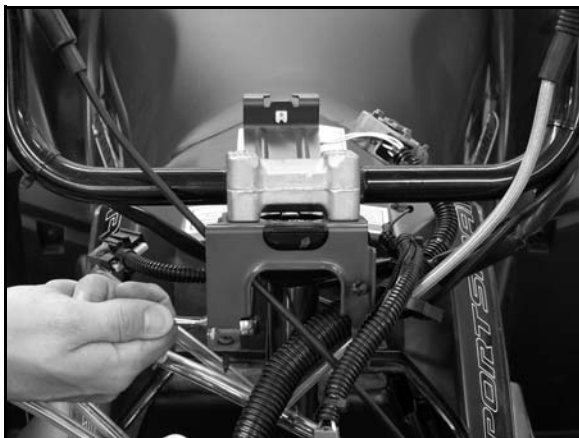
## STEERING (EPS MODELS)

### Upper Steering Post Removal

1. Remove the front rack and front cover (see Chapter 9).
2. Remove the upper and lower headlight pods from the handlebar bracket (see Chapter 9).

**IMPORTANT: Take note of all vent line, wire harness and throttle cable routing for reassembly purposes.**

3. Remove the (4) fasteners retaining the handlebar bracket and block to the steering post.



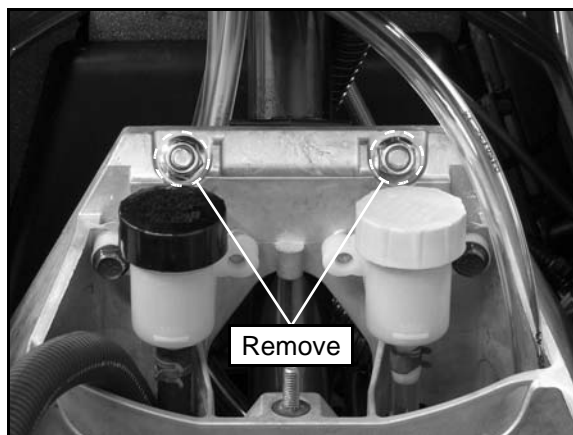
4. Carefully remove the handlebar assembly from the steering post and place it on the front cab.

**IMPORTANT: Take care not to bend the throttle cable or brake line while the handlebar is removed.**

5. Disconnect and remove the battery to access the upper steering post pinch bolts (see Chapter 2 “Battery Removal”).
6. Remove the pinch bolts retaining the upper steering post to the power steering unit.



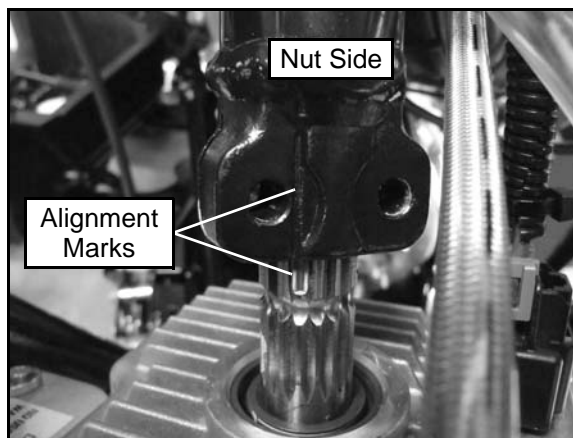
7. Remove the (2) fasteners retaining the upper steering post bushing bracket.



8. Lift the upper steering post up from the power steering unit remove it from the chassis.

### Upper Steering Post Installation

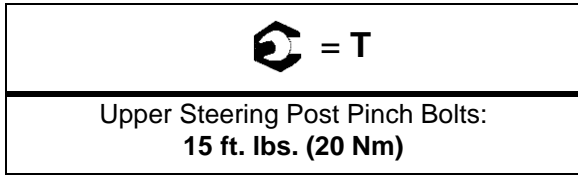
1. Reverse the “Upper Steering Post Removal” procedure to reinstall the steering post.
2. Apply anti-seize to the shaft splines to aid assembly.
3. Align the mark on the upper steering post (nut side) with the skip tooth spline on the upper power steering shaft upon installation.
4. Carefully slide the upper steering post onto the upper power steering shaft and install the pinch bolts.



### CAUTION

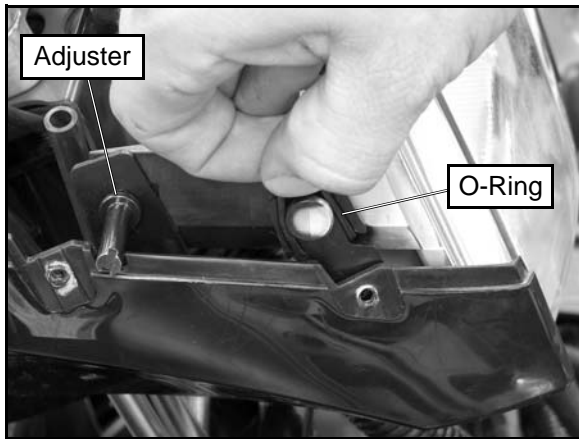
Striking the steering post can permanently damage the EPS unit and cause a Power Steering Fault.

5. Refer to “Steering Exploded View (EPS Models)” on page 10.12 for torque values.



**NOTE: Make sure to route all vent lines, wire harness and throttle cable correctly into the lower headlight pod.**

6. When installing the headlight into the lower pod, be sure to install the O-rings prior to installing the headlight.
7. Place the headlight into the lower pod mounting tabs and press firmly until the headlight snaps into place.
8. Lift the O-ring over the headlight mounting tab to secure it.

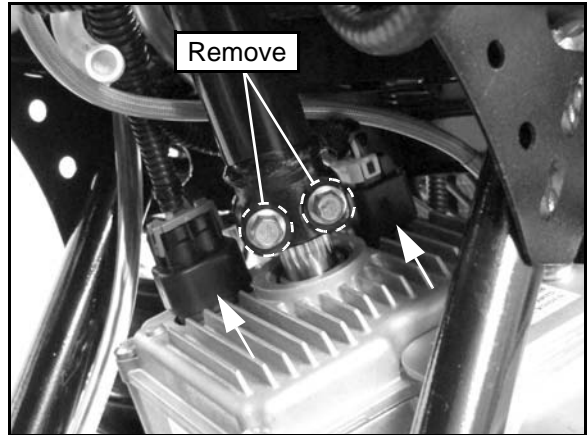


9. Reinstall the adjustment screw and be sure to adjust the upper headlight after reassembly.

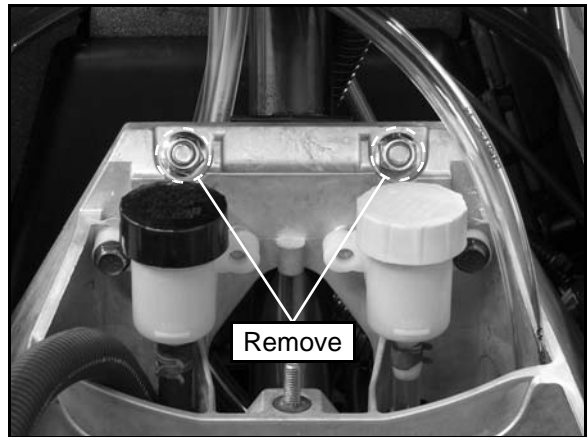
**NOTE: Refer to Chapter 9 when reassembling the upper and lower headlight pods.**

## EPS Unit Removal

1. Remove the front rack or front storage box and front cover (see Chapter 9).
2. Remove both front mud guards, upper side panels, front cab and right-hand footwell (see Chapter 9).
3. Remove the fuel tank (see Chapter 3).
4. Remove the pinch bolts retaining the upper steering post to the power steering unit.



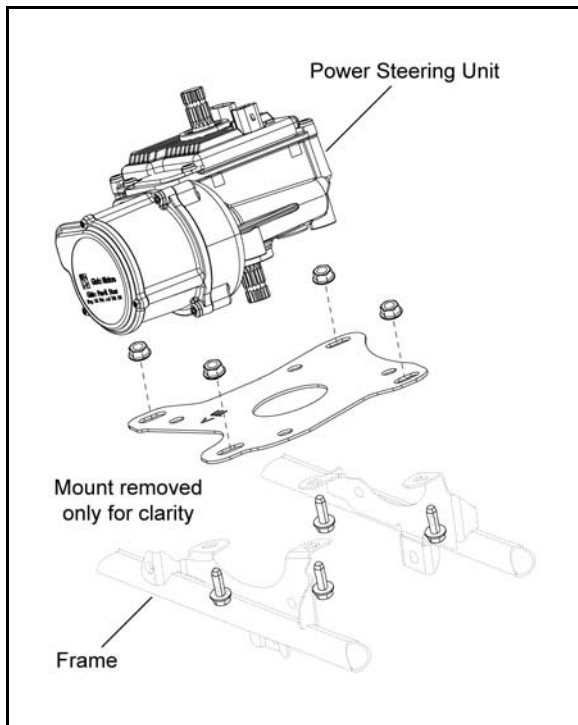
5. Disconnect the (2) electrical harnesses from the power steering unit.
6. Remove the (2) fasteners retaining the upper steering post bushing bracket.



7. Lift the upper steering post up from the power steering unit.

## STEERING / SUSPENSION

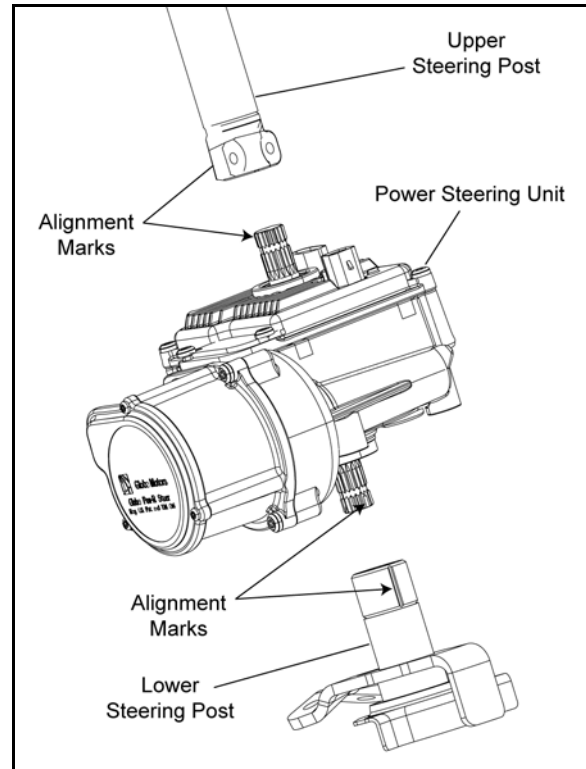
- Remove the (4) mounting fasteners that retain the power steering unit and mount plate to the frame.



- Carefully lift the power steering unit up to disengage the lower steering coupler and remove it from the chassis.

### EPS Unit Installation

- Position the vehicle so the front wheels are pointing straight forward.
- Clean the lower steering post so the alignment mark is visible. Mark the skip tooth spline on the lower power steering shaft.
- Apply anti-seize to the shaft splines to aid assembly.
- Align the two marks and install the power steering unit.



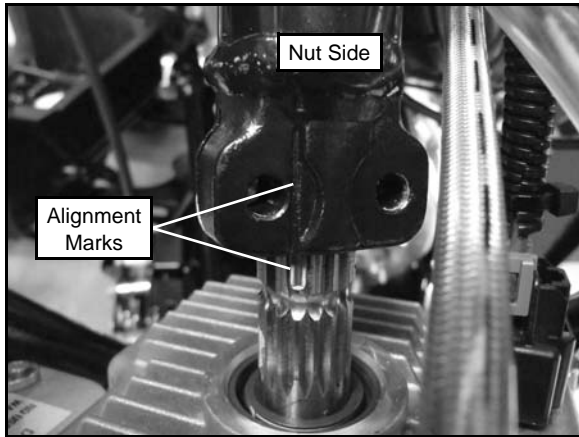
- Install the (4) mount plate fasteners and torque fasteners to specification. Refer to “Steering Exploded View (EPS Models)”.
- Reconnect the (2) electrical harnesses to the power steering unit.

### CAUTION

The 8-way connector, two rows of four pins, does not have a channeled lock on both sides, allowing it to be installed 180° from its intended position. The connector will not positively engage or snap into place while in the wrong position, but can still be installed. If the connector is not installed correctly, the Power Steering Unit will not function.

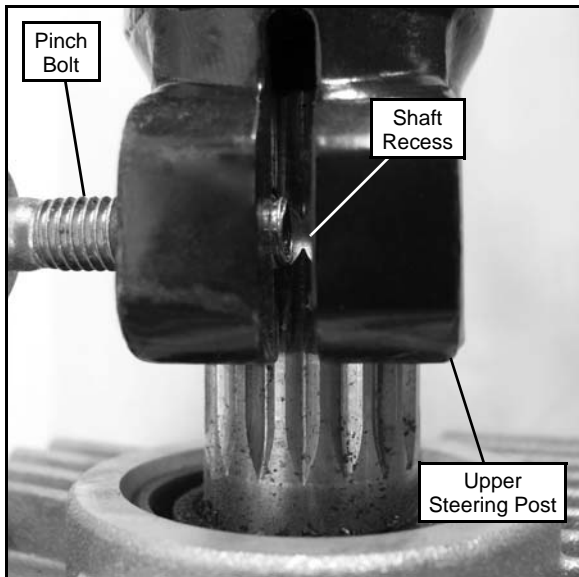


- Align the mark on the upper steering post (nut side) with the skip tooth spline on the upper power steering shaft upon installation.



**NOTE: Apply anti-seize to the shaft splines to aid assembly.**


- Position the upper steering post on the shaft so the pinch bolts are aligned with the recess in the power steering shaft.



**CAUTION**

Striking the steering post can permanently damage the EPS unit and cause a Power Steering Fault.

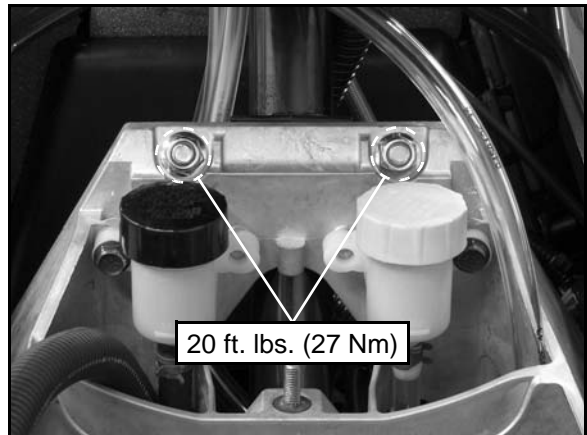
- Install the pinch bolts and torque to specification. Refer to "Steering Exploded View (EPS Models)".


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Upper Steering Post Pinch Bolts:  
**15 ft. lbs. (20 Nm)**

- Install the fuel tank assembly, fuel line and reconnect the fuel pump harness (see Chapter 3).
- Reinstall the upper steering post bushing bracket and torque the (2) fasteners to specification.



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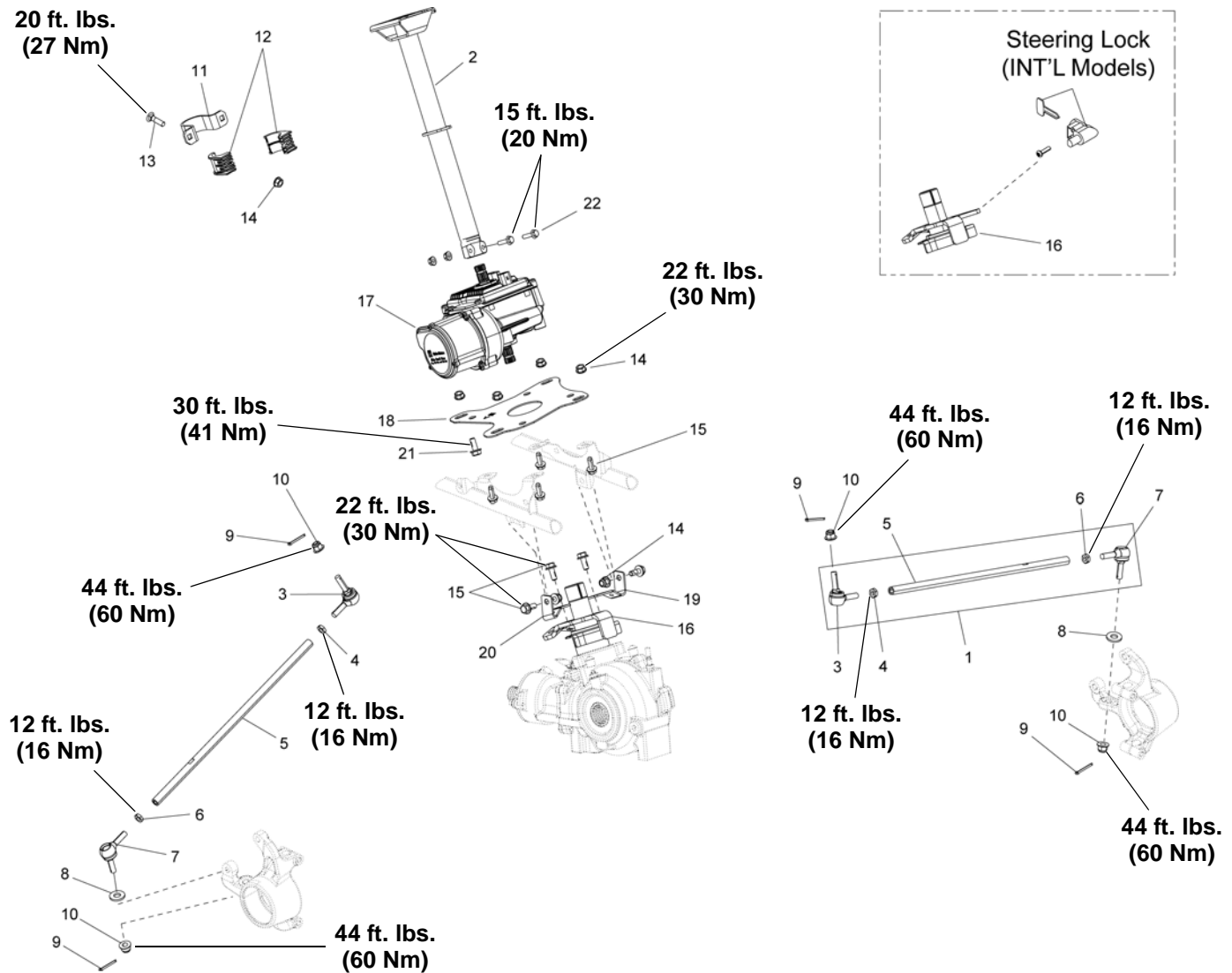
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Steering Post to Bulkhead Bolts:  
**20 ft. lbs. (27 Nm)**

- Turn the ignition key to the "ON" position and move the handlebar from left to right several times to ensure the power steering doesn't bind. If binding occurs:
  - Loosen the (4) mounting fasteners
  - Move handlebars from left to right several times to position the power steering unit
  - Torque the (4) mounting fasteners to specification and check the steering operation for binding again
  - If no binding is present, proceed; if binding is still present, repeat this procedure
- Install both front mud guards, upper side panels, front cab (if removed) and right-hand footwell (see Chapter 9).
- Install the front cover and front rack or storage box (see Chapter 9).

# STEERING / SUSPENSION

## Steering Exploded View (EPS Models)



REF.	DESCRIPTION	REF.	DESCRIPTION
1	Tie Rod Assembly	12	Upper Steering Bushing
2	Upper Steering Post	13	Carriage Bolt
3	Rod End, RH	14	Nut
4	Jam Nut, RH	15	Bolt
5	Tie Rod	16	Lower Steering Post
6	Jam Nut, LH	17	Power Steering Assembly
7	Rod End, LH	18	Power Steering Mount Plate
8	Washer	19	Front Drive Bracket, LH
9	Cotter Pin	20	Front Drive Bracket, RH
10	Nut	21	Bolt
11	Upper Steering Bracket	22	Pinch Bolt

## STEERING TIE ROD

### Tie Rod / Tie Rod End Replacement

Use the following procedure to replace the tie rod assembly or tie rod ends.

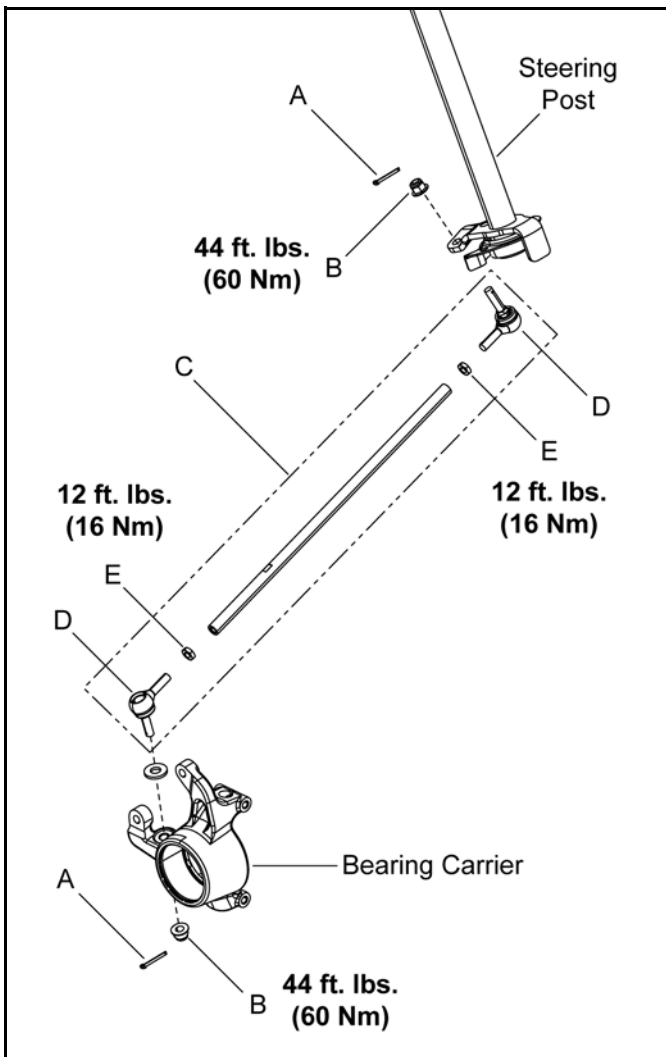
1. Elevate front of vehicle and safely support machine under the frame area.

**⚠ CAUTION**

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Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Always wear eye protection.

2. Remove the (4) wheel nuts and remove the front wheel(s).
3. Remove the cotter pins (A) and tie rod end fasteners (B).
4. Remove the tie rod assembly (C).



- If replacing just the tie rod end (D), loosen the jam nut (E) and remove the rod end
- Install new rod end and torque jam nuts to specification

5. Install the new tie rod assembly (C).
6. Install the rod ends and fasteners (B) in the proper orientation (see illustration).
7. Torque the tie rod end fasteners to specification and install new cotter pins.

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Tie Rod End Fastener:  
**44 ft. lbs. (60 Nm)**

8. Install the front wheel(s) and wheel nuts. Torque wheel nuts to specification.

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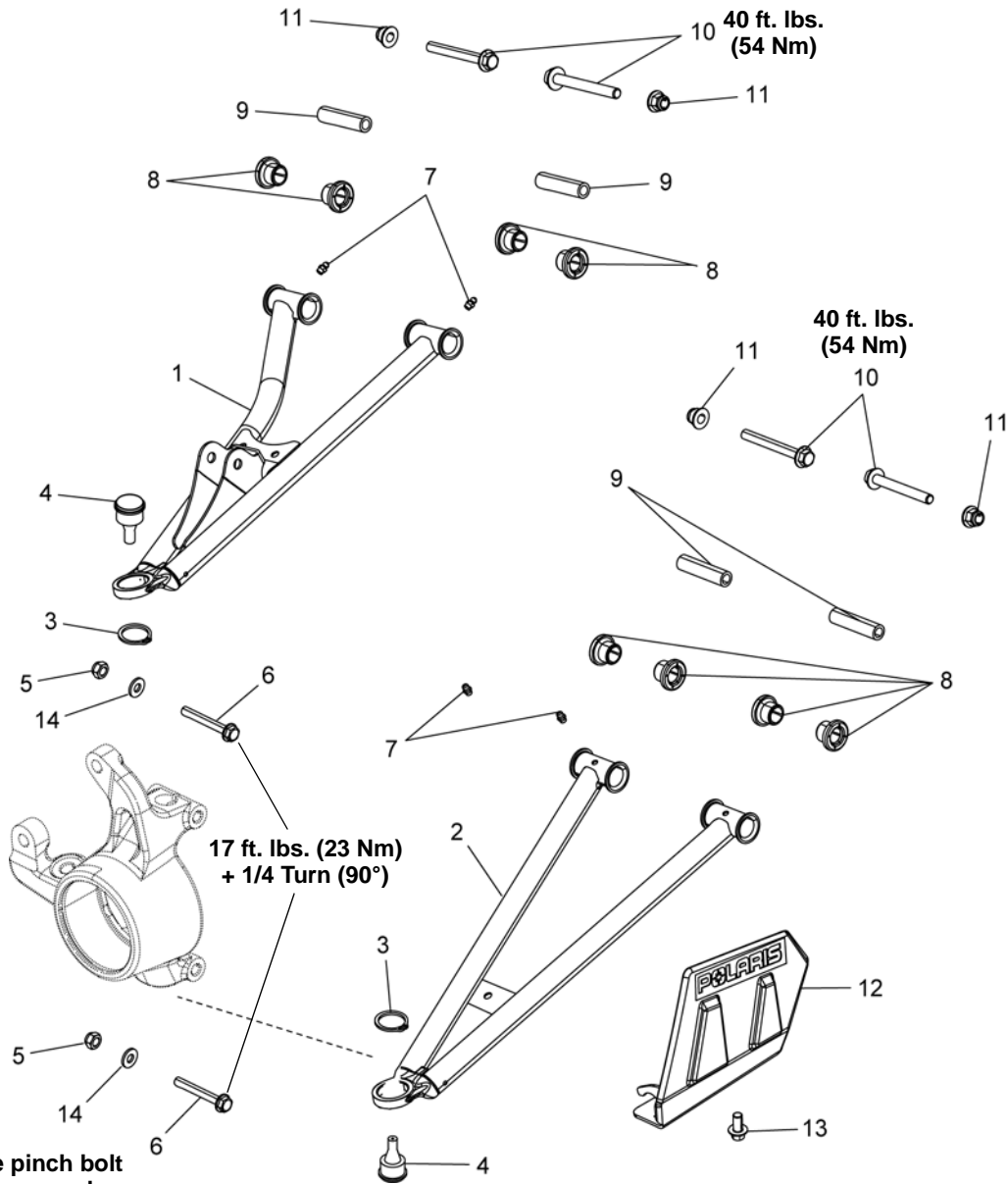
Wheel Nuts:  
**Steel Wheels: 45 ft. lbs. (61 Nm)**  
**Aluminum Wheels: 75 ft. lbs. (102 Nm)**

9. Check wheel toe alignment and adjust as necessary (see Chapter 2).

# STEERING / SUSPENSION

## FRONT A-ARMS

### Exploded View



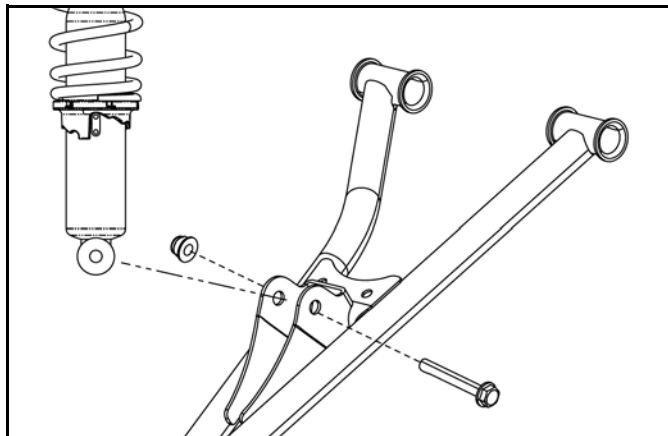
Always replace pinch bolt fasteners if loosened.

REF.	DESCRIPTION	REF.	DESCRIPTION
1	Upper A-arm	8	Bushing
2	Lower A-arm	9	Pivot Shaft
3	Retaining Ring	10	Bolt
4	Ball Joint	11	Nut
5	Nut	12	CV Shield
6	Bolt (replace if loosened or removed)	13	Screw
7	Grease Fitting	14	Washer

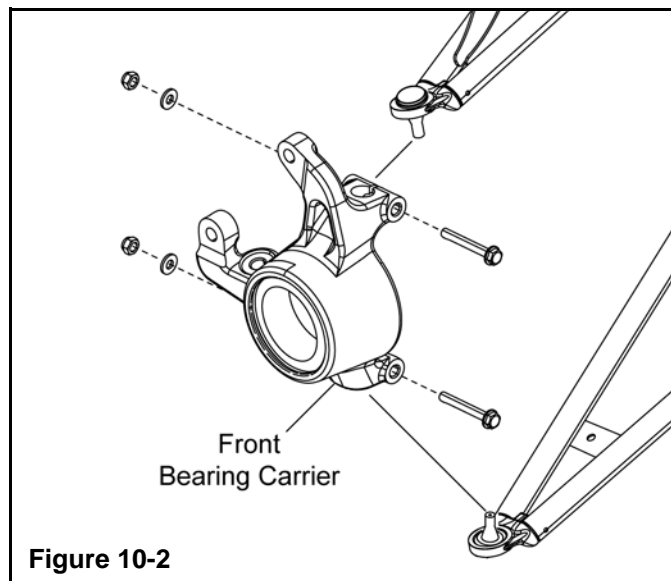
## Removal / Replacement

The following procedure details upper and lower A-arm removal and replacement on one side of the vehicle.

1. Elevate and safely support the front of the vehicle and remove the front wheel.
2. Remove the lower shock fastener from the upper A-arm.



3. Remove the upper ball joint pinch bolt from the front bearing carrier (see **Figure 10-2**).



**Figure 10-2**

4. Remove the brake line retainer from the upper A-arm.
5. Using a soft face hammer, tap on bearing carrier to loosen the upper ball joint end while lifting upward on the upper A-arm. Completely remove the ball joint end from the bearing carrier.
6. Remove the upper A-arm through-bolt fasteners and remove the A-arm from the vehicle (see “Exploded View”).
7. Examine A-arm bushings and pivot shafts (see “Exploded View”). Replace if worn and discard the hardware.

**⚠ WARNING**

The locking agent on the existing bolts was destroyed during removal. **DO NOT** reuse old hardware. Serious injury or death could result if fasteners come loose during operation.

8. If not replacing the A-arm, thoroughly clean the A-arm and pivot shafts.
9. Install new ball joint into A-arm. Refer to “Ball Joint Replacement” section.
10. Insert new bushings and pivot shafts into the new A-arm.
11. Install new upper A-arm assembly onto vehicle frame. Torque new bolts to **40 ft. lbs. (54 Nm)**.
12. Insert upper A-arm ball joint end into the bearing carrier. Install new pinch bolt and fastener hardware. Torque new pinch bolt to **17 ft. lbs. (23 Nm) + 1/4 Turn (90°)**.
13. Attach shock to A-arm with new fastener. Torque lower shock bolt to **37 ft. lbs. (50 Nm)**.
14. Remove the lower ball joint pinch bolt from the front bearing carrier (see **Figure 10-2**).
15. Using a soft face hammer, tap on bearing carrier to loosen the lower A-arm ball joint end while pushing downward on the lower A-arm. Completely remove the ball joint end from the bearing carrier.
16. Remove the lower A-arm through-bolt fasteners and remove the lower A-arm from the vehicle.
17. Examine A-arm bushings and pivot shafts (see “Exploded View”). Replace if worn and discard the hardware.
18. If not replacing the A-arm, thoroughly clean the A-arm and pivot shafts.
19. Install new ball joint into A-arm. Refer to “Ball Joint Replacement” section.
20. Insert new bushings and pivot shafts into the new A-arm.
21. Install new lower A-arm assembly onto vehicle frame. Torque new bolts to **40 ft. lbs. (54 Nm)**.
22. Insert lower A-arm ball joint end into the bearing carrier. Install new pinch bolt and fastener hardware. Torque new pinch bolt to **17 ft. lbs. (23 Nm) + 1/4 Turn (90°)**.
23. Grease all (4) A-arm grease fittings after reassembly.

**⚠ WARNING**

Upon A-arm installation completion, test vehicle at low speeds before putting into service.

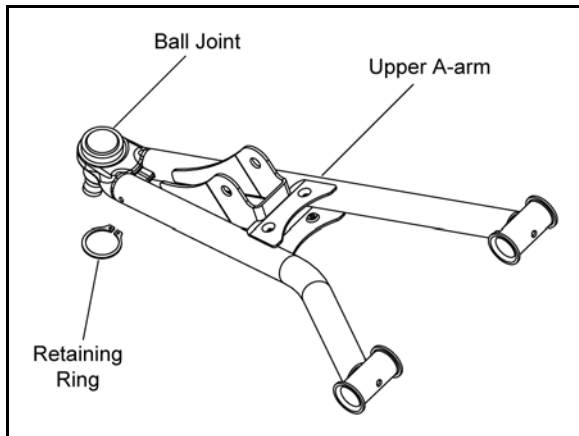
# STEERING / SUSPENSION

## BALL JOINT SERVICE

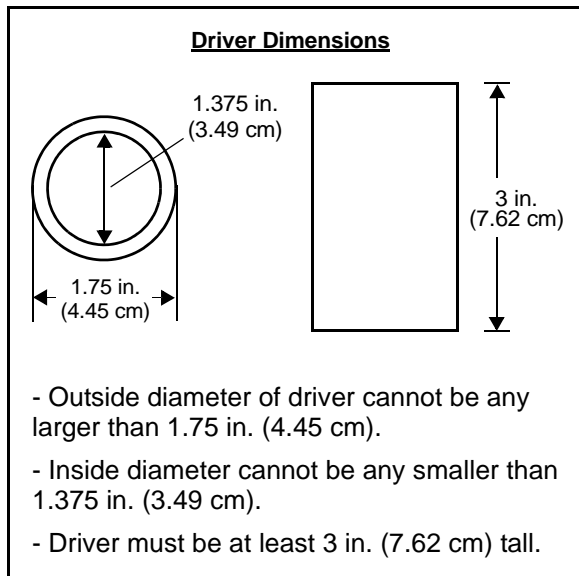
### Removal

**IMPORTANT:** Do not reuse a ball joint if it has been removed for any reason. If removed, it must be replaced. Use this removal procedure only when replacing the ball joint.

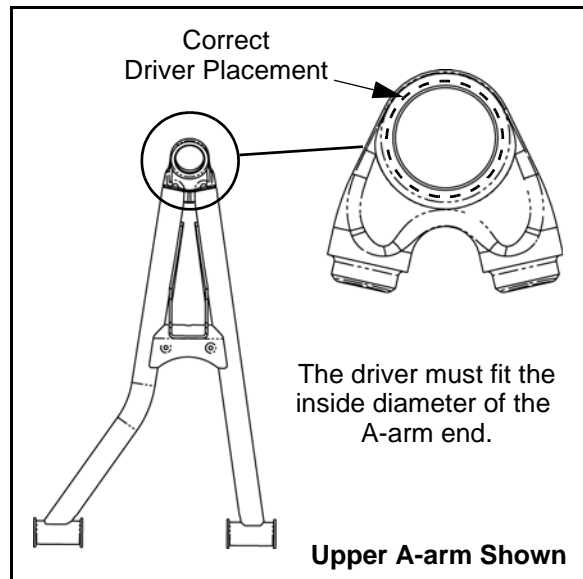
1. The A-arm must be removed to perform this procedure (see "FRONT A-ARMS - Removal / Replacement").



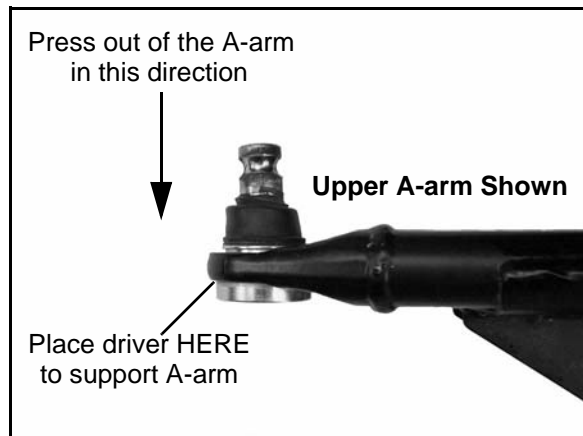
2. Remove the retaining ring from the ball joint.
3. A driver must be used for the removal of the ball joint. Use the dimensions below to fabricate or locate the correct size driver to use in the following process.



4. Use a press and correct size driver to remove the ball joint from the A-arm.

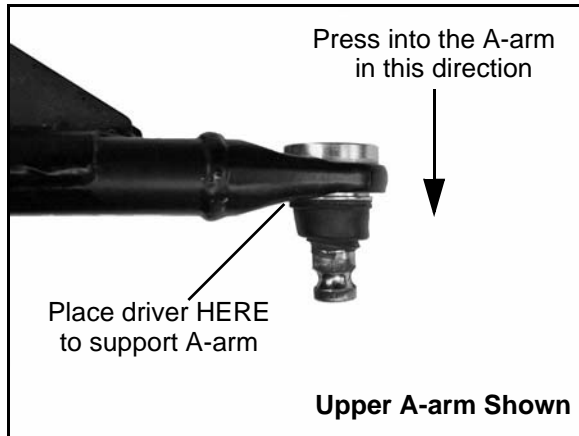


**NOTE:** The driver must fit the ball joint housing in the A-arm. This will allow the ball joint to be properly pressed out of the A-arm without damaging the A-arm.

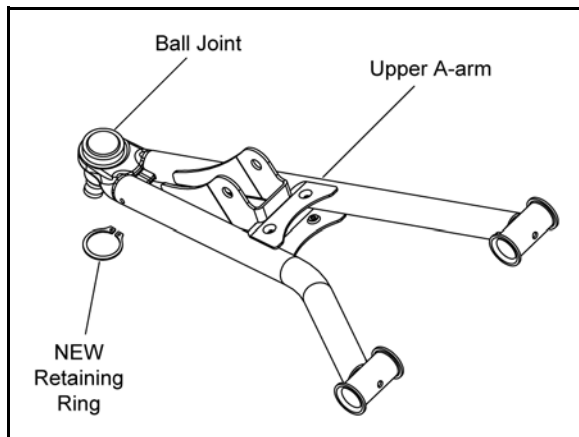


## Installation

1. Place the A-arm in the correct position for ball joint installation. Face the A-arm end flat on top of the driver. Carefully drive the ball joint into place until the ball joint is properly seated.



2. After the new ball joint is installed into the A-arm, install a new retaining ring.

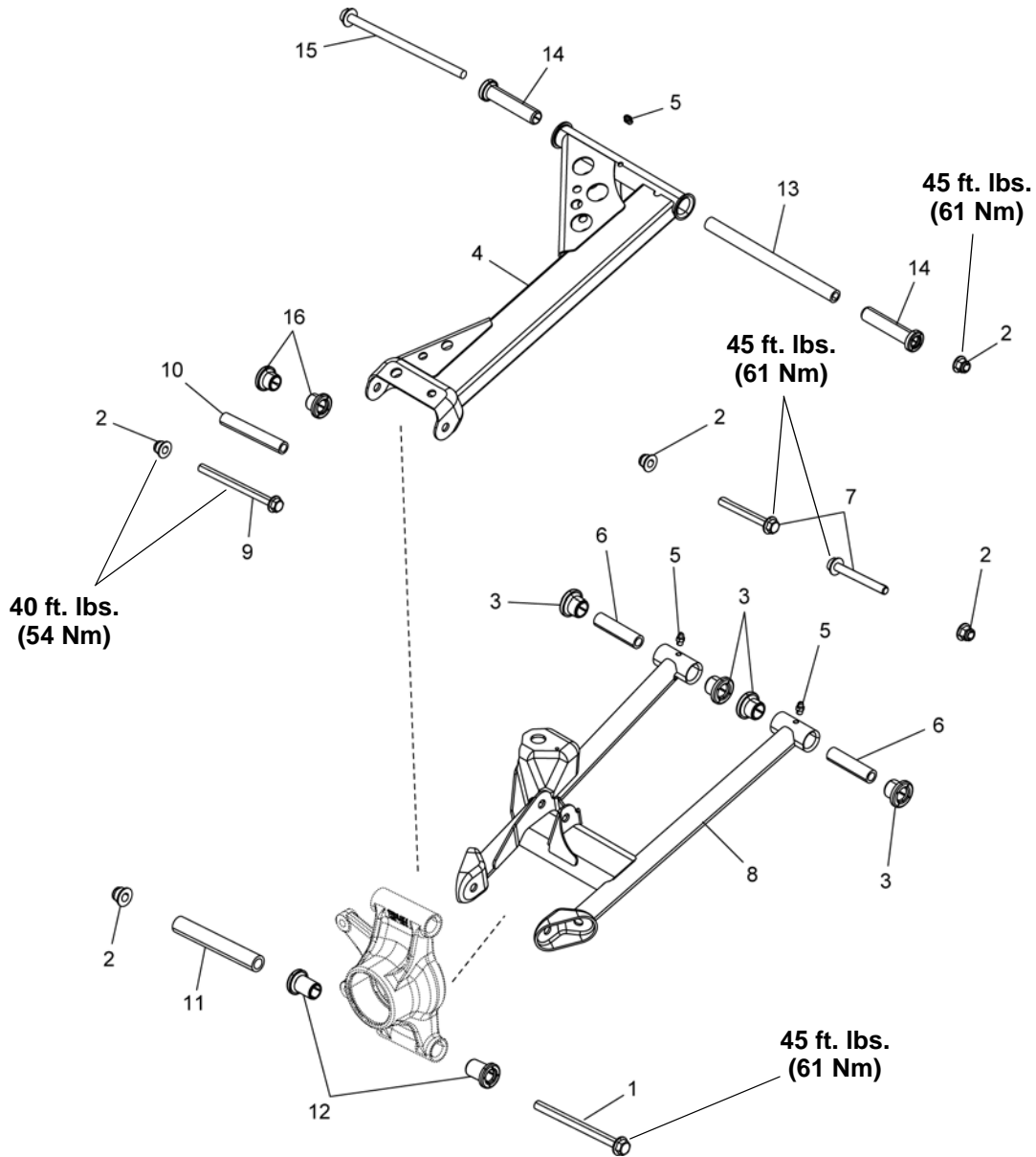


3. Reinstall the A-arm (see "FRONT A-ARMS - Removal / Replacement").
4. Repeat the ball joint service procedure for any additional A-arm ball joint replacements.

# STEERING / SUSPENSION

## REAR A-ARMS

### Exploded View



REF.	DESCRIPTION	REF.	DESCRIPTION
1	Bolt	9	Bolt
2	Nut	10	Pivot Shaft, Upper
3	Bushing, LCA	11	Pivot Shaft, Lower
4	Upper A-arm	12	Bushing, Lower
5	Grease Fitting	13	Pivot Tube
6	Pivot Shaft	14	Bushing, UCA
7	Bolt	15	Bolt
8	Lower A-arm	16	Bushing, Upper



## Removal

The following procedure details upper and lower A-arm removal and replacement on one side of the vehicle.

1. Elevate and safely support the rear of the vehicle and remove the rear wheel.

### Upper A-arm Removal

2. Remove the through-bolt fastener attaching the upper A-arm to the bearing carrier (see "Exploded View").
3. Remove the through-bolt fastener attaching the upper A-arm to the frame and remove the A-arm from the vehicle.
4. Examine A-arm and bearing carrier bushings and pivot shafts (see "Exploded View"). Replace if worn and discard the hardware.

### WARNING

The locking agent on the existing bolts was destroyed during removal. **DO NOT** reuse old hardware. Serious injury or death could result if fasteners come loose during operation.

5. If not replacing the A-arm, thoroughly clean the a-arm and pivot shafts.
6. Insert new bushings and pivot shafts into the new A-arm.

### Lower A-arm Removal

7. Remove the through-bolt fastener attaching the lower A-arm to the bearing carrier (see "Exploded View").
8. Remove the lower shock fastener from the lower A-arm.

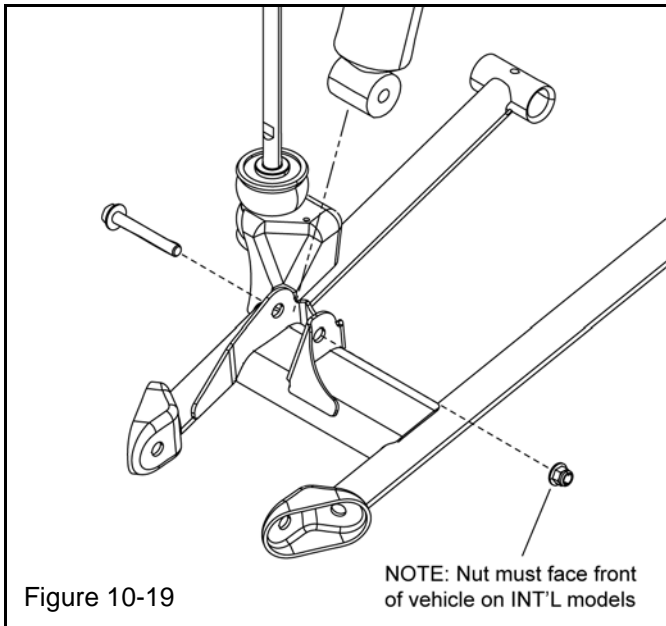
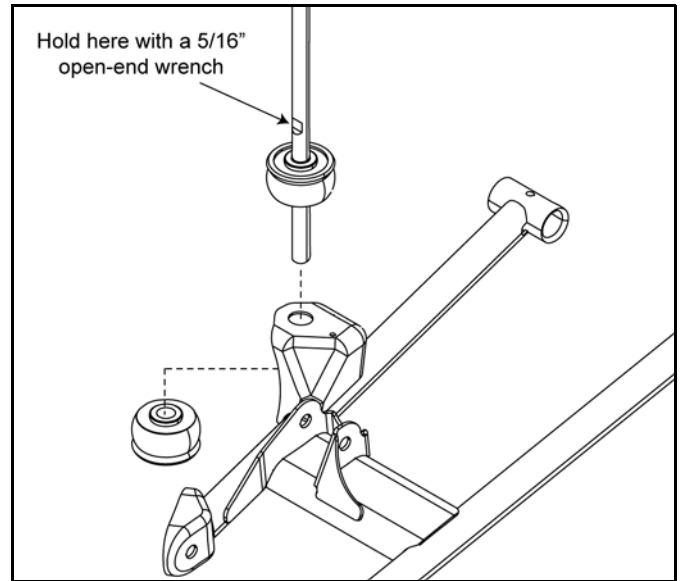


Figure 10-19

9. Remove the brake line retainer from the lower A-arm (if applicable).

10. Remove the fastener retaining the stabilizer linkage to the lower A-arm.



11. Remove the through-bolt fasteners attaching the lower A-arm to the frame and remove the A-arm from the vehicle.
12. Examine A-arm and bearing carrier bushings and pivot shafts (see "Exploded View"). Replace if worn and discard the hardware.
13. If not replacing the A-arm, thoroughly clean the a-arm and pivot shafts. Insert new bushings and pivot shafts into the new A-arm.

## Installation

1. Install upper and lower A-arm assemblies onto the vehicle frame. Torque new fasteners to **45 ft. lbs. (61 Nm)**.
2. Grease all (3) A-arm grease fittings after reassembly.
3. Attach lower A-arm to bearing carrier. Torque new fastener to **45 ft. lbs. (61 Nm)**.
4. Attach upper A-arm to bearing carrier. Torque new fasteners to **40 ft. lbs. (54 Nm)**. Grease both rear bearing carrier fittings after reassembly.
5. Route brake line on top of lower A-arm and install retainer (if applicable).
6. Reinstall the lower portion of the shock and lower portion of the stabilizer linkage to the lower A-arm. Torque shock mounting fastener (see Figure 10-19) to **37 ft. lbs. (50 Nm)**. Torque linkage fastener to **17 ft. lbs. (23 Nm)**.
7. Install the wheel and torque wheel nuts to specification (see page 10.2).

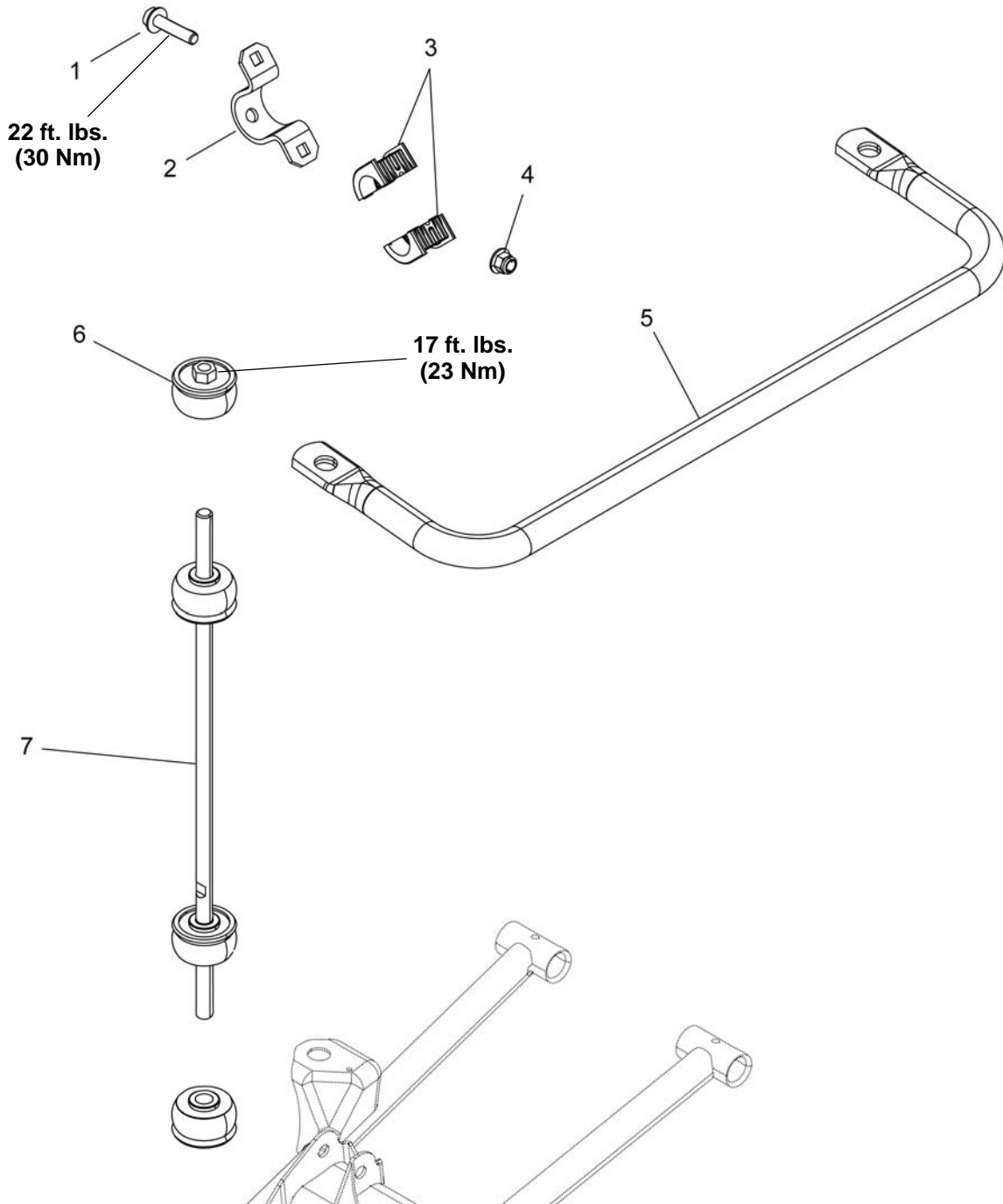
### WARNING

Upon A-arm installation completion, test vehicle at low speeds before putting into service.

# STEERING / SUSPENSION

## REAR STABILIZER BAR

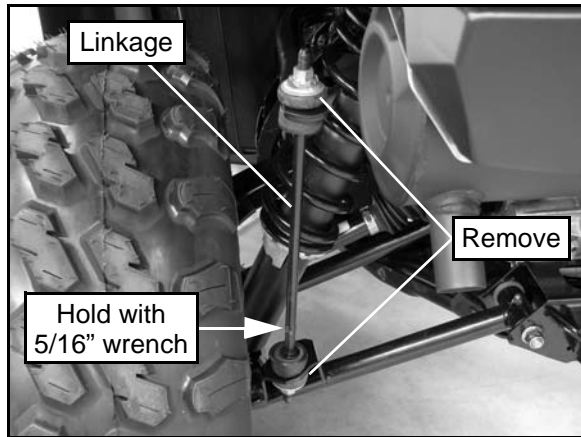
### Exploded View



REF.	DESCRIPTION	REF.	DESCRIPTION
1	Bolt	5	Stabilizer Bar
2	Stabilizer Bar Bracket	6	Bushing, Linkage
3	Bushing, Stabilizer Bar	7	Linkage Assembly, Stabilizer Bar
4	Nut		

## Linkage Removal / Installation

1. Remove the upper linkage bushing from each side. Using an 5/16" open-end wrench, hold the linkage rod and remove the lower linkage bushing.



2. Rotate the stabilizer bar up and remove the stabilizer linkage from the lower A-arm. Repeat this procedure if removing or replacing the other linkage.
3. Reverse this procedure to reinstall the stabilizer linkage. Refer to the "Exploded View" on the previous page for torque values.

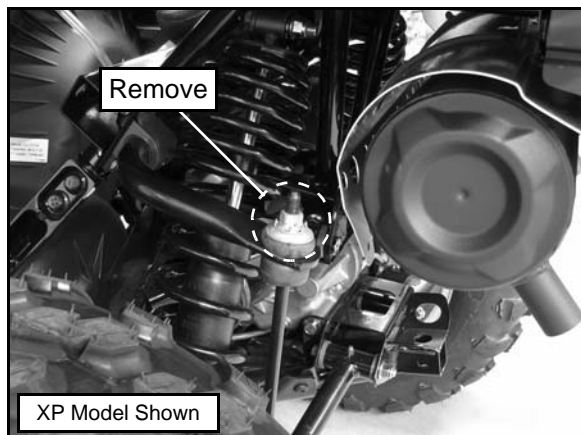
## Stabilizer Bar Removal / Installation

1. Elevate the rear of vehicle and safely support machine under the frame area.

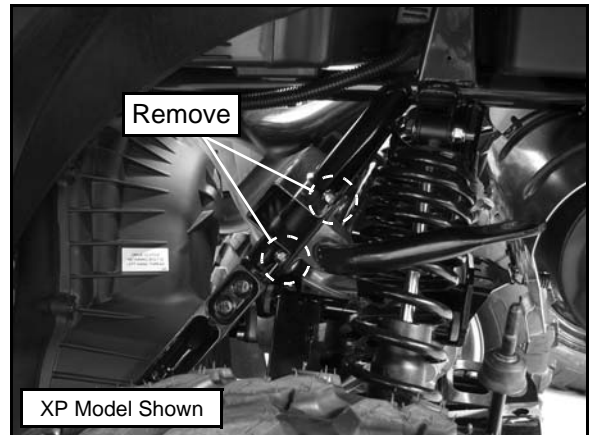


Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Always wear eye protection.

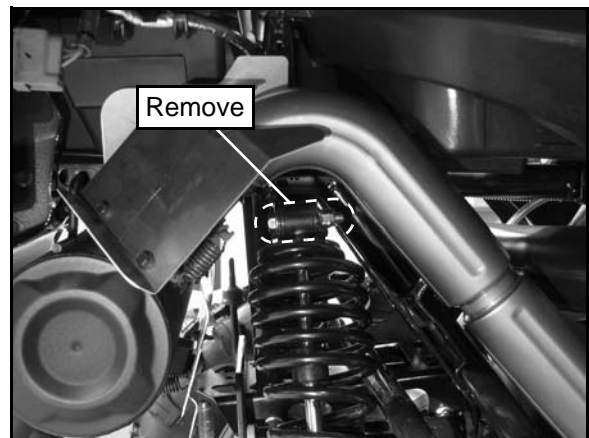
2. Remove the upper linkage bushing from each side and rotate the stabilizer bar up.



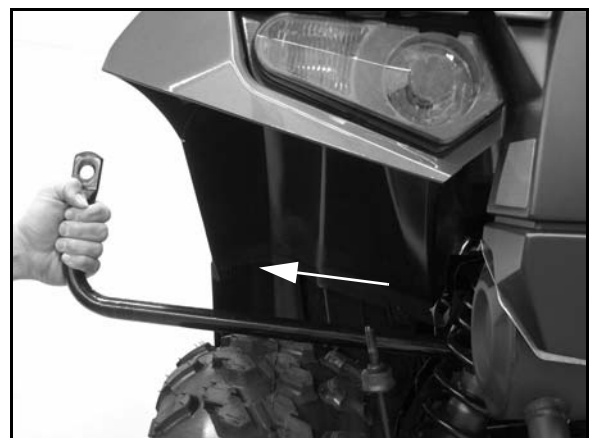
3. Remove the (2) fasteners from each stabilizer bar bracket retaining the stabilizer bar to the frame.



4. Remove the upper shock mounting fastener from the right rear shock and swing the shock out from the frame.



5. Carefully remove the stabilizer bar from the frame.

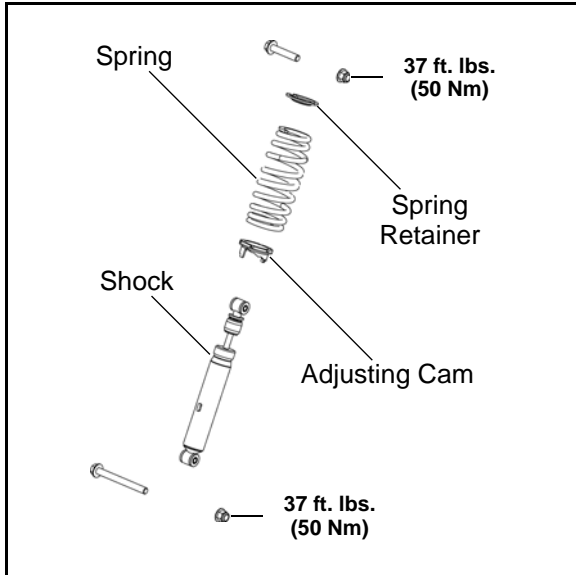


6. Inspect the stabilizer bar for straightness. Inspect the bushings and replace if needed. Inspect the rubber bushings on the stabilizer linkage(s) and replace if needed.
7. Reverse this procedure to reinstall the stabilizer bar. Refer to the "Exploded View" on the previous page for torque values.

# STEERING / SUSPENSION

## SHOCKS / SPRINGS

### Exploded View

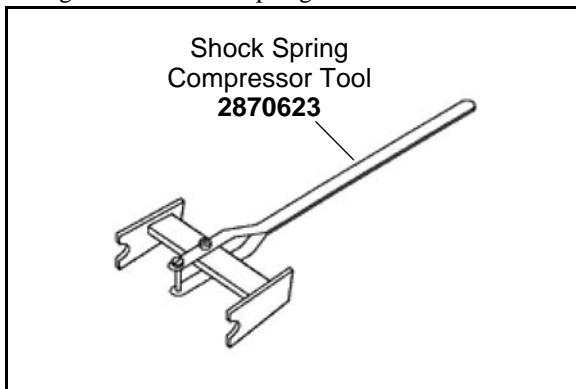


### Shock Removal / Installation

1. Elevate the vehicle off the ground to relieve the suspension load.
2. Remove the upper and lower fasteners retaining the shock and remove the shock from the vehicle.
3. Reverse the procedure to reinstall the shock. Torque new fasteners to **37 ft. lbs. (50 Nm)**.

### Shock / Spring Replacement

1. Using a spring compressor, compress the shock spring far enough to remove the spring retainer.



2. Remove the spring and adjusting cam from the existing shock and install components onto the new shock.
3. Compress the shock spring and install the spring retainer.
4. Reinstall the shock onto the vehicle and torque new fasteners to **37 ft. lbs. (50 Nm)**.