

# CHAPTER 6

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# BODY AND STEERING

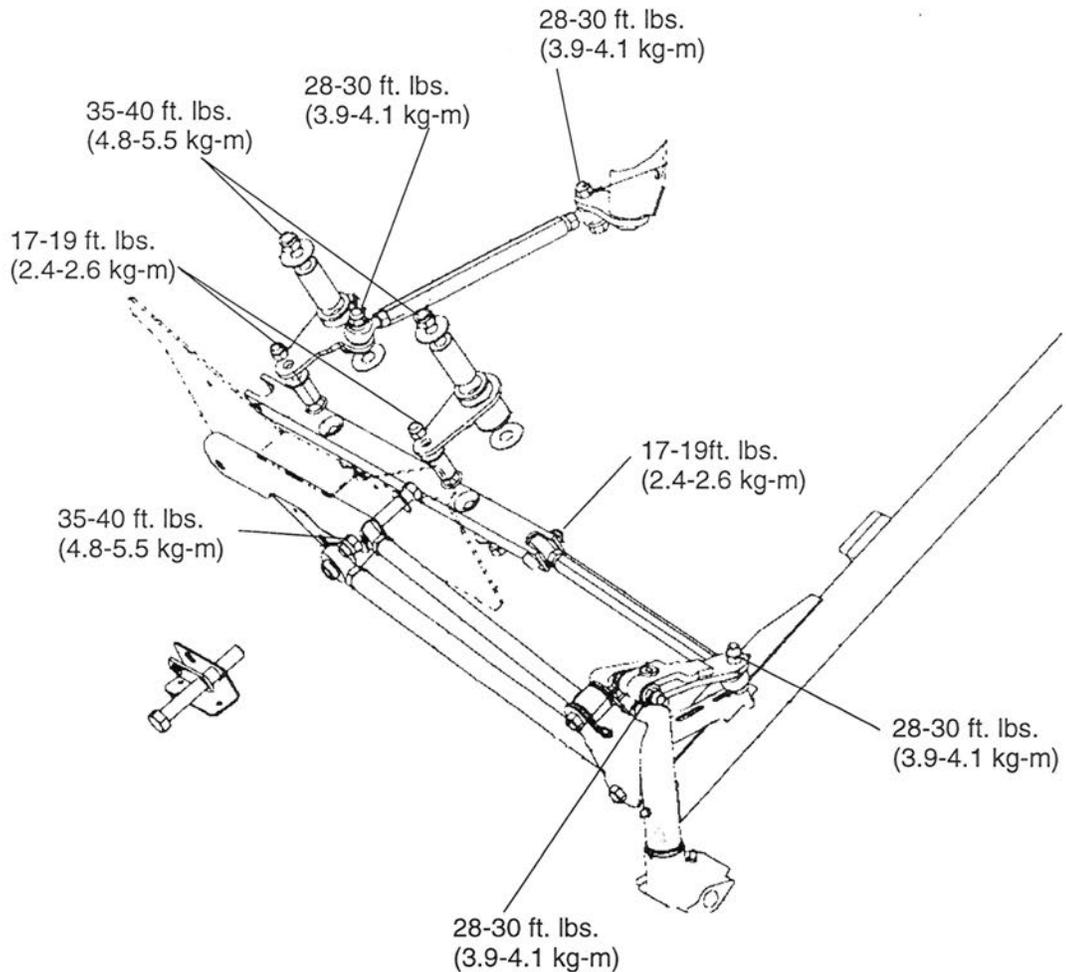
## Torque Specifications - Steering Assembly Exploded View

### Torque Application List

Due to the special grade bolts and nuts required for specific applications, observe the following torque values in the areas specified. Refer to exploded views for torque values and orientation of components and fasteners.

### 1999 XCF

Illustration depicts proper orientation of rod ends and bolts on steering components.



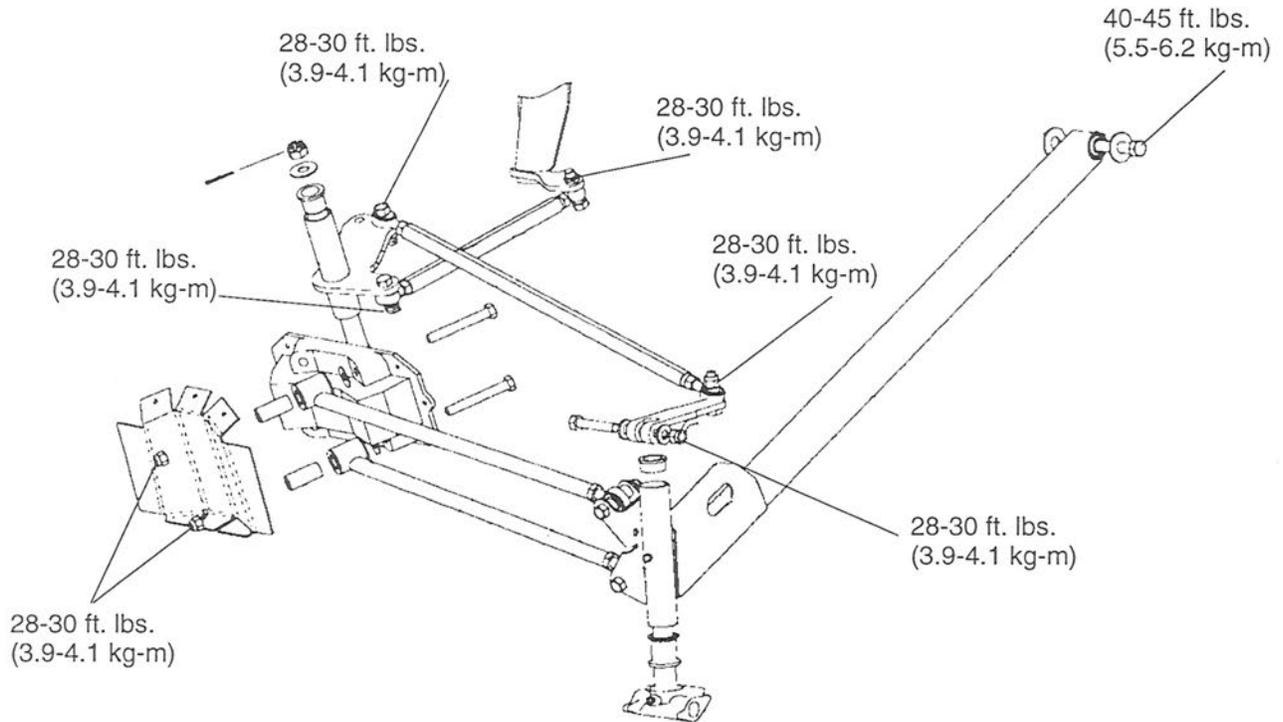
◆ Replace locking fasteners if removed.

# BODY AND STEERING

## Steering Assembly Exploded View

1999 340, 340 Deluxe, 340 Touring

Illustration depicts proper orientation of rod ends and bolts on steering components.



◆ Replace locking fasteners if removed.

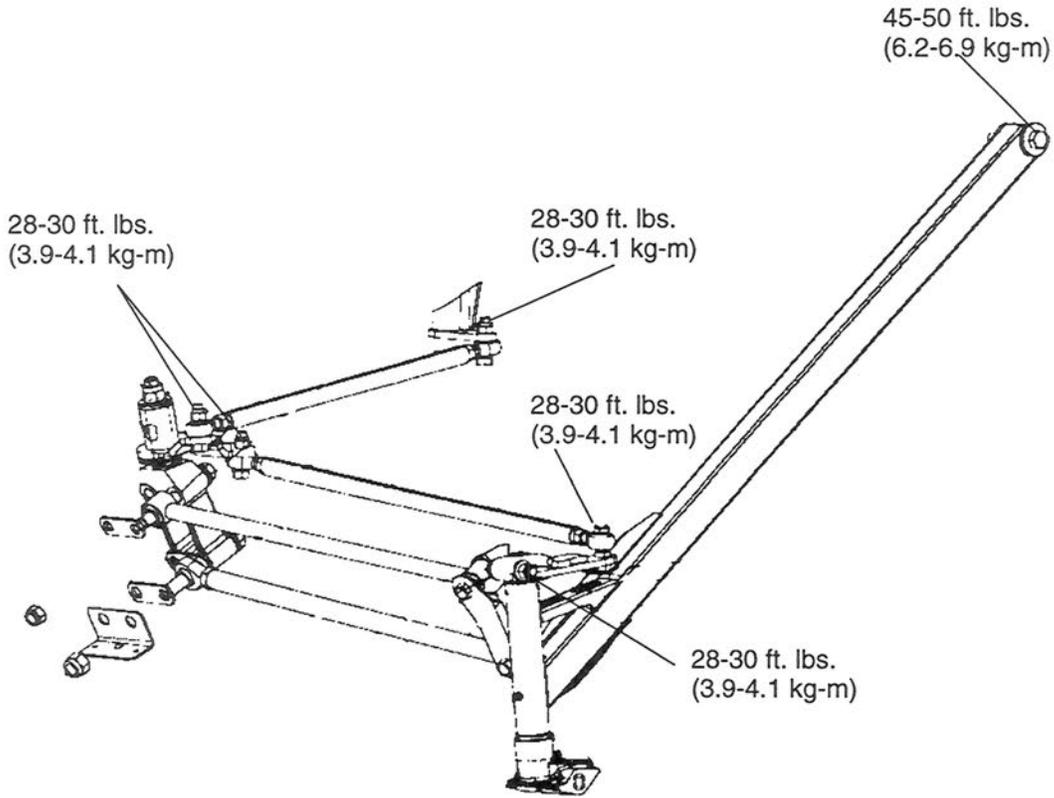


# BODY AND STEERING

## Steering Assembly Exploded View

### 1999 WideTrak LX

Illustration depicts proper orientation of rod ends and bolts on steering components.



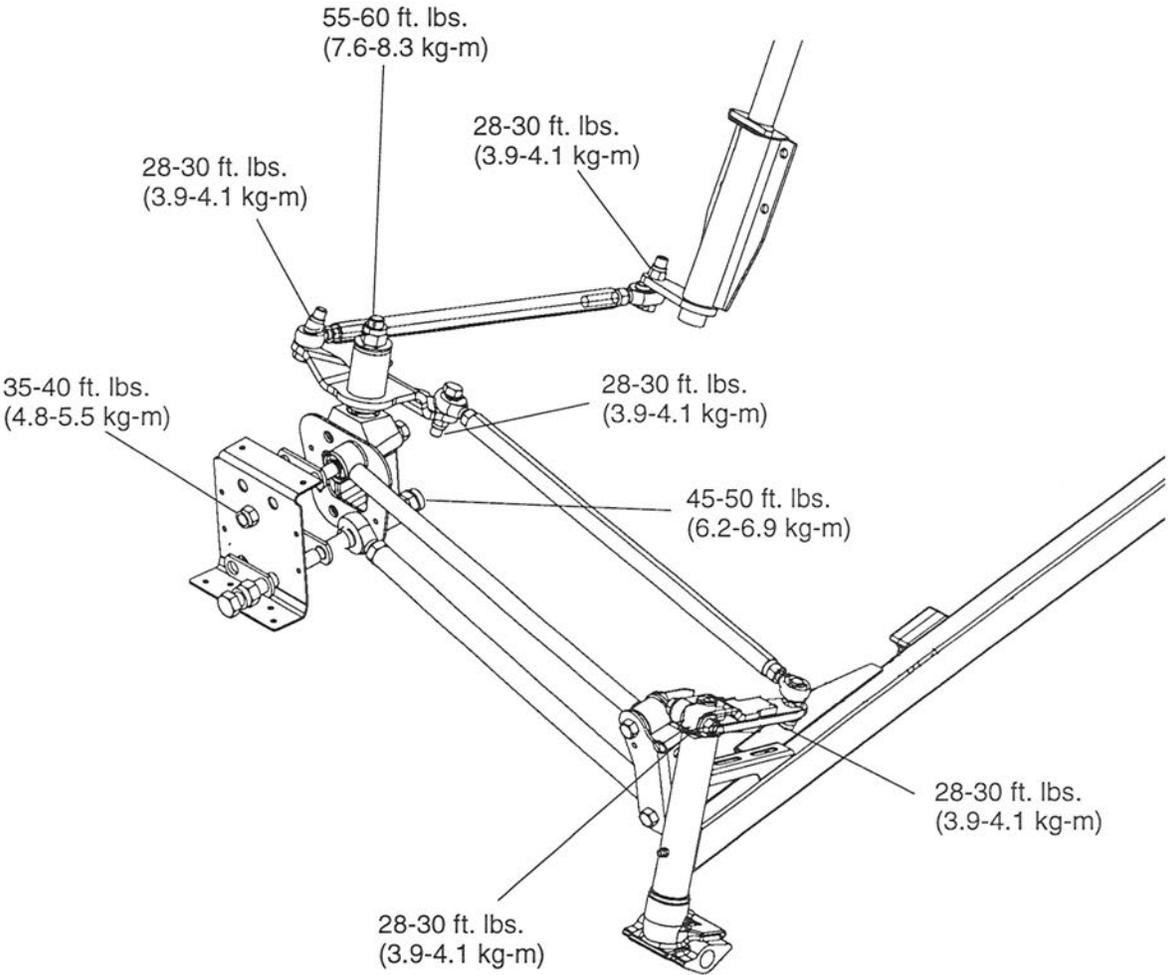
- ◆ Replace locking fasteners if removed.

# BODY AND STEERING

## Steering Assembly Exploded View

### 1999 Trail RMK, 500 RMK

Illustration depicts proper orientation of rod ends and bolts on steering components.



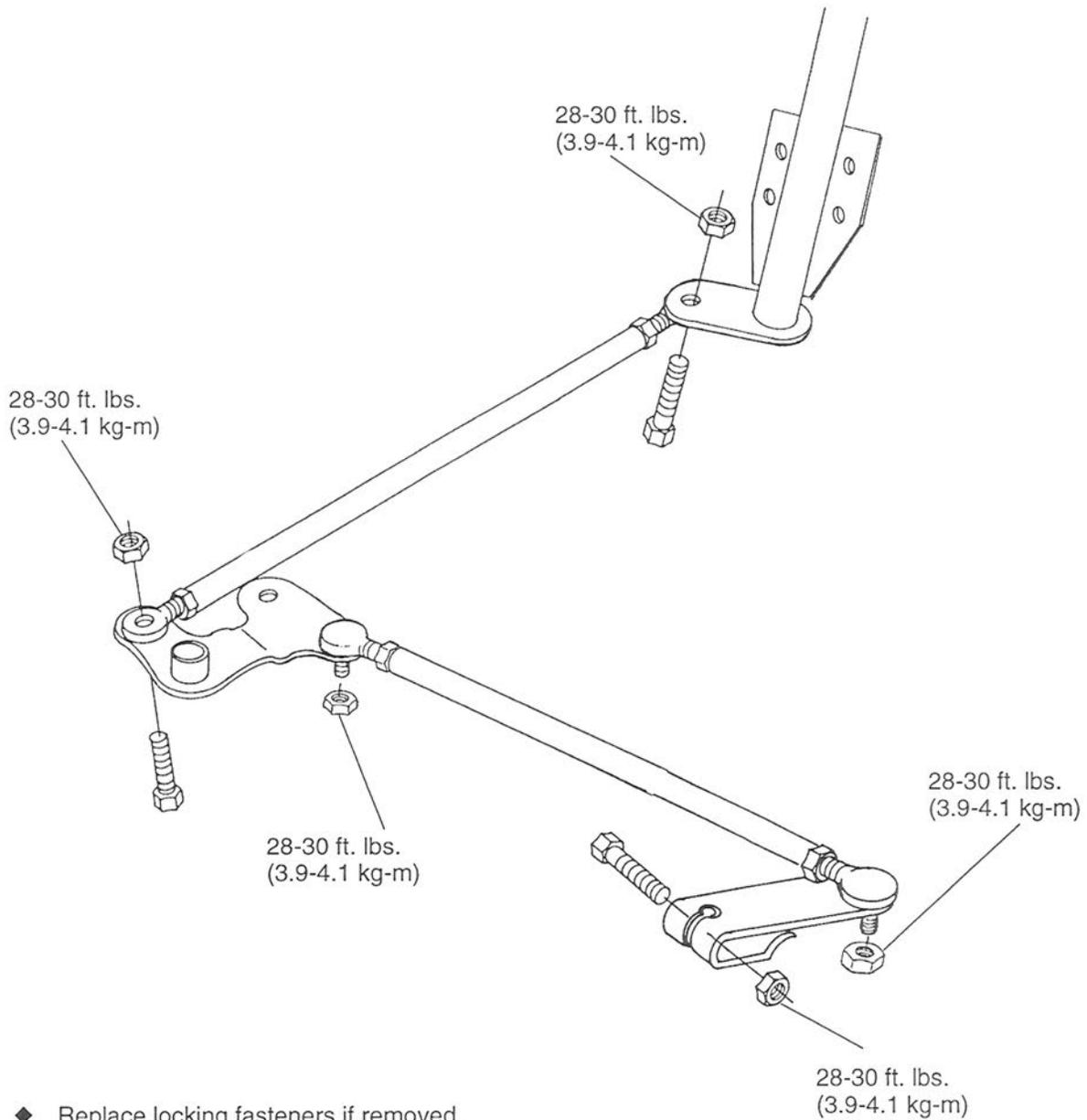
◆ Replace locking fasteners if removed.

# BODY AND STEERING

## Steering Assembly Exploded View

1999 Supersport, Trail, Trail Touring 500, 500 Classic, Classic Touring

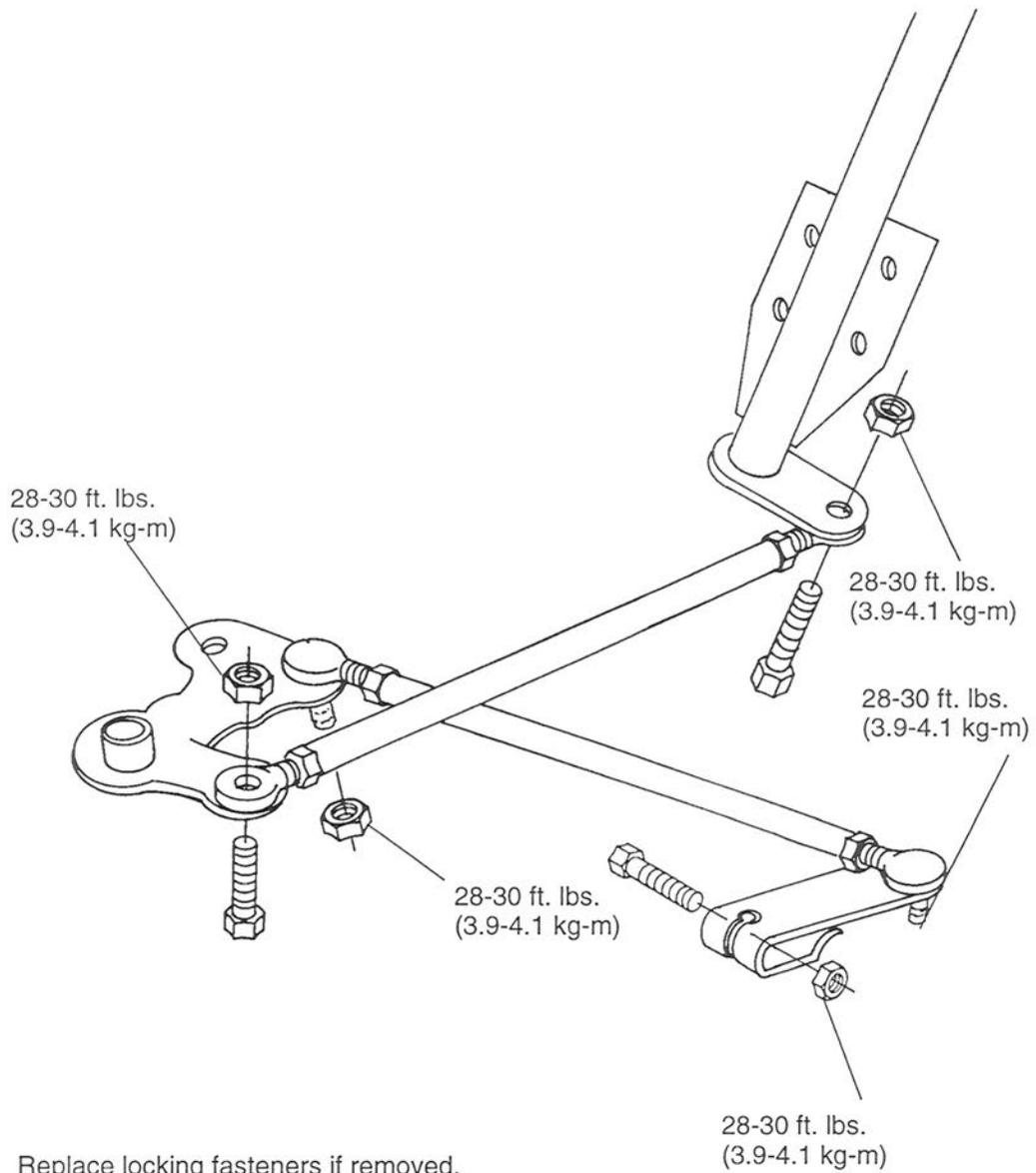
Illustration depicts proper orientation of rod ends and bolts on steering components.



# BODY AND STEERING

## Steering Assembly Exploded View

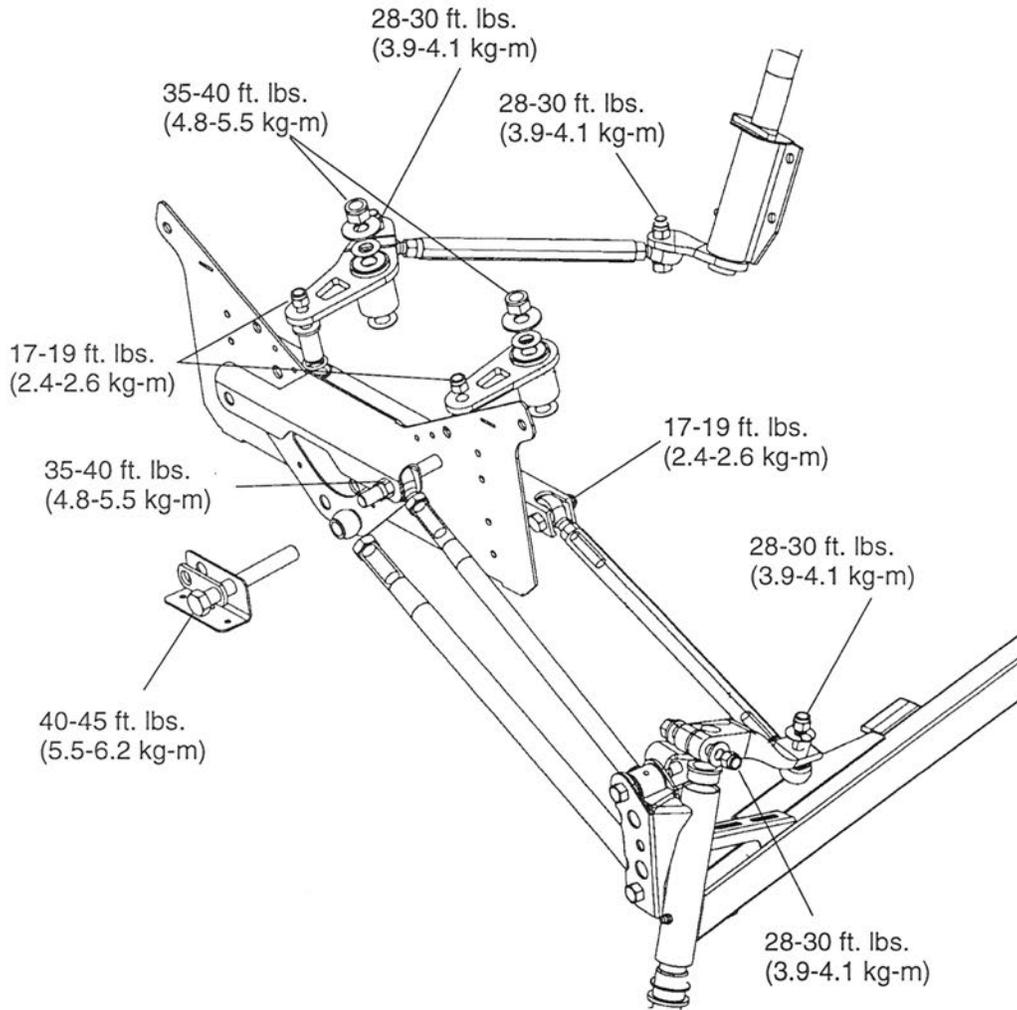
1999 XLT Classic, XLT Touring



# BODY AND STEERING

## Steering Assembly Exploded View

1999 440 XCR, 500 XC /SP

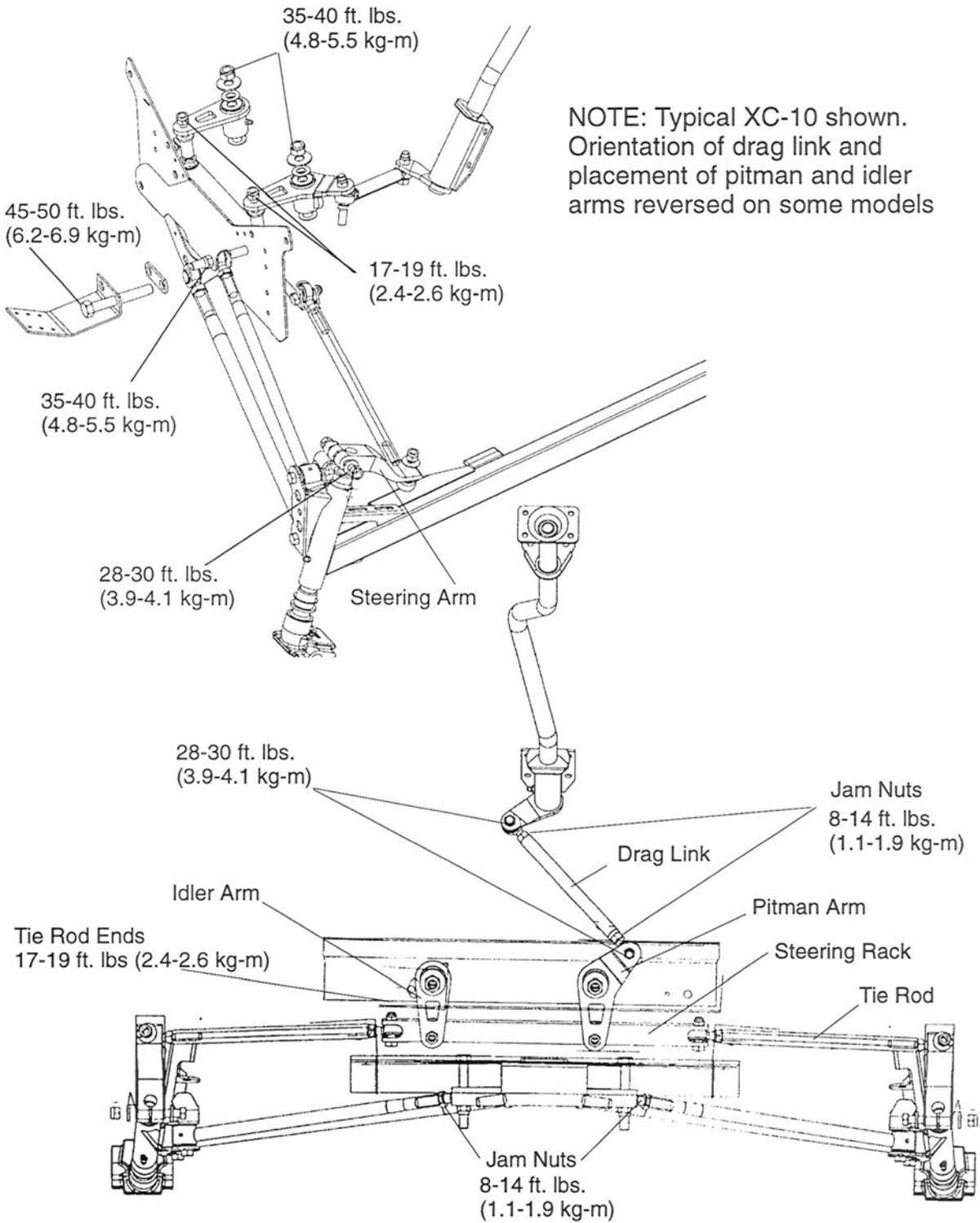


◆ Replace locking fasteners if removed.

# BODY AND STEERING XC-10 CRC Steering Assembly Exploded View

## 1999 600 XC/SP, 700 XC/SP

Illustration depicts proper orientation of rod ends and bolts on steering components for most models.

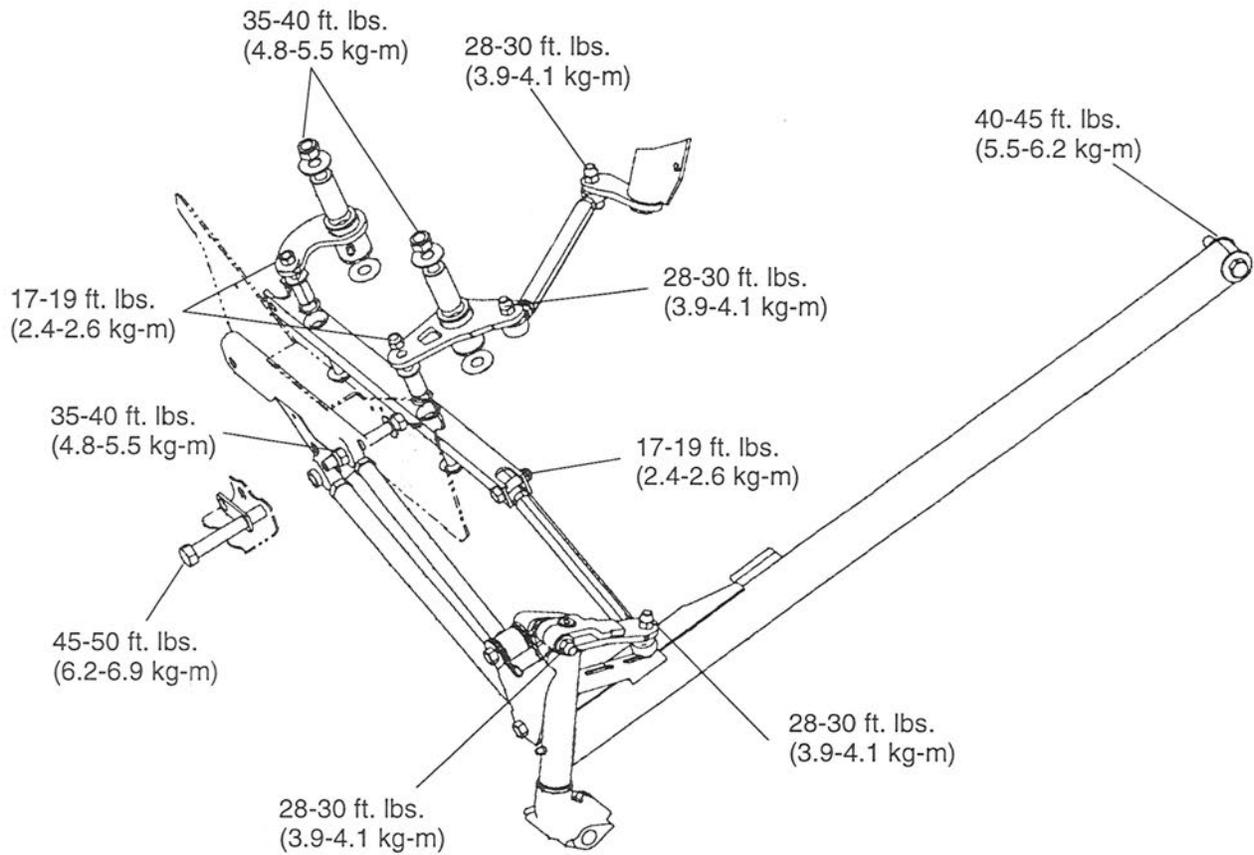


# BODY AND STEERING

## XC-10 CRC Steering Assembly Exploded View

1999 600 RMK, 700 RMK

Illustration depicts proper orientation of rod ends and bolts on steering components for most models.



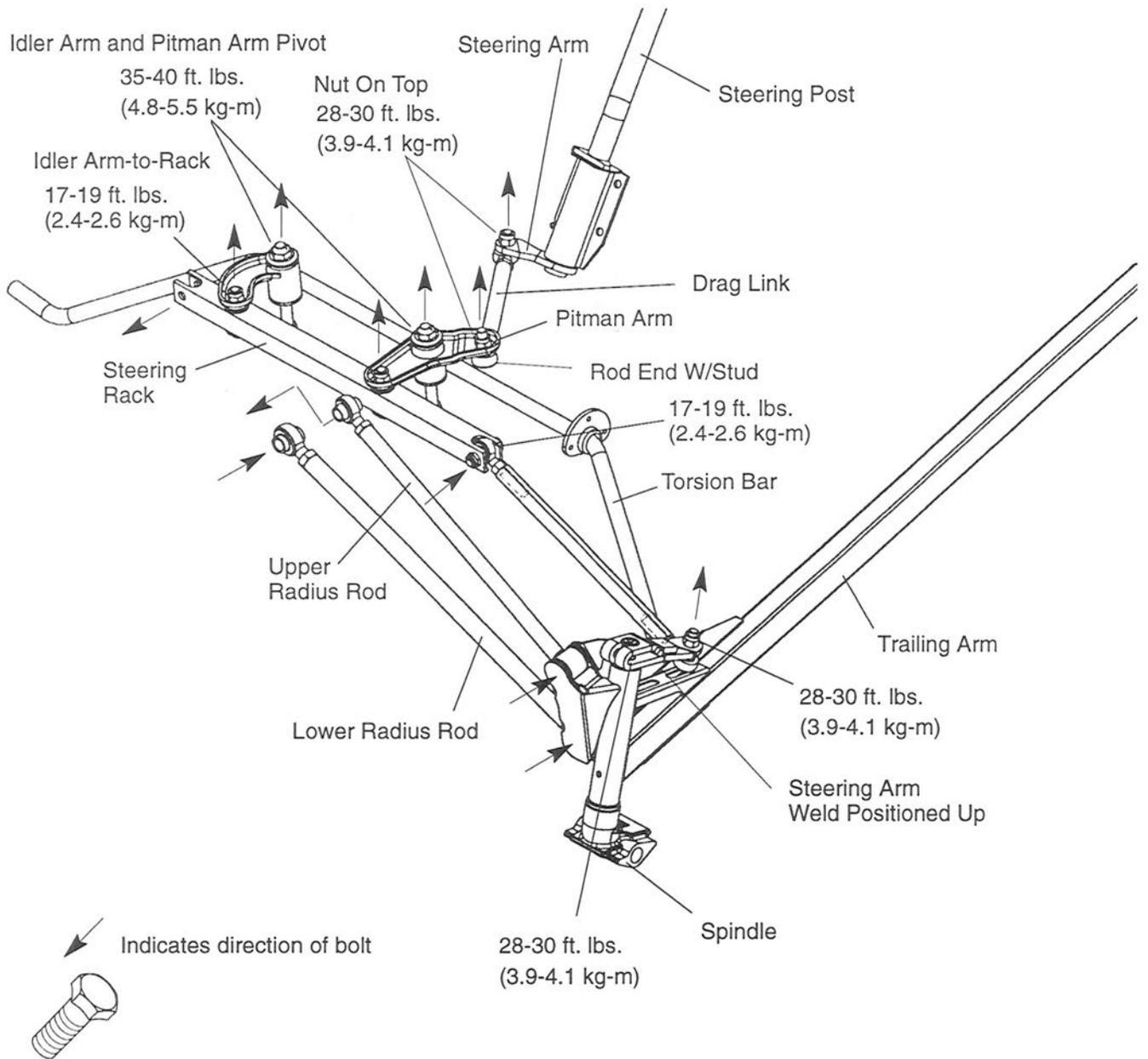
◆ Replace locking fasteners if removed.

# BODY AND STEERING

## Steering Assembly Exploded View

**Models: 1999 XLT Special, 700 SKS, 700 XCR, 800 XCR**

Illustration depicts proper orientation of rod ends and bolts on steering components.



# BODY AND STEERING

## Steering Inspection

### Inspection

Prior to performing steering alignment, inspect all steering and suspension components for wear or damage and replace parts as necessary. Refer to steering assembly exploded views in this chapter for identification of components and torque values of fasteners. While disassembling, make notes of what direction a bolt goes through a part, what type of nut is used in an application, in which direction do the steering arms go on - weld up or weld down, etc.

Some of the fasteners used in the IFS are special and cannot be purchased at a hardware store. Always use genuine Polaris parts and hardware when replacing front end components. Review steering adjustment guidelines on page 6.13 before making adjustments.

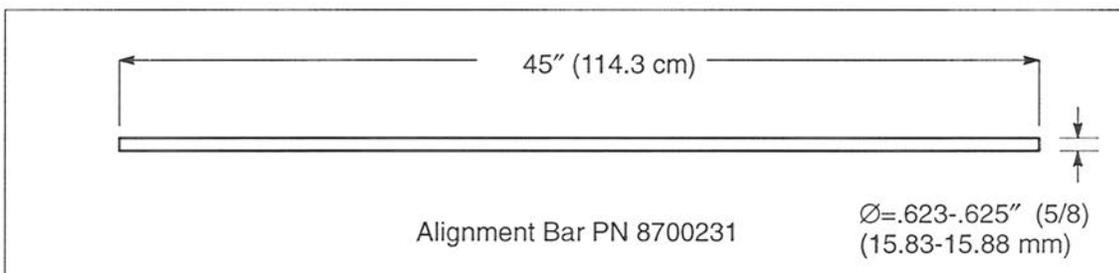
The following components must be inspected at this time:

**NOTE:** Always follow rod end engagement guidelines found on page 6.13. Maximum setup width must be checked whenever front suspension components are adjusted or replaced.

- Tie rods and tie rod ends
- Radius rods and radius rod ends
- Torsion bar and bushings / linkage (where applicable)
- Handlebars and steering post assembly
- Spindles and bushings
- Trailing arms and bushings
- Skis and skags
- Bell crank / Pitman arm / Idler arm
- Steering arms
- Shock absorbers, shock mounts, springs
- All related fasteners - check torque. Refer to steering exploded views at the beginning of this section.
- Grease all fittings.

### Alignment Bar Specifications

<b>Material:</b>	C-1018
<b>Diameter:</b>	.623" - .625" (5/8") ..... (15.82 - 15.87 mm)
<b>Length:</b>	45" (114.3 cm)
<b>PN 8700231 See Service Tool Catalog for ordering information.</b>	

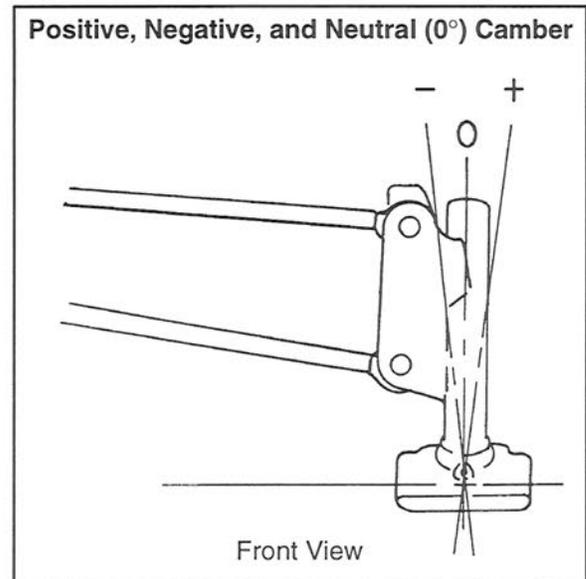


## BODY AND STEERING Steering Adjustment Guidelines - All IFS

### Camber Definition - All IFS

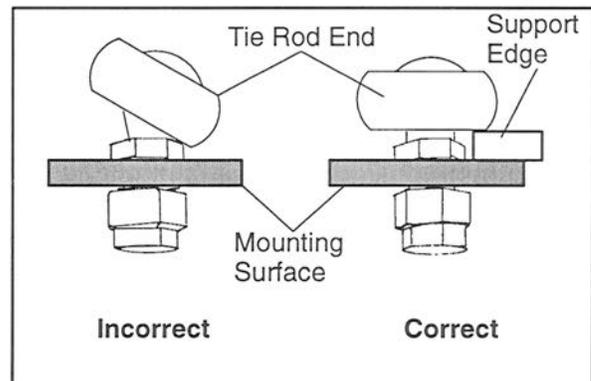
The following definitions of camber use automotive terminology to describe positive and negative positions. Refer to the illustration at right.

- 0 (Neutral) Camber - Spindle is 90° (perpendicular) to ground
- + (Positive) Camber - Spindle bottom is canted inward toward chassis
- - (Negative) Camber - Spindle bottom is canted outward from chassis



### Radius Rod and Tie Rod End Torque Procedure

Radius rod and tie rod ends must be parallel to their respective mounting surface after tightening jam nut as shown at right. Hold tie rod or radius rod and tighten jam nut. If possible, support the edge of the rod end as shown to keep it from rotating out of position until jam nut is tight. When tie rod ends are properly tightened, the tie rod should rotate freely approximately 1/8 turn.



### Rod End Engagement Guidelines - All IFS

**Tie Rod Or Radius Rod End Must Engage Rod A Minimum Of 2x Thread Diameter When Adjustment Is Complete**

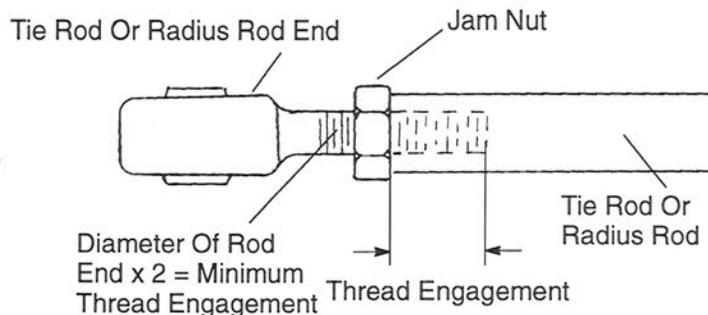
**EXAMPLE**

7/16" Rod End x 2 = 7/8"

Minimum Thread Engagement = 7/8"

11mm x 2 = 22mm

Minimum Thread Engagement = 22mm



**BODY AND STEERING**  
**Steering Adjustment - All IFS**

**1999 IFS Steering Alignment Specifications**

The following information is to be used for 1999 Polaris Snowmobile front suspension setup. The data in the following table is based on the 1999 Polaris factory settings. **Maximum Width and Camber measurements are to be taken with the front end elevated and shocks at full extension. Toe alignment is measured at ride height.**

Suspension Type	Maximum Setup Width ± 1/4" (6mm)	Camber ± 5/16"	Toe (At Ride Height)
<b>LITE</b> 340 Indy, 340 Deluxe, 340 Touring	36 5/16" (92.25 cm)	0	ALL MODELS  1/8 - 1/4" Toe Out  At Normal Ride Height
<b>38-RMK</b> Trail RMK, 500 RMK	36 3/4" (93.35 cm)	0	
<b>38-RMK CRC</b> 600 RMK, 700 RMK	36 15/16" (93.80 cm)	3/8"	
<b>38x7</b> WIDETRAK	37 9/16" (95.40 cm)	3/4"	
<b>41x7</b> Sport, Sport Touring Transport	40 5/16" (102.40 cm)	9/16"	
<b>XTRA-10</b> Trail, Trail Touring, Supersport, 500 Indy	40 7/16" (102.70 cm)	0	
<b>XTRA-10 CRC</b> 600 SKS Euro, 700 SKS, 700 SKS Euro, XLT SP, XCF, 700 XCR, 800 XCR	39 1/4" (99.70 cm)	3/4"	
<b>XC-10 CRC</b> 440 XCR, 500 XC, 500 XC SP, 600 XC, 600 XC SP, 700 XC, 700 XC SP	39" (99.00 cm)	1 1/16"	
<b>XTRA-12</b> 500 Classic, Classic Touring XLT Classic, XLT Touring	40 7/16" (102.70 cm)	0	

**WIDTH NOTE:** Width is measured in inches from the center of the spindles near the grease fitting for the ski mount bolt located at the base of the spindle. The tolerance on this measurement is ± 1/4".

**TOE ADJUSTMENT NOTE:** Toe is measured in inches with the machine on the ground and resting at normal ride height - not full rebound. Measure at a point 10" (254mm) forward of the ski mount bolt and 10" behind the ski mount bolt, preferably on the centerline of carbide skags. Note: Measurements to points on the skis may be inaccurate.

**NOTE:** *Camber* measurement is taken in inches from top of alignment bar to the top of ski mount hole in the spindle (bushing removed). All camber specifications are ± 5/16" or 1/2 the diameter of the alignment bar (± 8mm).

- An alternate method of alignment using the Camber and Toe Alignment Travel Bars (Kit PN 2871537) can be performed on snowmobiles equipped with XTRA-10 CRC or XC-10 CRC front suspension. The travel bars are *not intended for use on 38 RMK CRC or non-CRC models.*

## BODY AND STEERING

### Steering Adjustment - All IFS

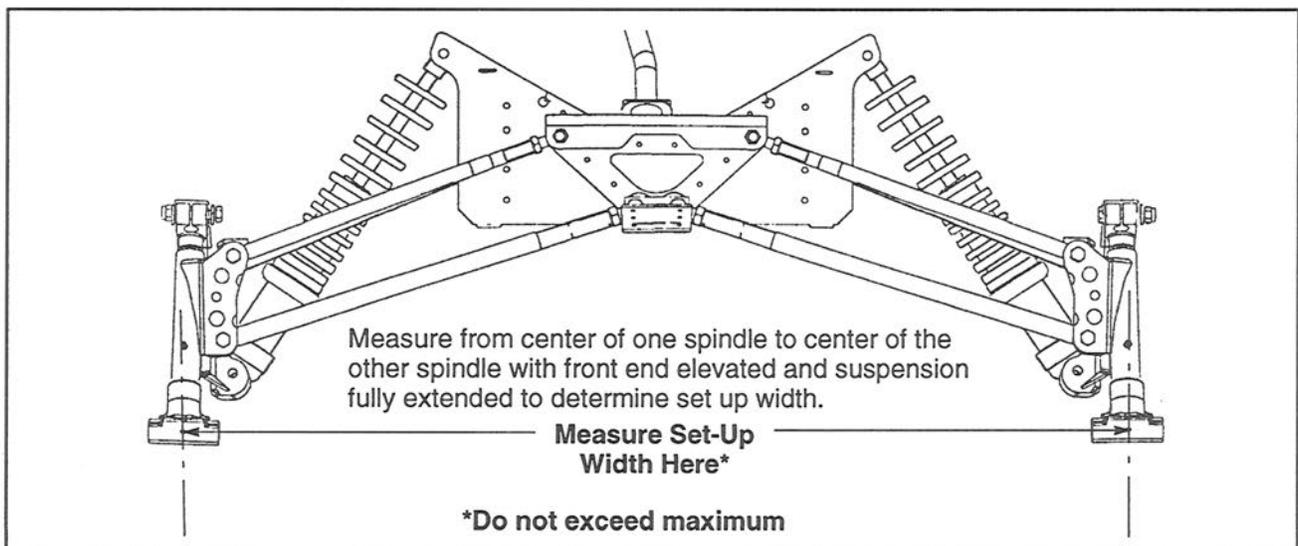
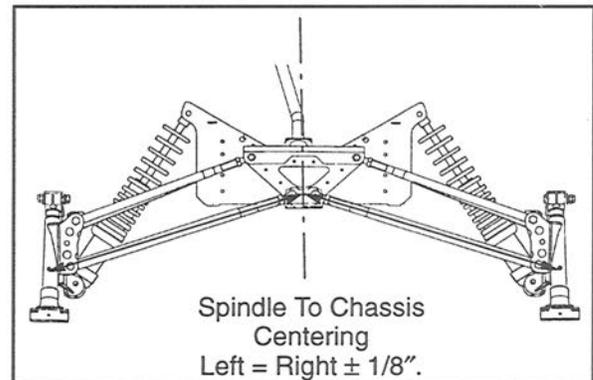
Prior to performing steering alignment, the suspension should be inspected for damage or wear and replacement parts installed as required. See inspection on page 6.12.

#### **⚠ WARNING**

A maximum set up width is listed in the chart on page 6.14. Maximum set up width is the maximum allowable distance between ski spindle centers with front end of vehicle off the ground and suspension fully extended. The Maximum Set Up Width specifications are maximum width measurements, and are critical to ensure adequate torsion bar engagement with the trailing arm. If the suspension is set too wide, **the torsion bar can come loose and interfere with steering**. Do not attempt to set the suspension wider than the specified Maximum Set Up Width.

#### **Spindle Centering / Set Up Width**

1. Make sure the track is properly aligned. Refer to Maintenance Chapter for procedure. This will be used as a reference point for final toe out measurement.
2. Support the front of the machine 1-2" (2.5-5.1 cm) off the floor.
3. Remove skis and ski pivot bushings.
4. Disconnect adjustable torsion bar linkage where applicable.
5. Measure spindle to chassis centering as shown and record measurement. Both spindles should be an equal distance  $\pm 1/8"$  (3 mm) from the center of the chassis after adjusting camber, width, and toe alignment. This measurement is controlled by adjusting radius rod length.
6. Measure set up width and record. This measurement is controlled by adjusting radius rod length, and must not exceed the Maximum Setup Width listed in the appropriate table (at the front of this section) after all steering adjustments are complete. See illustration below for procedure.

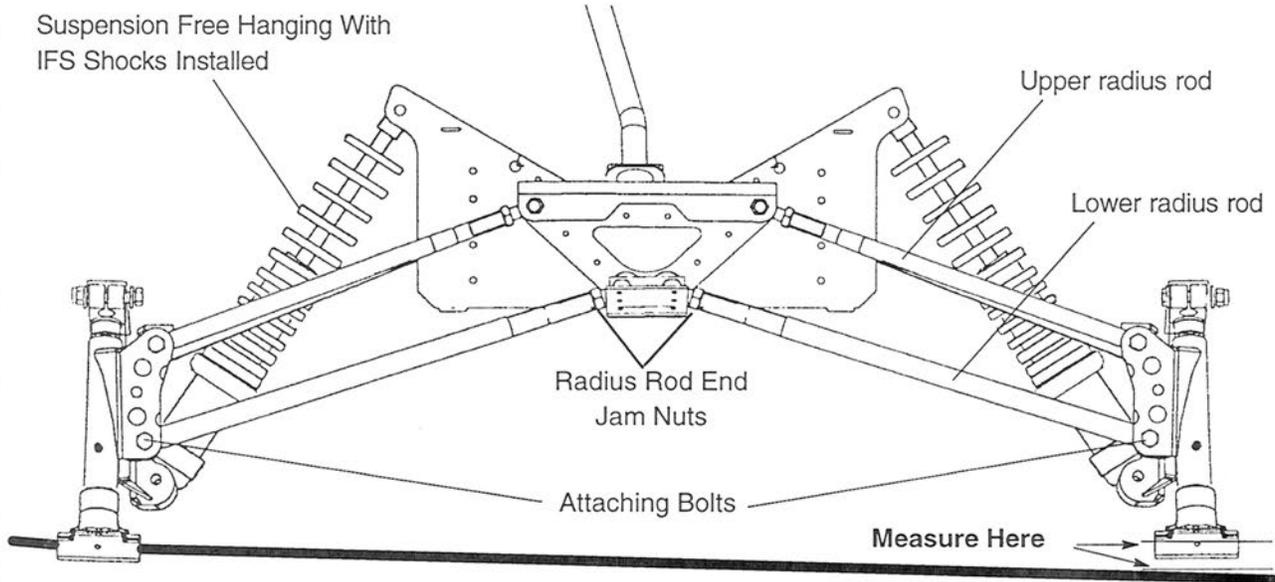


**BODY AND STEERING**  
**Steering Inspection - All IFS**

**CAMBER INSPECTION**

All Models - Elevate Front End - Shocks Installed

Typical CRC Shown - Style varies by model



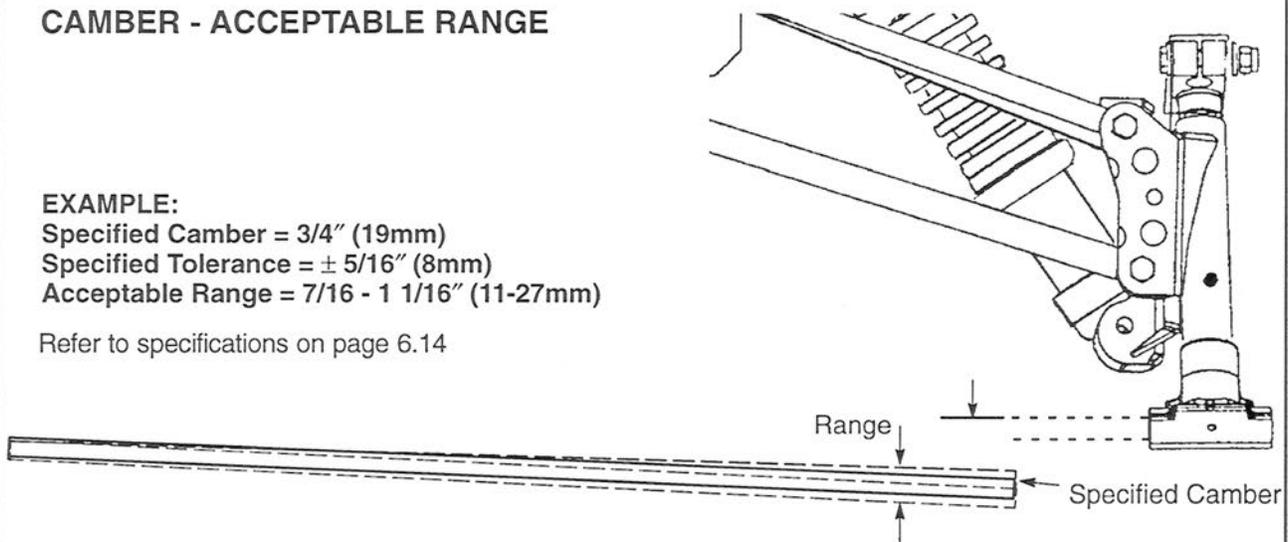
Refer to specifications for:  
 • IFS type  
 • Specified amount of camber

☐ To adjust, lengthen or shorten appropriate lower radius rod until top of bar is within specified camber distance. Measurement should be taken from *top of alignment bar to top of ski pivot bushing hole in spindle (bushing removed)*. Radius rod must be re-attached to trailing arm before measuring.

**CAMBER - ACCEPTABLE RANGE**

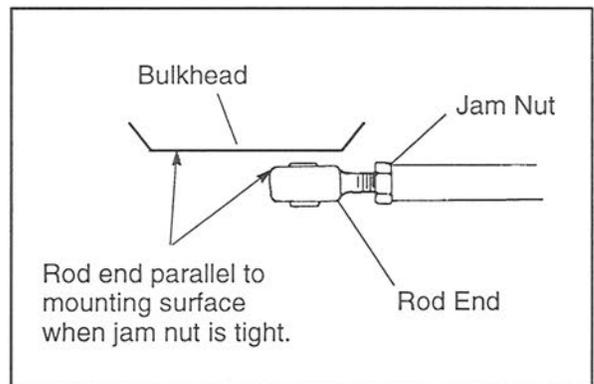
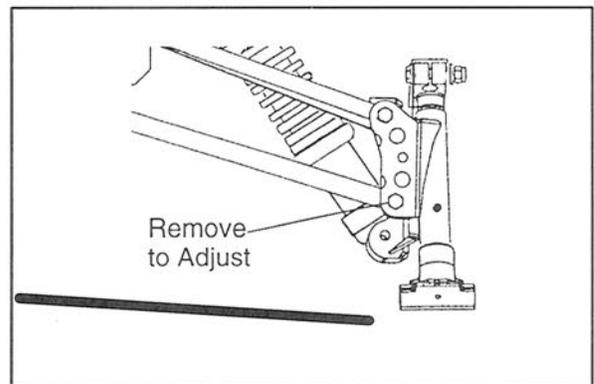
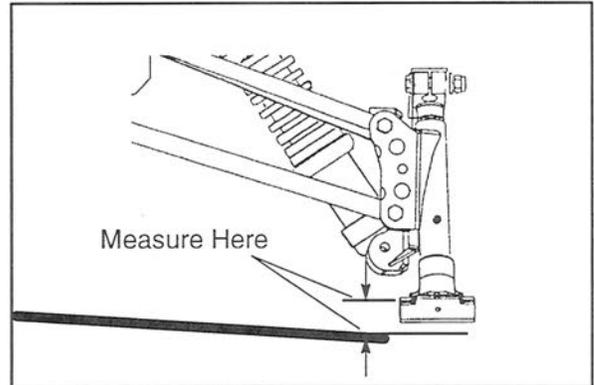
**EXAMPLE:**  
 Specified Camber = 3/4" (19mm)  
 Specified Tolerance = ± 5/16" (8mm)  
 Acceptable Range = 7/16 - 1 1/16" (11-27mm)

Refer to specifications on page 6.14



**Camber Adjustment**

1. Determine which spindle requires the greatest amount of correction by installing the alignment bar through one side to the opposite spindle. Remove the bar and install it through the other side to the opposite spindle.
2. Using a 3/8" (1 cm) drive 11/16" (1.7 cm) crow foot wrench and 20" (51 cm) long 3/8" (1 cm) drive extension, loosen the radius rod end jam nut. Remove the lower radius rod bolt from the spindle requiring the most camber correction. Adjust the opposite side next.
3. To adjust camber, change lower radius rod length until alignment bar measurement is within specified range for each spindle. Refer to charts on page 6.14 for camber specifications. On models with neutral camber (0) the bar should slide freely through both spindles ( $\pm 5/16"$ ).



**CAUTION:**

Radius rod ends must remain parallel to the bulkhead after rod end jam nuts are tightened to specified torque. See illustration at right.

4. Tighten all jam nuts. Torque radius rod attaching bolts to specification.

**WARNING**

After camber adjustment is complete, be sure to measure set up width outlined on page 6.15 and compare to specifications listed on page 6.14. Do not attempt to set suspension wider than the specified maximum set up width. If set up width exceeds maximum, adjust upper and lower radius rods equally to maintain camber adjustment.

**Radius Rod End Jam Nut Torque -**  
 8-14 ft. lbs. (1.1-1.9 kgm)

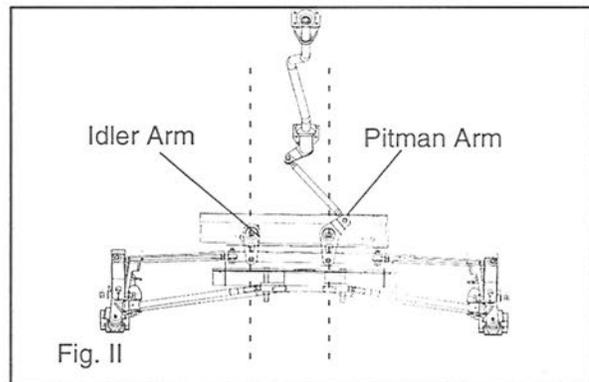
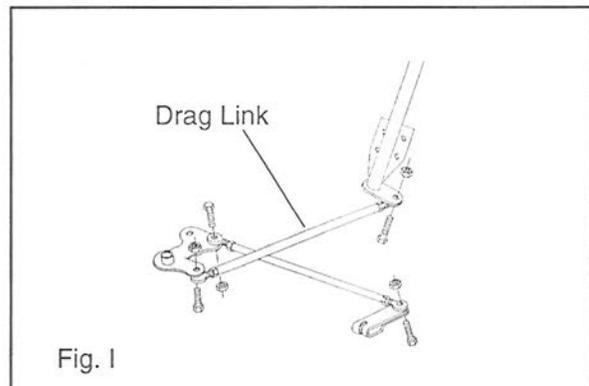
**Radius Rod Attaching Bolt Torque -**  
 3/8" (outer) 28-30 ft. lbs. (3.86-4.14 kg-m)  
 7/16" (inner top) 35-40 ft. lbs.  
 (4.83-5.52 kg-m)  
 1/2" (inner bottom) 40-50 ft. lbs.  
 (5.52-6.9 kg-m)

## BODY AND STEERING

### Steering Adjustment - All IFS

#### Handlebar Centering

5. With alignment bar installed through spindles (on 0 camber models), center handlebars by adjusting drag link length (Fig I). On models with negative camber, the alignment bar cannot be installed through spindles. On these models, the pitman and idler arm (Fig II) (or bellcrank on non-CRC models) should be pointed straight forward.
6. Lubricate ski pivot bushings with Polaris Premium All Season Grease and install in spindle. Torque ski bolts to specification. Install new cotter pin in castle nut.
7. Perform Toe Adjustment on page 6.19.



## BODY AND STEERING

### Steering Adjustment - All IFS

#### Toe Adjustment, All Models

Toe adjustment on all models must be performed with the vehicle weight on the suspension (no rider), at Normal Ride Height. Although not required, an alternate high performance method of toe alignment (using the travel bar kit 2871537) can be used to set toe on models equipped with XTRA-10 CRC front suspension (use 11.65 travel bars). On XC-10 CRC models, only the camber can be set with the travel bars (13.70 travel bars); toe on XC-10 CRC must be set with shocks installed and front end elevated. Refer to pages 6.20-6.25.

1. Make sure the track is properly aligned. This will be used as a reference point for toe out measurement.

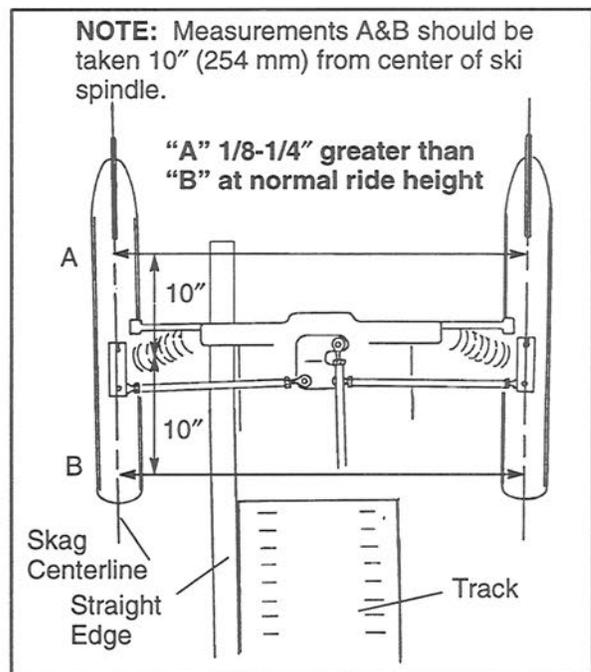
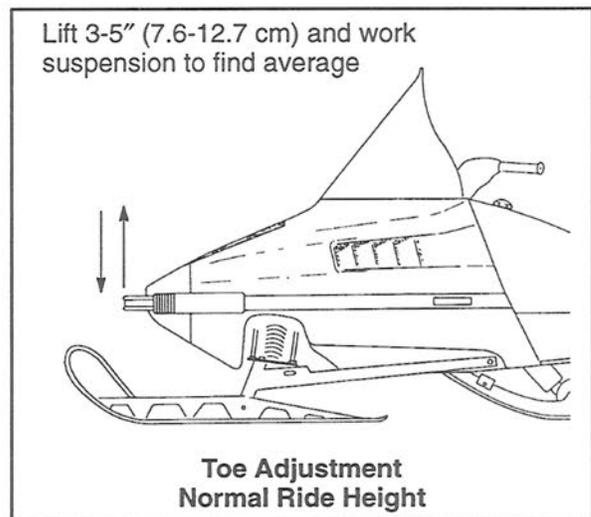
2. To obtain normal ride height of the front suspension, lift the front end 3-5" (7.6-12.7 cm) with the front bumper. Lift the machine several times, working the suspension and front skis until an average is obtained.

**NOTE:** To prevent carbide skags from grabbing, make sure the surface under the skis will allow full side-to-side movement. Avoid rough concrete, asphalt, or carpet which may cause carbide skags to grab or catch and restrict movement.

**SERVICE HINT:** Before final measurement is taken, skis should be pushed together lightly at the tips to remove play in the steering components. This will help achieve accurate measurement. If a strap is used be sure it is not *too tight* or it will alter measurement (this is most important on models with composite skis).

#### Toe Alignment: All Models

Measurement "A" should be  $1/8"$  -  $1/4"$  (3.17 - 6.35 mm) greater than measurement "B" at normal ride height (toe out).



# High Performance

## XTRA-10 CRC and XC-10 CRC

### Inspection and Alignment

Pages 6.20 - 6.25 pertain to precise CRC front set up information for high performance or racing applications. The following procedures can be performed *only* on XTRA-10 CRC or XC-10 front suspensions if desired. These instructions should not be used for 38-RMK CRC or non-CRC front suspensions.

# BODY AND STEERING

## High Performance Controlled Roll Center (CRC) Steering Alignment

### XTRA-10 CRC and XC-10 CRC Steering Alignment

The following steering alignment procedure can be performed on XTRA-10 CRC or XC-10 CRC front suspensions *only*, and should not be used for 38-RMK CRC or non-CRC front suspensions.

#### General Set Up Tips

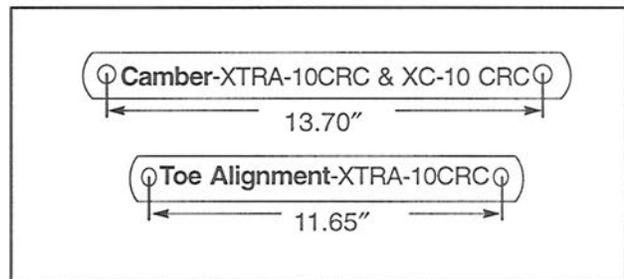
Before adjustments are performed on CRC steering, inspect all front suspension and steering components. While disassembling, make notes of what direction a bolt goes through a part, what type of nut is used in an application, in which direction do the steering arms go on - weld up or weld down, etc.

Some of the bolts used in the IFS are special, and cannot be purchased at a hardware store. Always use genuine Polaris parts and hardware when replacing front end components.

#### Tools

Tools required:

- 5/8" alignment bar – PN 5333508
- 6' tape measure
- Travel location bars -13.70" long (PN 5211714)
- Travel location bars -11.65" long (PN 5211822)
- Chassis stand or blocking



**NOTE:**The CRC Travel Location Bars are included in kit PN 2871537, along with a 46" alignment bar, and assorted hardware. Kit components are also available separately. See tool catalog for tool ordering information.

Refer to the chart below for travel bar application for width, camber, and toe adjustments on XTRA-10 CRC and XC-10 CRC models. See text on following pages for specific procedures.

XTRA-10 CRC and XC-10 CRC Models			
	When Measuring Set Up Width	To Inspect / Adjust Camber	To Inspect / Adjust Toe
<b>Travel Location Bar Length</b>	Suspension Fully Extended - Shocks Installed	Install 13.70 Bars	Install 11.65 Bars (XTRA-10 ONLY; Set Toe w/Shocks Installed on XC-10 models)

#### **▲ WARNING**

Maximum set up width is the maximum allowable distance between ski spindle centers with front end of vehicle off the ground and suspension fully extended. The Maximum Set Up Width specifications listed on page 6.14 are maximum width measurements, and are critical to ensure adequate torsion bar engagement with the trailing arm. If the suspension is set too wide, **the torsion bar can come loose and interfere with steering**. Do not attempt to set the suspension wider than the specified Maximum Set Up Width.

## BODY AND STEERING

### High Performance CRC Steering Adjustment

#### CRC Steering Adjustment

To ensure accurate adjustment of the CRC steering mechanism, all steps listed below must be performed in sequential order.

- Spindle to Chassis Centering (must also be checked after adjustment)
  - Set-Up Width adjustment (must also be checked after adjustment)
  - Camber Adjustment
  - Handlebar Centering
  - Toe Adjustment
  - Verify Spindle to Chassis Centering and Set-up width are within limits
1. Securely support the front of the machine high enough to remove the skis. Make sure machine is level.
  2. Remove skis.

#### Spindle to Chassis Centering

3. Follow procedure on page 6.15.

#### Set Up Width Measurement

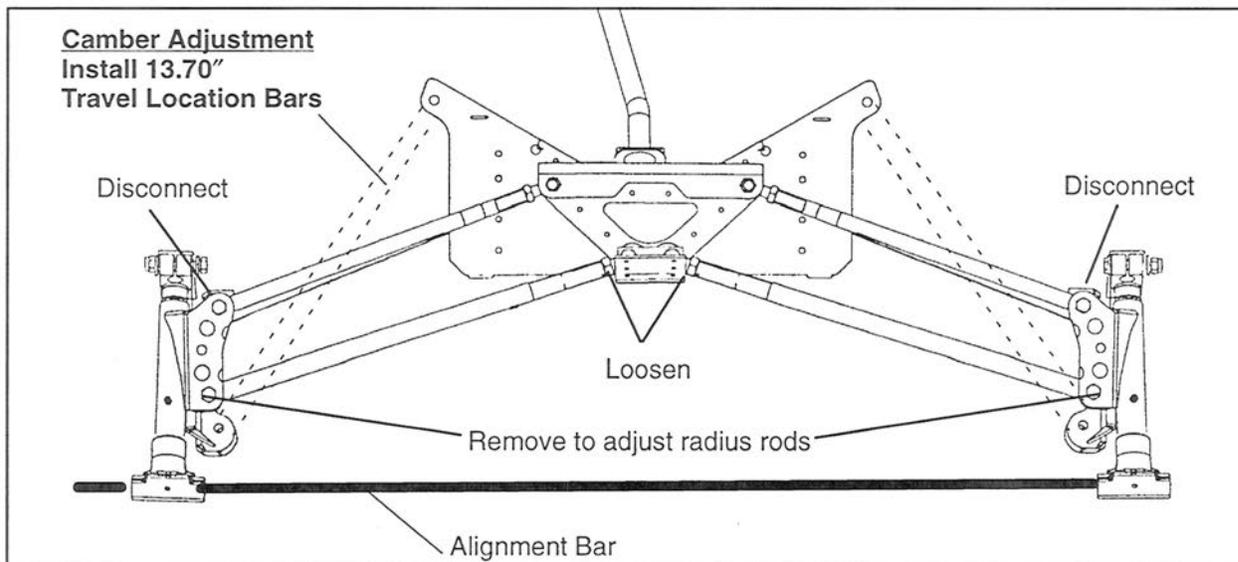
4. Follow procedure on page 6.15.

#### **⚠ WARNING**

This is the maximum allowable distance between ski spindle centers with front end of vehicle off the ground and suspension fully extended. The maximum set up width specifications listed on page 6.14 are maximum width measurements, and are critical to ensure adequate thread engagement of steering tie rod and radius rod ends. If the suspension is set too wide, the torsion bar can come loose and interfere with steering. Do not attempt to set the suspension wider than the specified Maximum Set Up Width.

#### Camber Adjustment - XTRA-10 CRC and XC-10 CRC

5. Remove IFS shocks and install 13.70" travel location bars. The travel location bars will locate the IFS at a given point of travel where the camber should be neutral (0°).
6. Disconnect tie rods from steering arms. **NOTE:** If *toe adjustment is correct*, the spindles will *not* be horizontally aligned with the 13.70" travel location bars installed. Therefore the alignment bar will not slide through both spindles. Disconnecting the tie rods will eliminate bind on the alignment bar and allow for more precise camber adjustment. It may also be helpful to secure the tie rods so they don't interfere with inspection or adjustment.
7. Determine which spindle requires the greatest amount of correction by installing the alignment bar through one side to the opposite spindle, then remove the bar and install it through the other side to the opposite spindle.



## BODY AND STEERING High Performance CRC Steering Adjustment

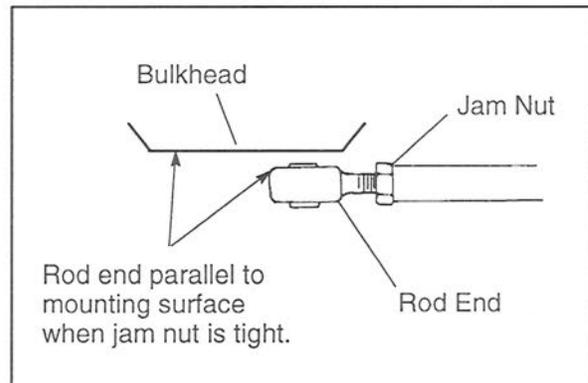
### Camber Adjustment - XTRA-10 CRC and XC-10 CRC, (Cont.)

- Using a 3/8" drive 11/16" (1.7 cm) crow foot wrench and 20" (51 cm) long 3/8" (1 cm) drive extension, loosen the radius rod end jam nut and remove the lower radius rod bolt from the spindle requiring the most camber correction. Adjust the opposite side next. Change radius rod length until alignment bar slides freely through both spindles.
- When adjustment is correct, tighten jam nuts to 24-25 ft. lbs. (3.31-3.45 kg-m). Torque radius rod attaching bolts to 28-30 ft. lbs. (3.86-4.14 kg-m).

#### CAUTION:

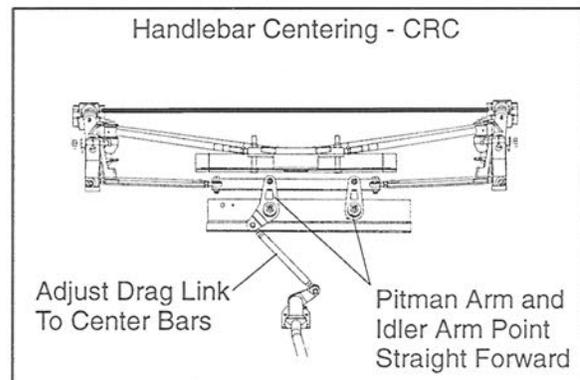
Radius rod ends must remain parallel to the mounting brackets after the rod end jam nuts are tightened to the specified torque. See illustration at right.

- Tighten all jam nuts. Torque radius rod attaching bolts to specification.
- Re-check set up width and compare to specifications.



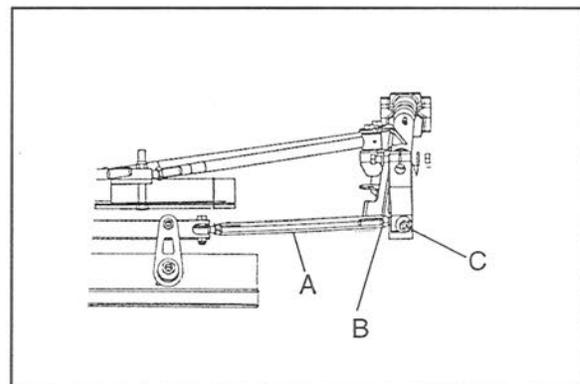
### Handlebar Centering-CRC

- With alignment bar in spindles and tie rod ends disconnected, center the steering rack by pointing the pitman arm and idler arm straight forward.
- Center the handlebars by adjusting drag link length. Tighten jam nuts to 24-25 ft. lbs. (3.31-3.45 kg-m).
- The steering arms should be parallel to the ski centerline or slightly inward.



- Re-attach steering tie rod ends (C) to steering arms. It may be necessary to loosen the tie rod adjustment jam nuts (B) and adjust tie rod length (A) as required until rod end studs can be installed in steering arm. Torque tie rod end attaching nuts to 28-30 ft. lbs. (3.86-4.14 kg-m). If tie rod adjustment was necessary, do not tighten them until toe adjustment is complete.

- Perform toe adjustment on following page.

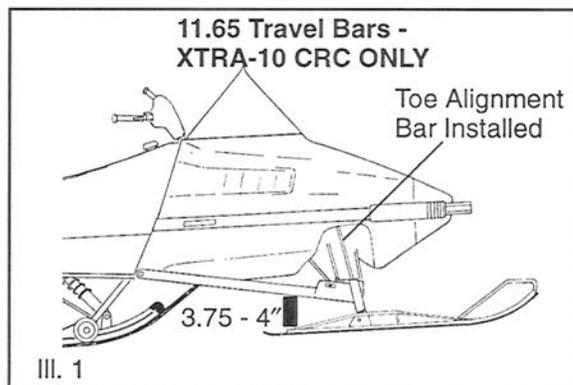


## BODY AND STEERING

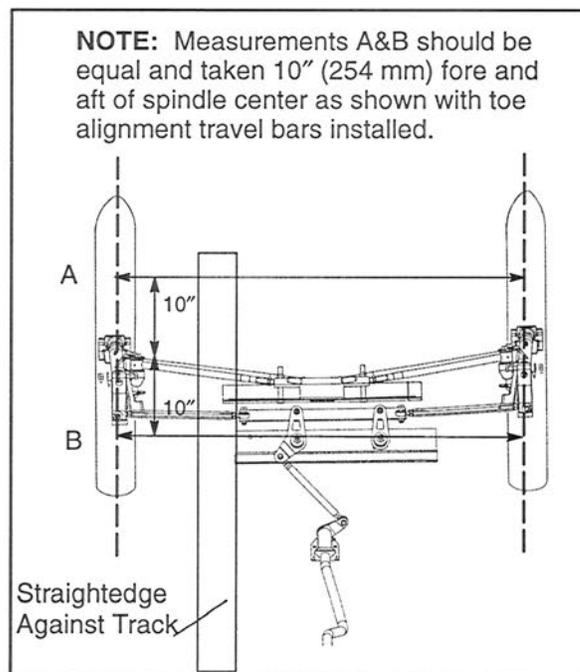
### High Performance CRC Steering Adjustment

#### Toe Adjustment- XTRA-10 CRC / XC-10 CRC

17. Remove alignment bar from spindles.
18. Remove 13.70" travel location bars and install 11.65" toe alignment bar on XTRA-10 CRC only. **Toe alignment is set with shocks installed on XC-10 CRC.**
19. Install skis.
20. With the front of the machine still securely supported off the ground, install a block or spacer between the rear of the ski frame and the bottom of the trailing arm. The block should be 3.75" - 4.0" long. The blocks will keep ski-to-ground surface orientation correct for more accurate toe adjustment.



21. Adjust toe so skis / carbides are parallel - zero toe out or toe in with toe alignment travel bar installed. Measure from equal point on skag centerline to straightedge to determine the amount of adjustment required per ski. Measuring from points on skis may vary and should not be used.

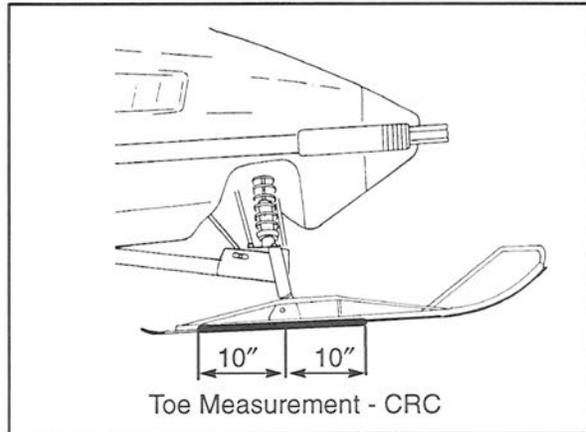


## BODY AND STEERING

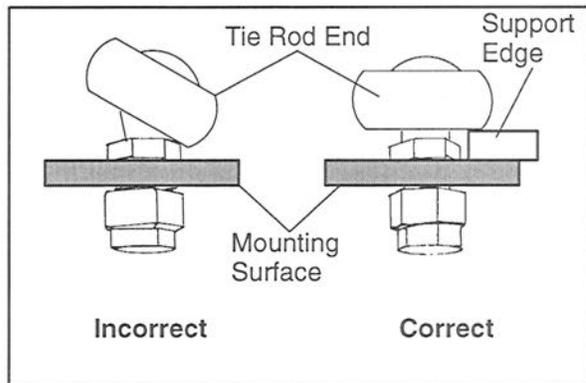
### High Performance CRC Steering Adjustment

#### Toe Adjustment - XTRA-10 CRC and XC-10 CRC, cont.

22. To adjust toe, hold tie rod flats or support edge of tie rod end with a wrench or flat stock to keep it from rotating. Loosen jam nuts on each end of both tie rods. Turn tie rod as required to adjust toe.



23. Hold tie rod and tighten jam nuts. Be sure to position inner and outer tie rod ends parallel to their respective mounting surface as shown. When tie rod ends are properly tightened, the tie rod should rotate freely approximately 1/8 turn.



**Tie Rod Jam Nut Torque -**

**8-14 ft. lbs. (1.1-1.9 kg-m)**

# All Models

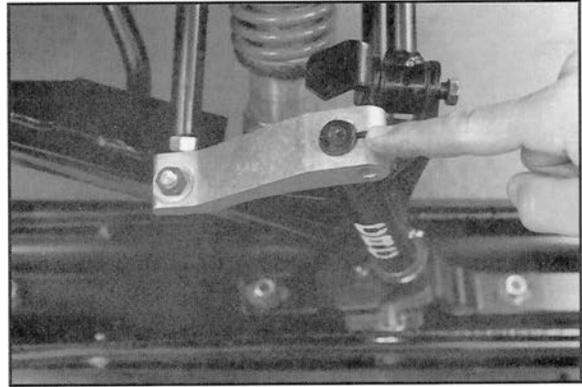
## Body and Steering

Continued

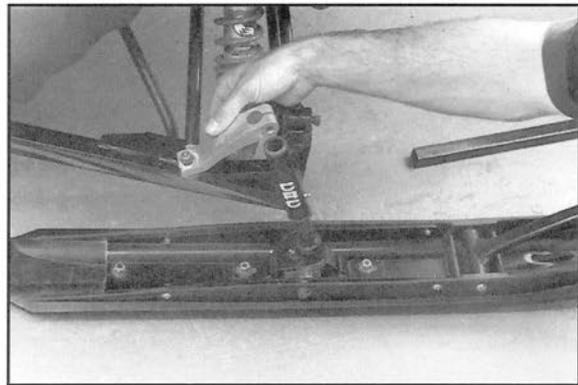
## BODY AND STEERING Ski Spindle Bushing Replacement

### Ski Spindle Bushing Removal

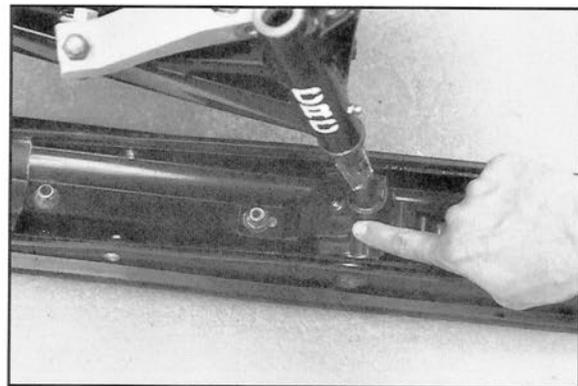
1. Using a scribe, center punch, or paint, mark the spindle and steering arm for reference during reassembly. Note direction of steering arm bolt and remove. Also note orientation of grease fitting for ski pivot bushing. The fitting faces forward on models with leading spindle, and rearward on trailing spindles.



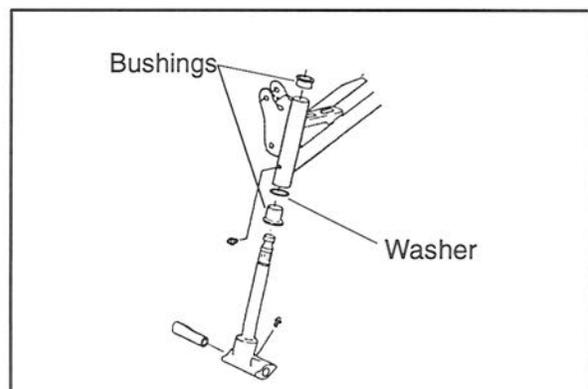
2. Remove steering arm.



3. Slide spindle and ski assembly out bottom of trailing arm. Inspect spindle for wear or damage.



4. Remove old bushings and washer from bottom of spindle tube with a drift punch. Inspect condition of washer and replace if worn. Install new bushings, tapered end first.



## BODY AND STEERING

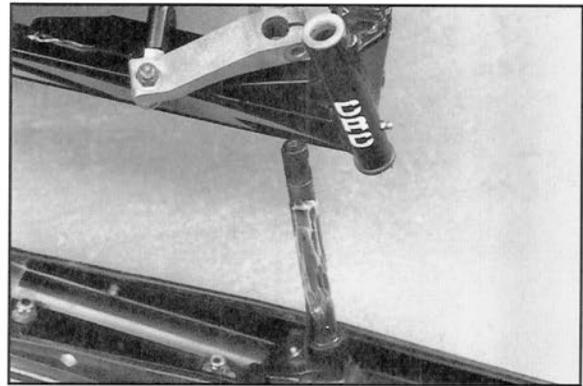
### Ski Spindle Bushing Replacement

#### Ski Spindle Bushing Installation

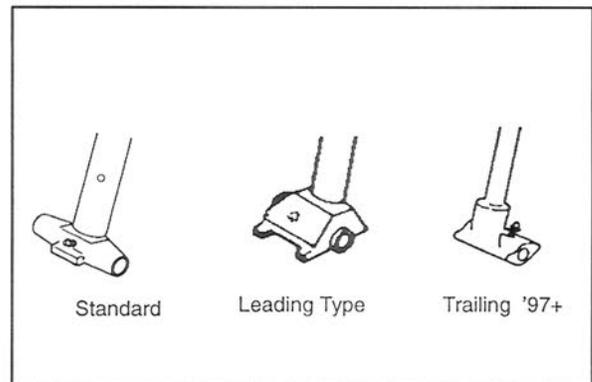
- Grease spindle shaft and new bushings with Polaris All Season Grease.

#### All Season Grease

PN 2871322 (3 oz.)  
PN 2871423 (14 oz.)



- Install spindle into trailing arm with grease fitting facing forward (standard and leading spindles) or rearward (trailing spindles).

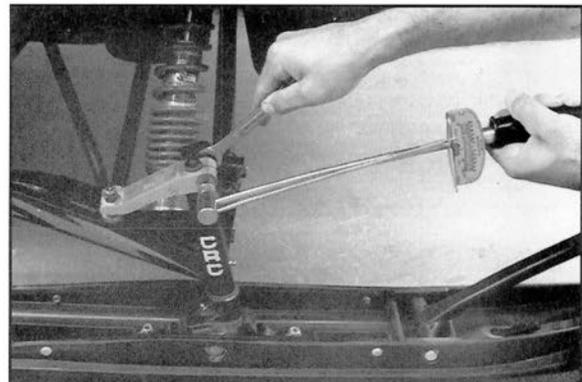


- With ski facing straight forward, attach steering arm. Align with marks made in step 1.

- Install steering arm bolt and torque to specification.

#### Spindle Bolt Torque

28-30 ft. lbs. (3.86-4.14 kg-m)



## BODY AND STEERING

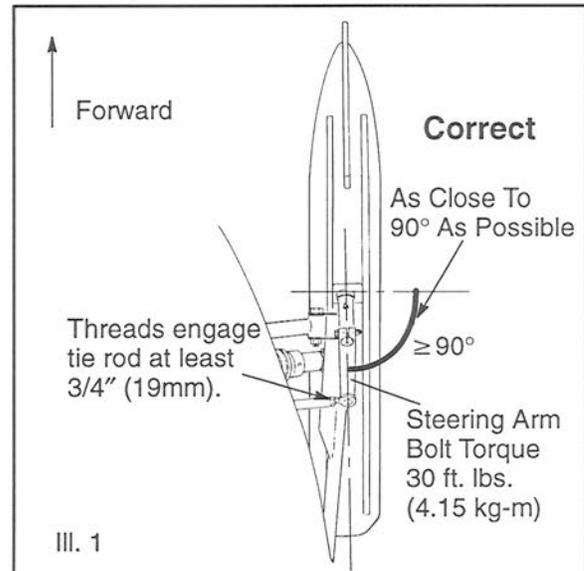
### Steering Arm Installation

#### Steering Arm Orientation

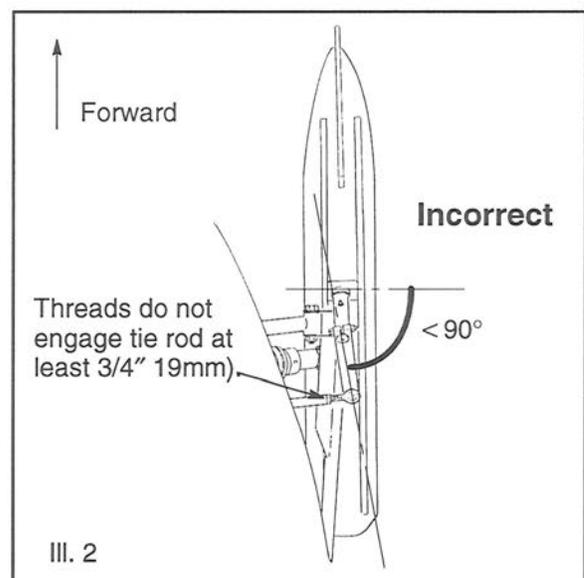
#### **⚠ WARNING**

Steering arm orientation is important to ensure proper steering tie rod end thread engagement and steering performance. Always mark steering arms and spindles before removal for reference upon reassembly. When installing new parts or after steering arm installation, refer to the illustrations and text below. Always verify proper steering operation after completing adjustments or repairs.

1. The steering arms on each spindle should be parallel to slightly inward in relation to each ski. When correctly installed (Ill. 1) the centerline of the ski and centerline of the ski bolt hole in the spindle will form (approximately) a  $90^\circ$  angle or slightly greater.



2. If the steering arm is installed incorrectly the threads of the steering tie rod end will not engage the tie rod sufficiently, and the angle formed between ski and ski bolt centerlines is considerably less than  $90^\circ$  as shown at right.



3. Reinstall torsion bar linkage (where applicable). Torque attaching bolts to specification.

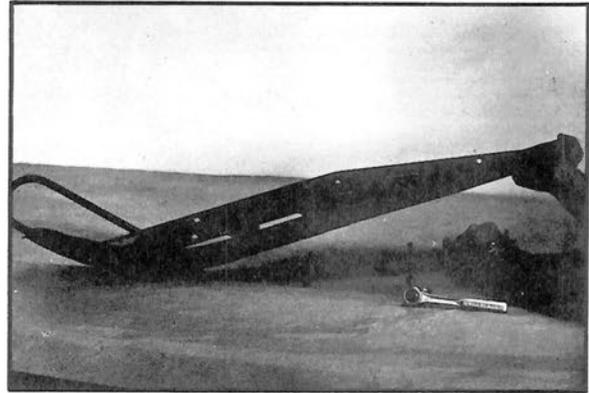
## BODY AND STEERING

### Ski Skag Removal - IFS

When performing normal maintenance or tune-up, check the ski skags for wear. To prevent damage to the skis, and for greater steering control, replace all skags which are half worn or greater.

#### Ski Skag Removal

1. Remove retaining nuts as shown.
2. Push bolt down through ski.
3. Pull rear of skag from ski as shown. This frees the skag for removal from the ski.



#### Ski Skag Installation

1. Push skag forward, then up into position.
2. Reinstall nuts and torque to specification.

#### Ski Skag Retaining Nut Torque -

Steel Ski, Steel w/skins - 15 ft. lbs. (2.1 kg-m)

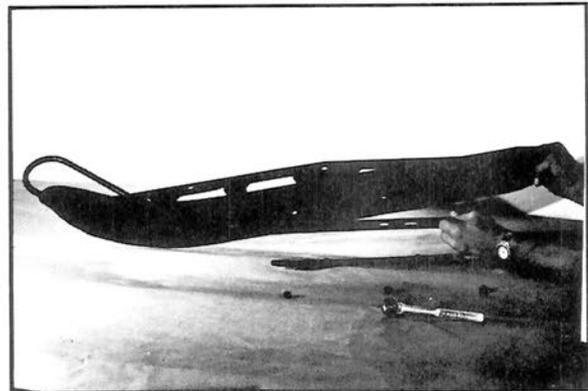
Plastic Ski - 20-25 ft. lbs. (2.76-3.45 kg-m)

#### Ski Skag Removal - EZ Steer

1. Remove the three nuts from the skag.
2. Pull down and rearward to remove the skag.

#### Ski Skag Installation - EZ Steer

1. Install flat bar as shown.
2. Install IFS carbide skag.
3. Reinstall nuts and torque to specification.



#### Ski Skag Retaining Nut Torque -

15 ft. lbs. (2.1 kgm)

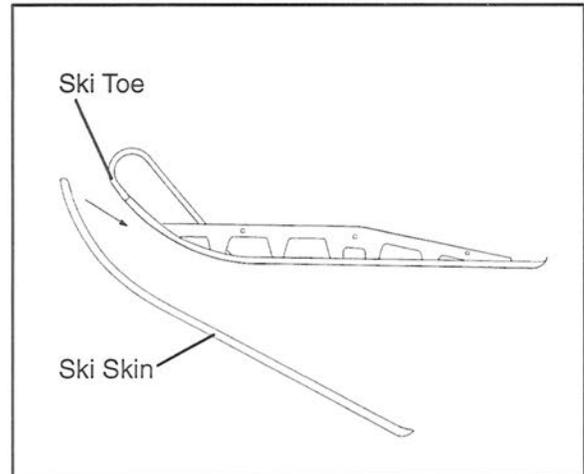
### Ski Skin Installation

1. Lift and support front end of machine for easier access to skis.

**⚠ WARNING**

Be sure the machine is stable and solidly supported before proceeding. Serious injury may result if machine tips or falls.

2. Remove cotter pin from ski bolt.
3. Remove ski bolt and take off ski. Note direction of rubber ski stop.
4. Remove the bolts from the skag. Pry the back of the skag downward from the ski and remove from the front slot.
5. Place heel of ski on a solid surface and slide plastic ski skin onto toe of ski as shown.
6. Tap ski skin toe with plastic mallet to be sure it has snapped completely onto the toe. Check to see that the skag holes line up.
7. Working from the toe of the ski, continue snapping ski skin onto ski. **NOTE:** Clamps may be used if the skin is difficult to install.
8. Replace skag removed in step 4.
9. Replace ski removed in steps 2 and 3.
10. Repeat procedure for second ski.



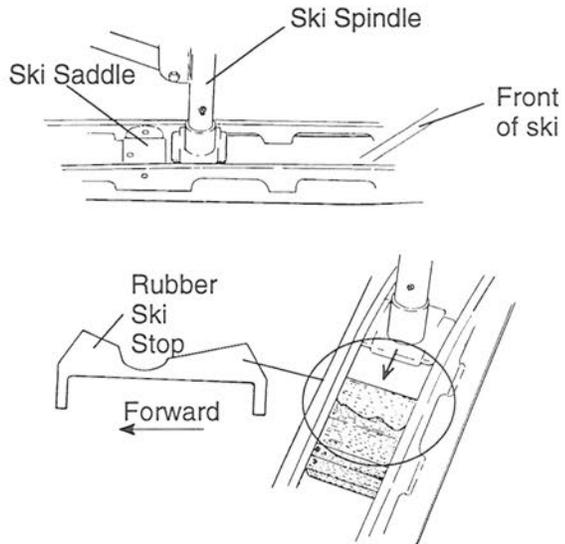
# BODY AND STEERING

## Ski Skag Removal

### Ski Installation

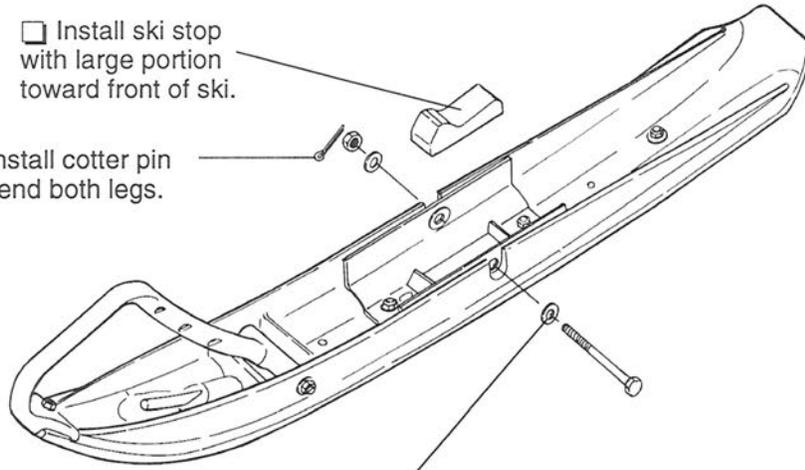
#### SKI INSTALLATION - STEEL SKIS

- Install ski over spindle, slightly in front of ski saddle with ski pointing outside.
- Slide ski forward until spindle is just behind ski saddle and turn to the forward position.
- Slide ski forward so spindle is behind ski saddle.
- Apply soapy water solution to the rear portion of the rubber ski stop. Install ski stop on top of ski saddle with large portion forward.
- Push ski back to slide spindle into place. From outside of ski, install bolt and castle nut. Torque to 36 ft. lbs. Install cotter pin and bend both legs



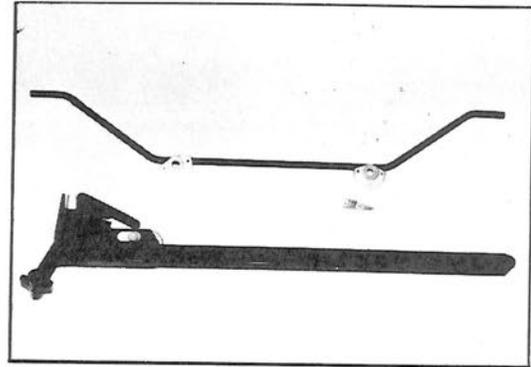
#### SKI INSTALLATION - COMPOSITE

- Install ski stop with large portion toward front of ski.
- Install cotter pin and bend both legs.
- Install ski to spindle. From outside of ski, install bolt, washers and castle nut. Torque to 36 ft. lbs. (4.97 kg-m).
- Carefully lower machine

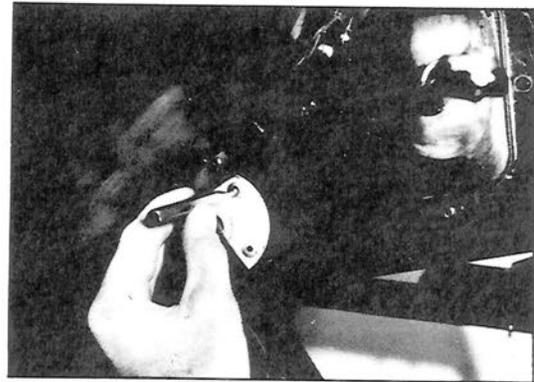


### **Torsion Bar Removal**

1. Remove trailing arm assembly.
2. Using a small pin punch, tap out the rivet mandrels in the center of the torsion bar support rivets.



3. Using a 1/4" bit, drill out the center portion of the rivets.
4. Punch out the rivet body.
5. Remove support and torsion bar.
6. Repeat procedure for second torsion bar.



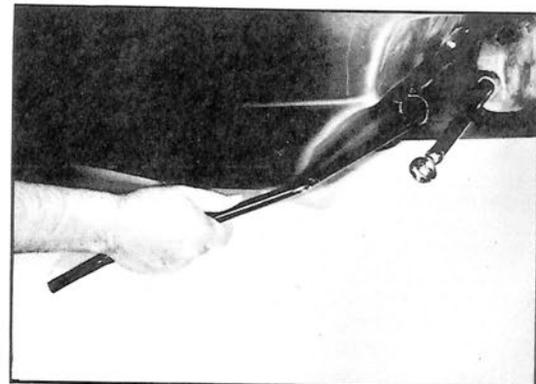
### **Torsion Bar Installation**

1. Rivet support in place using Polaris PN 7621449 rivets. **NOTE:** *These high strength "Q" rivets are the only replacement rivets recommended for this application.*

**Torsion Bar Support Rivets**

**PN 7621449**

2. Reinstall torsion bar.
3. Reinstall trailing arm assembly.
4. Check camber and toe adjustments. Refer to Chapter 2.



## BODY AND STEERING

### Handlebar Torque

#### Handlebar Torque and Sequence - Indy Style

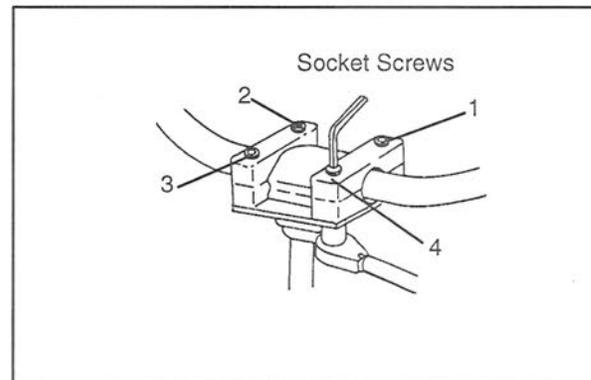
1. Remove handlebar cover and foam.
2. Using a 7/16" (11 mm) wrench, loosen four nuts on bottom of adjuster block. **NOTE:** Turn handlebar to left or right for access to back nuts.
3. Adjust handlebar to the desired height. Be sure that handlebars, brake lever and throttle lever operate smoothly and do not hit the fuel tank, windshield or any other part of the machine when turned fully to the left or right.

**IMPORTANT:** When adjusting the handlebar, be sure the serrations in handlebar and adjuster block match before torquing.

4. Torque the handlebar adjuster block bolts to specification following sequence shown. The gap should be equal at front and rear.

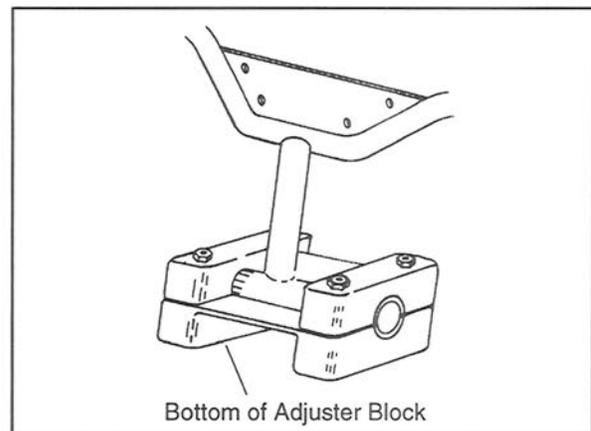
**Handlebar Adjuster Block Bolt Torque -**  
11-13 ft. lbs. (1.5 - 1.8 kgm)

5. Replace handlebar cover and foam.



#### Handlebar Torque and Sequence - Evolved and Aggressive Style

1. Remove two plastic fasteners holding console cover located below handlebar cover on hood side of steering post.
2. Using a 7/16" (11 mm) wrench, loosen four nuts on bottom of adjuster block. **NOTE:** Turn handlebar to left or right for access to rear nuts.
3. Adjust handlebar to the desired height. Be sure that handlebars, brake lever and throttle lever operate smoothly and do not hit the gas tank, windshield or any other part of the machine when turned fully to the left or right.
4. Torque the handlebar adjuster block bolts evenly to specification. The gap should be equal at the front and rear.
5. Replace console cover.



#### **⚠ WARNING**

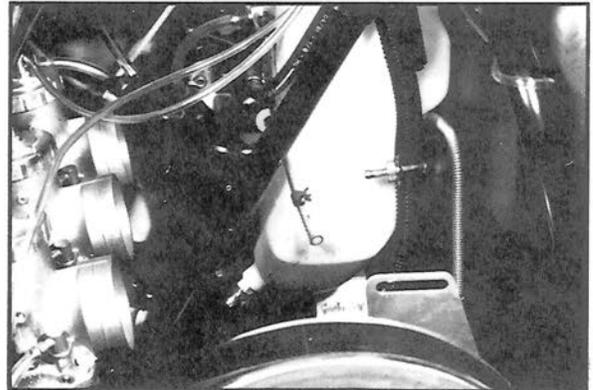
Improper adjustment of the handlebars, or incorrect torquing of the adjuster block tightening bolts can cause limited steering or loosening of the handlebars which could result in loss of control.

**⚠ WARNING**

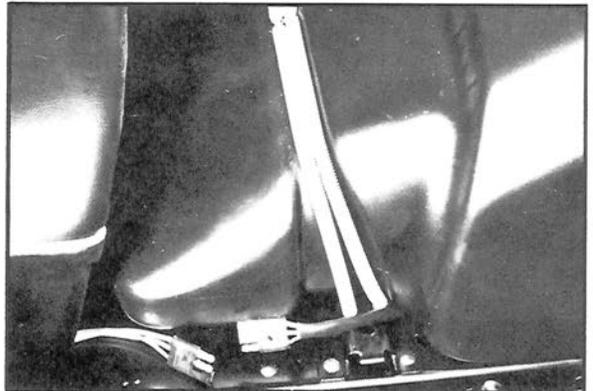
Gasoline is extremely flammable and explosive under certain conditions. Do not smoke or allow open flames or sparks in or near the area where work is being performed. If you should get gasoline in your eyes or if you should swallow gasoline, see your doctor immediately. If you should spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing. Prolonged exposure to petroleum based products may cause paint failures. Always protect finished surfaces and wipe up any spills immediately.

**Two Piece Fuel Tank/Seat Removal**

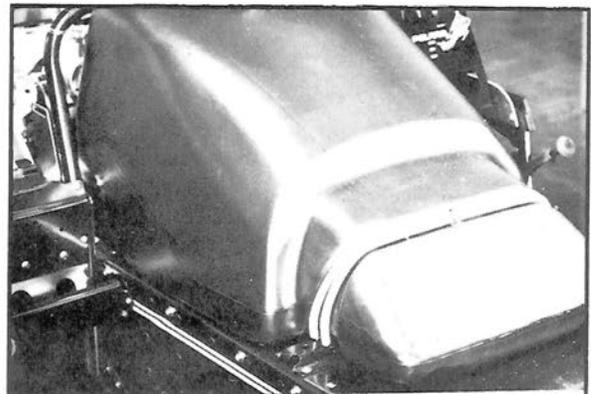
1. Remove tank cover by disconnecting snaps.
2. Remove vent line at front LH side of tank.
3. Remove gas cap and rubber grommet.
4. Remove air silencer box.
5. Disconnect fuel line from fuel pump and plug line to prevent fuel spillage from tank. See photo one at right.
6. Roll front tank hold-down spring forward off tank saddle.
7. If machine is equipped with a fuel gauge connector, this should be unplugged.
8. Remove two bolts holding rear of seat to tunnel.



9. Slide seat rearward enough to gain access to taillight connector at RH side of fuel tank. Unplug connector. Slide seat off machine and set aside.



10. Fuel tank can now be removed from chassis by disconnecting two springs at center of fuel tank.

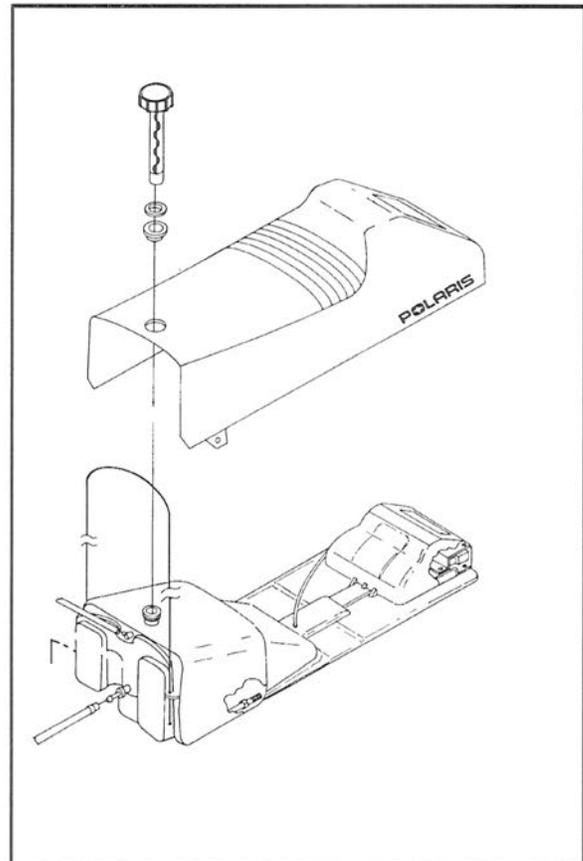


## BODY AND STEERING

### Fuel Tank and Seat Removal

#### One Piece Fuel Tank/Seat Removal

1. Remove front tank retaining spring located behind driven clutch area.
2. Remove fuel cap and grommet.
3. Remove fuel lines.
4. If machine is equipped with gauges, unplug gauge wires.
5. Remove two bolts in tool box.
6. Disconnect taillight wiring.
7. Remove two console bolts attaching console to tunnel.
8. Remove two console bolts located under hood.
9. Remove fuel cap and lift console up. Replace fuel cap.
10. Lift up at rear of seat and slide out.



## BODY AND STEERING

### Seat Cover Replacement (Plastic Base)

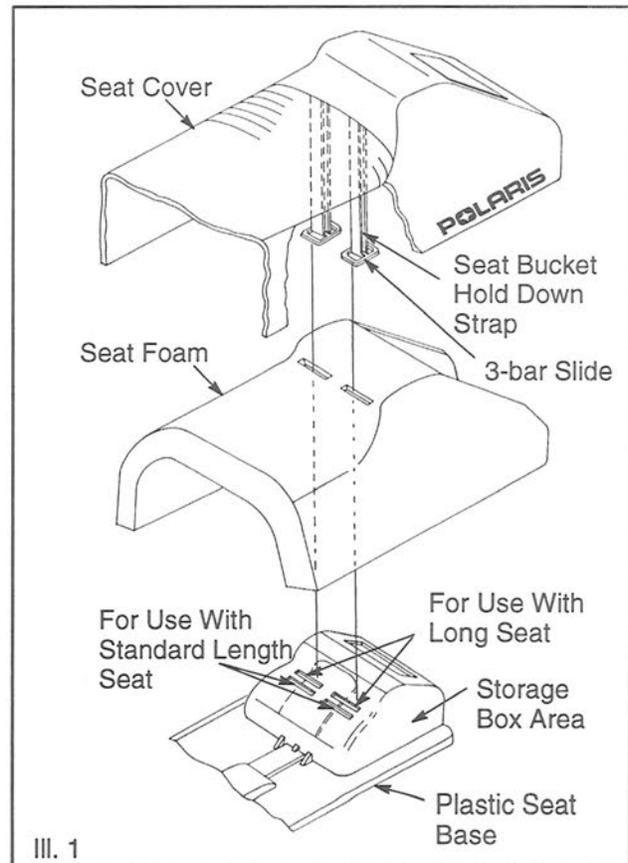
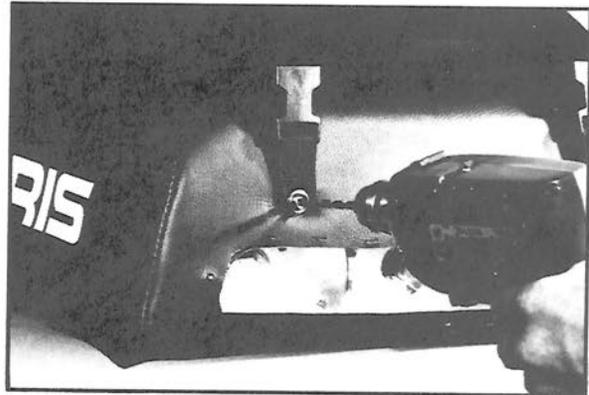
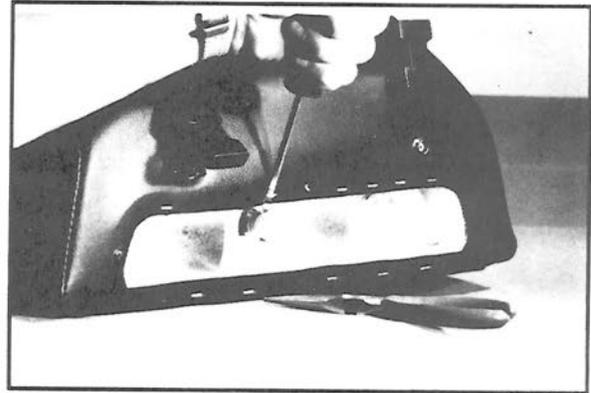
#### Seat Cover Replacement

1. Remove seat assembly as outlined on page 6.36.
2. Remove seat and seat covering to be replaced. Carefully remove staples by loosening with a small flat blade screwdriver. Pull each staple straight out with a pliers.
3. On some models, it will be necessary to drill out the rivets holding the strap buckles. Reach inside the tool box and rotate the "D" ring buckle which secures the center hold down strap. Push the "D" ring through the slot in the tool box and carefully pull it through the foam cushion.

**Reassembly Note:** For ease of assembly, hook a wire to the center strap. This will allow you to pull the center strap back through the foam and into the storage box.

4. Place the seat foam on the seat base assembly as shown in Ill. 1.
5. Drape the seat cover over the seat foam.
6. Insert and pull the two seat bucket hold down straps, attached to the seat cover, through the two holes in the seat foam and the routed-out holes located in the storage box area on the plastic seat base. **HINT:** A stiff wire attached to the 3 bar slide on the hold down strap will aid in this process.

**NOTE:** Use the rear two holes for a longer length seat and the forward two holes for the standard length seat.



## BODY AND STEERING

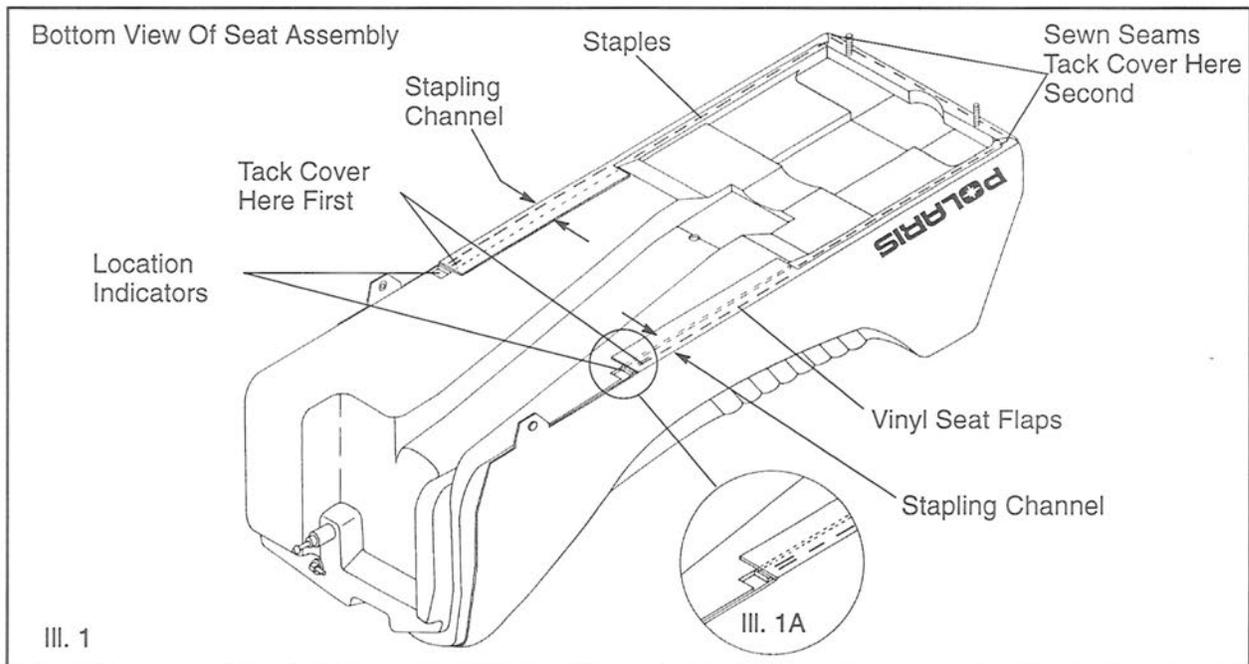
### Seat Cover Replacement

- Turn the assembly over and begin upholstering by lining up the seat cover vinyl side flaps with the indented square location indicators located on the plastic seat base as shown in Ill. 1A.

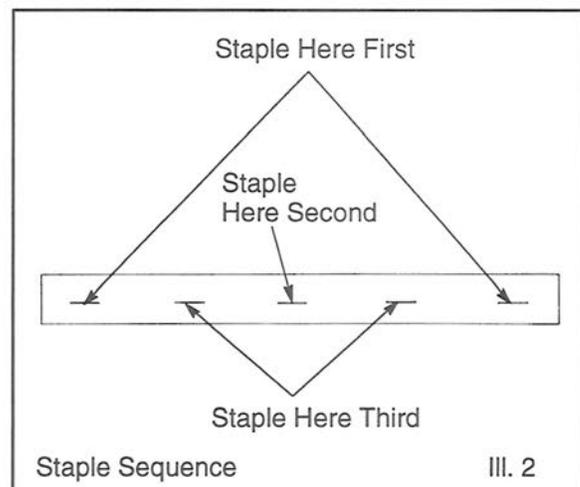
#### CAUTION:

**Apply staples in the stapling channel only.** See Ill. 1. If you apply staples outside the channel, you will damage the fuel tank reservoir in the seat base. If this happens you must replace the entire seat base assembly.

- Using a staple gun, tack each side of the vinyl cover in place using two staples. If cover has a Polaris emblem carefully align emblem with bottom edge of seat. This will help ensure that the cover is positioned properly.
- Align the two sewn seams located at the rear of the seat cover with the two back corners of the seat base. See Ill. 1. Pull the vinyl tight and tack the seat cover to the plastic seat base in each corner. Use two or three staples per corner.
- Now that the seat cover is correctly positioned, and tacked to the plastic seat base in four places, turn the assembly over and inspect it. If the seat cover seems to fit correctly and everything looks straight, including the tool compartment flap, continue with step 11.



- Staple the remainder of the unattached seat cover to the plastic seat base as shown in Ill. 1. **HINT:** Always staple between two existing staples and follow this procedure until the seat cover is completely stapled to the seat base. See Ill. 2.
- Turn the seat cushion assembly over and inspect for wrinkles or imperfections. If imperfections are visible, remove the staples in the affected area and staple correctly.



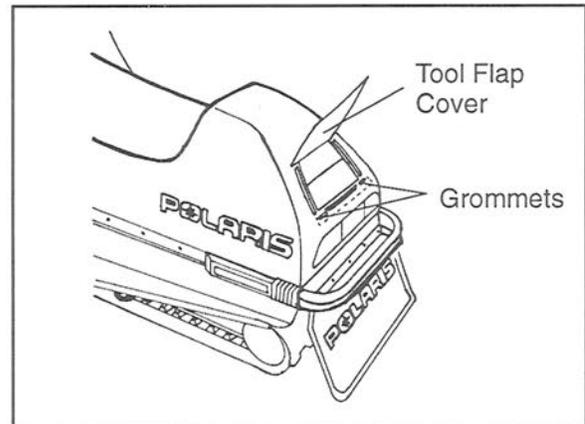
## BODY AND STEERING Seat Cover Replacement

### Models With Grommets In Tool Flap

13. Close tool flap cover, making sure it is aligned properly, and mark grommet holes.
14. Align twist lock with mark from step 13. Verify alignment with grommet in tool flap.
15. Using twist lock as a template, drill two .160" to .164" holes through vinyl and seat base.
16. Rivet twist lock to seat base using rivets provided.

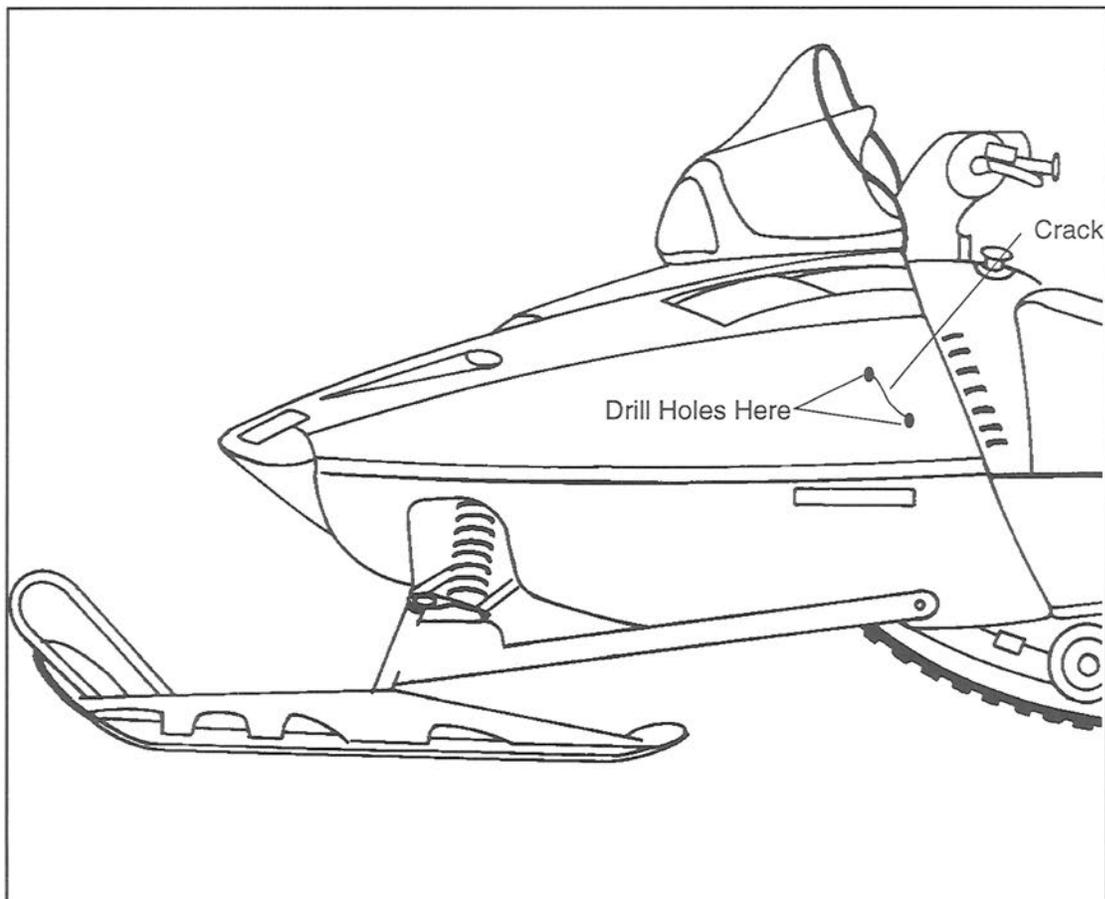
### All Models

17. Trim excess vinyl from the bottom around the back of the seat area only after a satisfactory fit is obtained. See Ill. 1, page 6.38.
18. Reinstall seat by reversing disassembly steps as they apply to your particular model.



### Hood Repair

Currently there is no procedures or materials recommended by Polaris for repairing hoods. Hoods for 1999 model snowmobiles are made of Thermoplastic Olefin (TPO) and cannot be repaired. If a hood is broken it must be replaced. For small cracks you may drill a small hole on both ends of the crack to limit spreading.

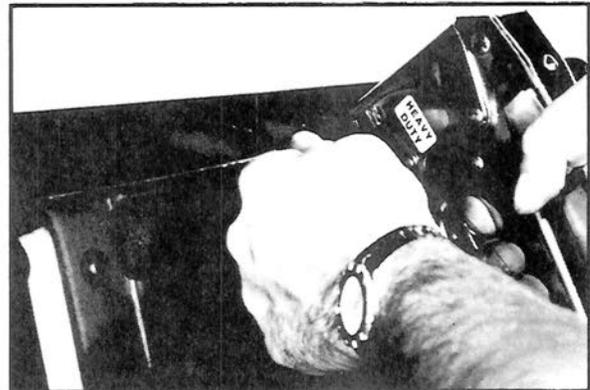
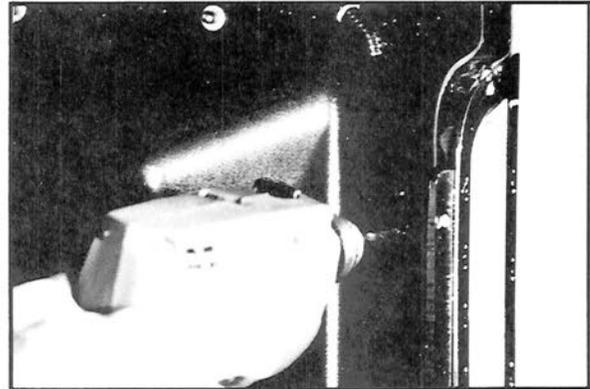


## BODY AND STEERING

### Taillight Assembly Replacement

#### Taillight Assembly Replacement - Standard Indy

1. After removal of seat cover, drill out three rivets from top of taillight.
2. Remove taillight assembly and wire harness.
3. Install new taillight assembly and rivet into place.
4. Connect taillight wire harness. **NOTE:** Taillight harness wires must be routed away from any possible contact with seat cover staples to prevent electrical shorts.
5. Pull seat cover tightly and evenly into position and re-staple to seat pan.
6. Inspect cover for a wrinkle-free finish before reinstalling on the snowmobile.



## BODY AND STEERING Seat Interchangeability

### Seat Length Matrix

The following chart lists seat interchangeability for 1999 models. Arrows indicate interchangeability. For production seats only.

1 Up Indy (Lite)	Standard Length	Mid Length	Long Length	2 Up Lite	XC Performance	Deluxe 2 Up Touring	Standard 2 Up Touring	2 Up WideTrak
Indy 340  340 Deluxe		XLT Special, w, bw flags 500 XC, w, bw flags 600 XC, w, bw flags 700 XC, w, bw flags 700 XCR, w, bw flags 800 XCR, w, bw flags		340 Trg	XCF w/o pads, w, bw flags  500 XC SP, w, bw flags 600 XC SP, w, bw flags 700 XC SP, w, bw flags  4400 XCR, w, bw flags	Trail Trg.  Classic Trg.  XLT Trg.	Sport Trg.  TranSport	WideTrak LX
	Super Sport white	↔	Trail RMK, pb 600 RMK, pb 700 RMK, pb 700 SKS, pb					
	Sport, pb Trail #2 w 500 #1, pb	↔	Trail #1, w 500 #2, pb Classic, pb XLT Class, pb 500 RMK, pb					

**NOTE:** All domestic and new 440/550 fans use 90 degree outlet on tank, making them unique.

w= white "Polaris"

pb= process blue fade "Polaris"

bw flags= black and white flags

- Any evolved seat will interchange with another evolved seat. However, some have a white "Polaris" decal and others have a process blue fade "Polaris" decal.
- Any Gen II one up standard style seat with a white "Polaris" decal will interchange with a Gen II one up standard style seat with a process blue "Polaris" decal.

For example, a Super Sport with a white "Polaris" decal will interchange with a 700 SKS (process blue "Polaris" decal) seat if a customer desires a different length seat.

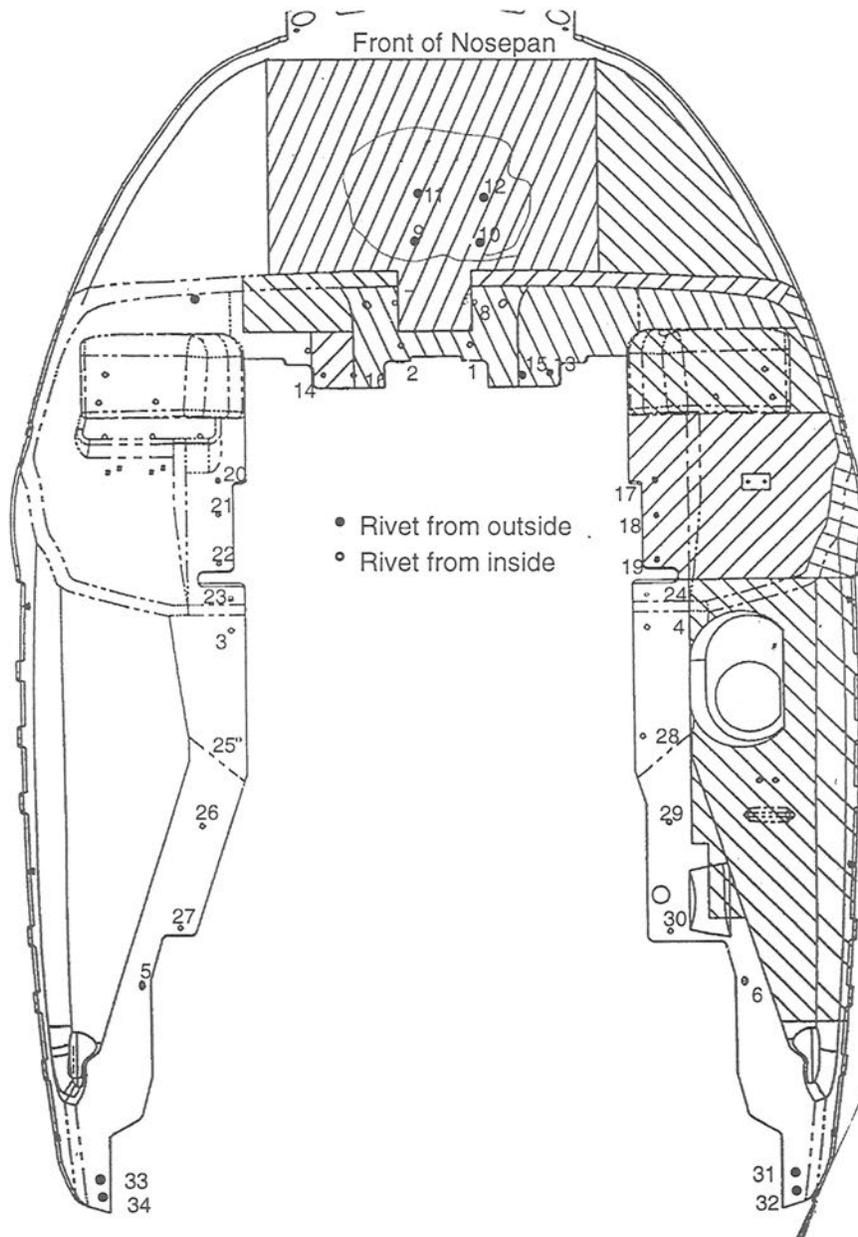
# BODY AND STEERING

## Nosepan Replacement Procedure

### Nosepan Replacement Procedure - Evolved Style

**IMPORTANT:** When installing a replacement nosepan, this rivet sequence must be followed correctly in order to ensure proper nosepan and body panel fit.

**NOTE:** The rivet for polyethylene nosepans is PN 7621467.



**NOTE:**

1. When transfer drilling holes do not force pan into a position which is not uniform with the other side. (Use the same method to drill both sides)
2. Rivet holes across from one another in unison.

## BODY AND STEERING Nosepan Replacement Procedure

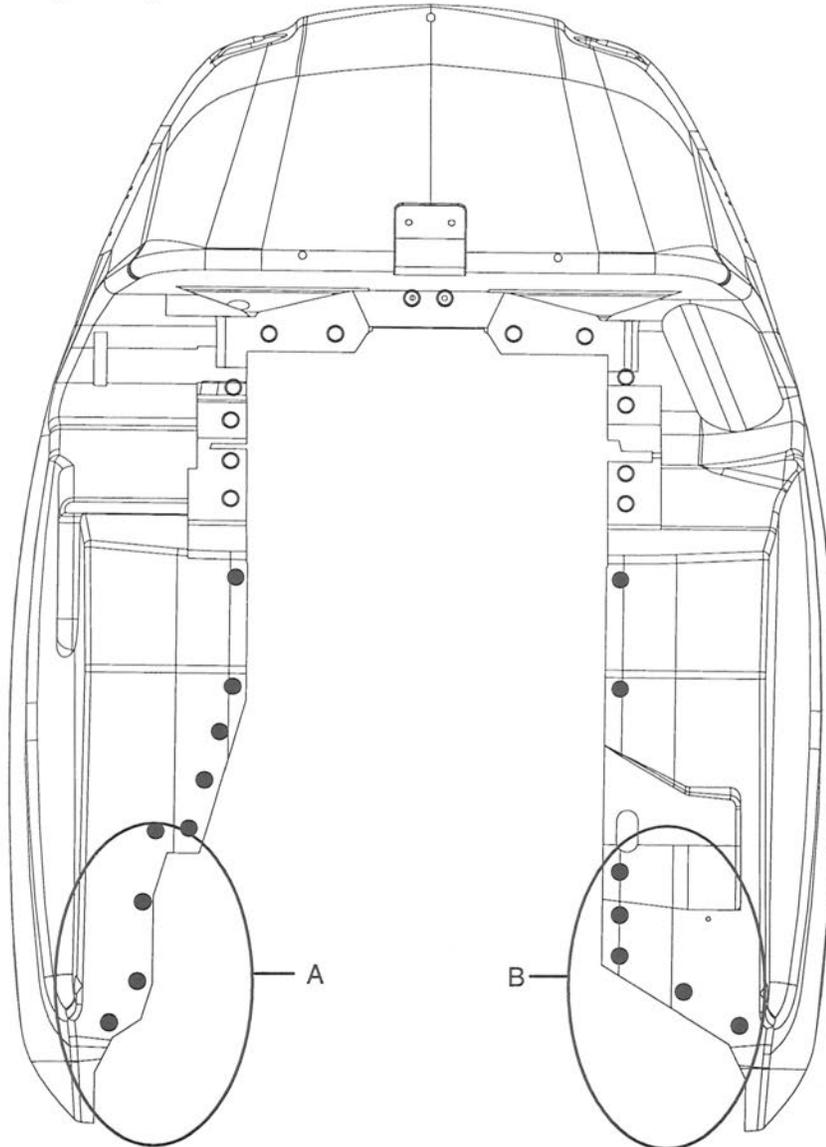
### Nosepan Replacement Procedure - Gen II XTRA-10 Front Suspension

**IMPORTANT:** When installing a replacement nosepan, the open circles represent rivets installed from inside the nosepan through the bottom. The filled in circles represent rivets installed from the under side of nosepan through to the top.

**NOTE:** The rivet for polyethylene nosepans is PN 7621467.

**NOTE:** Rivet holes may require drilling into the bulkhead.

Non-tipped in trailing arm style



**NOTE:**

1. When transfer drilling holes do not force pan into a position which is not uniform with the other side. (Use the same method to drill both sides)
2. Rivet holes across from one another in unison.
3. Liquid cooled models will have recesses on both sides like reference A. Fan cooled models will not have recesses and will look like reference B on both sides.

## BODY AND STEERING Nosepan Replacement Procedure

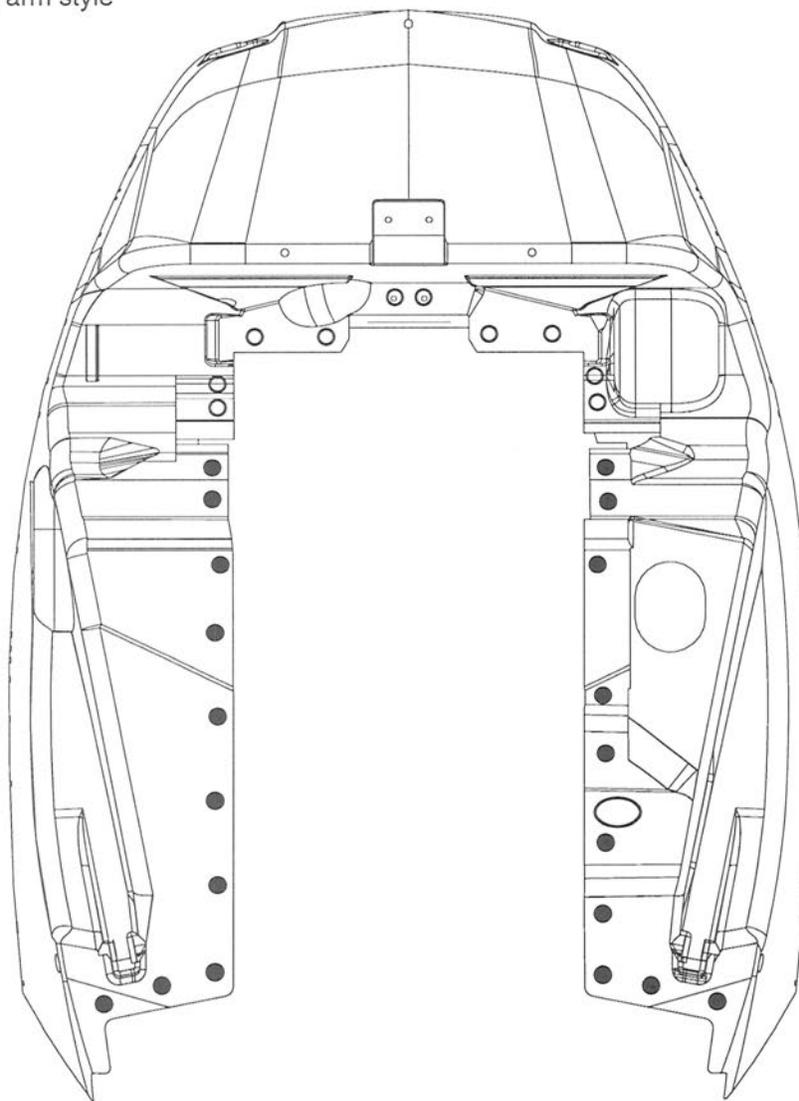
### Nosepan Replacement Procedure - Gen II XC-10 Front Suspension

**IMPORTANT:** When installing a replacement nosepan, the open circles represent rivets installed from inside the nosepan through the bottom. The filled in circles represent rivets installed from the under side of nosepan through to the top.

**NOTE:** The rivet for polyethylene nosepans is PN 7621467.

**NOTE:** Rivet holes may require drilling into the bulkhead.

Tipped In trailing arm style



**NOTE:**

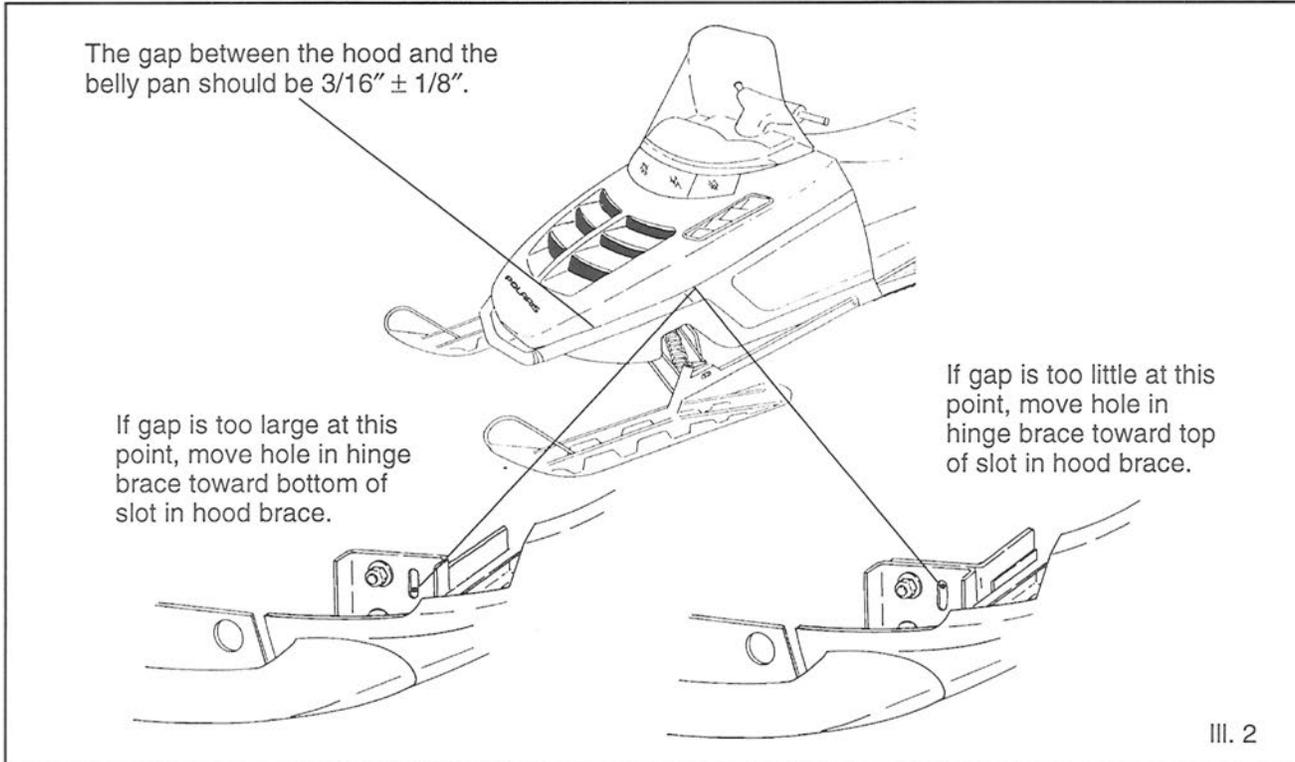
1. When transfer drilling holes do not force pan into a position which is not uniform with the other side. (Use the same method to drill both sides)
2. Rivet holes across from one another in unison.

## BODY AND STEERING Hood Adjustment

### Hood to Belly Pan Alignment - Evolved Style

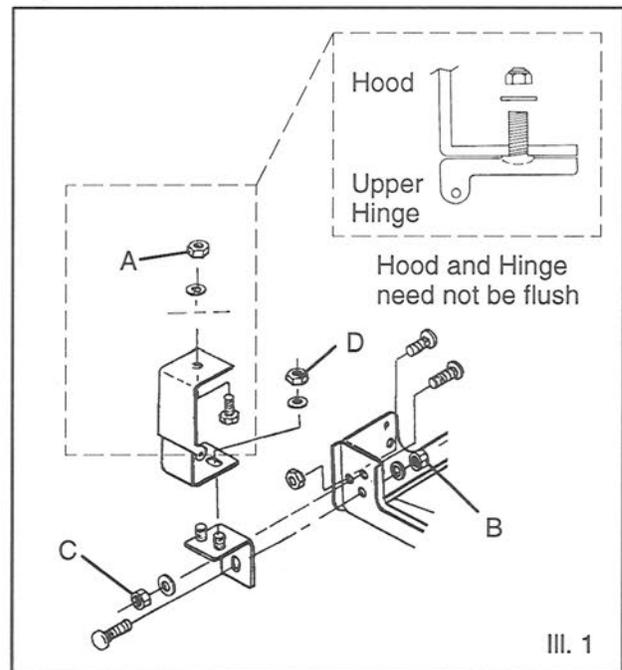
The gap between the hood and belly pan should always be  $3/16'' \pm 1/8''$  (4.8 mm  $\pm$  3 mm). Refer to Ill. 2 for adjustment procedures.

**NOTE:** Hood may have to be removed to make this adjustment.



### Hood Adjustment - Evolved Style

1. Check to see that hood and upper hood hinge are properly aligned. To adjust, loosen nuts (A) and align properly. Tighten nuts. See Ill. 1.
2. With hood open, loosen nut (B). See Ill. 1.
3. Close hood and remove both rubber plugs. Then, using a  $7/16''$  (.4 cm) socket with an 8" (20 cm) extension, loosen nut (C). Adjust hood to pan gap. Tighten nuts.
4. Check outer perimeter alignment and front and rear alignment of hood, side bumpers and side panels. There should be  $3/16''$  (.5cm) +  $1/8''$  (.3cm) -0 clearance between hood to side panels and side bumpers. If adjustment is required, open hood and loosen nuts (D). Adjust and re-tighten one nut per hinge. Close hood and recheck alignment.
5. After correct alignment is achieved, tighten all nuts.

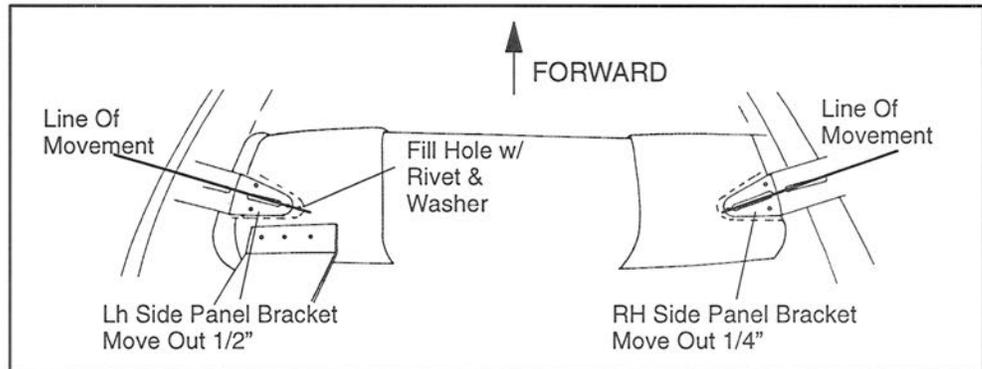


## BODY AND STEERING

### Hood Adjustment

#### Nosepan, Front Bumper and Side Bumper Adjustment - Evolved Style

1. Open hood and remove side panels.
2. Remove foil tape covering right side nose pan bracket.
3. Drill out rivets (3) and slide bracket outward 1/4" (6.35 mm) as shown in the illustration below. Be sure to mount the bracket at the same angle as before, so the side panel fits squarely against the mounting bracket.



4. Transfer drill holes in bracket to 3.16" (.1875" or 4.75 mm) and rivet in new location using rivet PN 7621485.
5. Apply a new section of foil tape (PN 5810908) over the bracket.
6. Repeat this procedure for the left side with the following exceptions: move the bracket outward 1/2" (12.7 mm). Fill the open hole at the tip of the bracket with a rivet and washer.

## BODY AND STEERING Decal Removal and Installation

### Decal Removal

1. Before removing old decal, it is important to note its position by marking it in several locations.
2. Remove old decal completely. **NOTE:** A small amount of solvent will aid in removing the old decal.
3. The decals are UV based. If heat will not remove decal, gently buff area with a mild abrasive. Use 3M Scotch Brite™ Graphics Removal Discs with a No. 1 Roloc and holder, or an equivalent low RPM buffing disc.

#### CAUTION:

Maintain 2500-3500 RPM to prevent damage to hood caused by excessive heat.

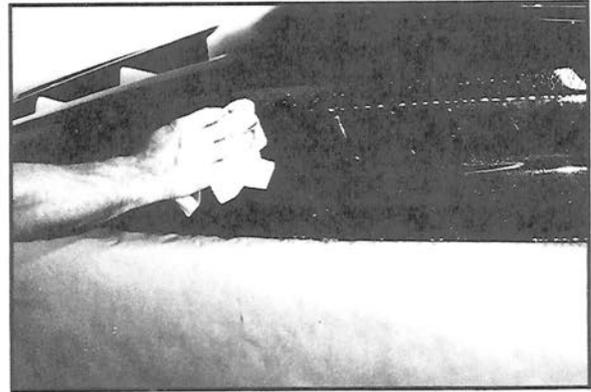
4. Remove any remaining decal adhesive with a citrus based cleaner or equivalent non-solvent based cleaner.
5. *Thoroughly clean* area where the new decal will be installed using a solution of mild soap (such as dishwashing liquid) and clean water. **NOTE:** Use approximately four ounces soap to one gallon water.

### Decal Installation

1. Apply a solution of mild soap mixed with clean water to the area where the new decal is to be applied. Do not wipe off.
2. Carefully remove decal backing and apply new decal.
3. If decal does not have a pre-mask, apply additional soapy water solution to top of decal after it is in position.
4. Holding decal in position, remove all trapped air and soapy water solution from under decal using a clean, soft rubber squeegee to prevent scratching of decal surface.
5. If decal has a pre-mask, carefully remove.

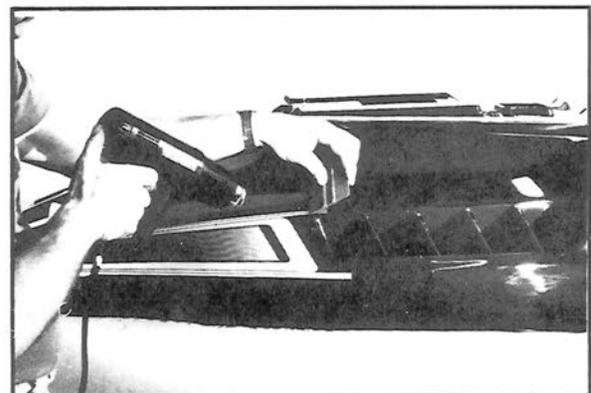
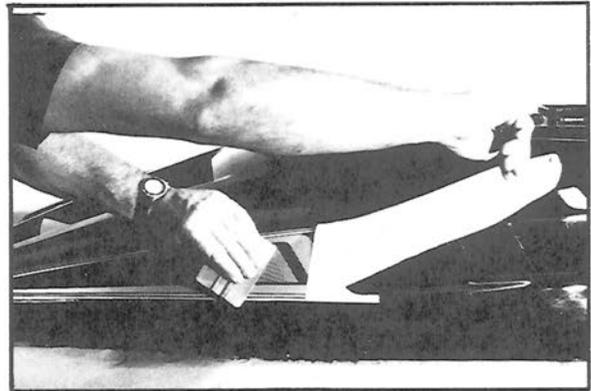
**NOTE:** If the decal being applied needs to be stretched around a radius, follow these recommendations:

6. Fasten a straight edge to tail end of decal.
7. Pull or stretch remaining portion of decal around radius and into position. **NOTE:** A small amount of heat applied to the decal will aid in forming it to the radius. The mass of the decal which was secured in previous steps will hold it in position while pulling.
8. Again, apply soapy water solution to top of decal and remove trapped air using a clean, soft rubber squeegee. Use care to prevent scratching the decal surface.
9. Apply a small amount of heat to the decal to fasten it securely.
10. Carefully remove excess decal material.



3M Scotchbrite™ Graphics Removal Disc  
3M PN 048011-16855

No. 1 Roloc and holder  
3M PN 048011-15408



## BODY AND STEERING Troubleshooting

Problem	Possible Cause	Solution
*Machine darts from side to side	<ul style="list-style-type: none"> <li>-Incorrect ski toe alignment</li> <li>-Incorrect camber</li> <li>-Loose or worn steering components or fasteners</li> <li>-Cracked or broken skis, skags, or carbides</li> </ul>	<ul style="list-style-type: none"> <li>-Adjust to correct toe alignment</li> <li>-Adjust to correct camber</li> <li>-Tighten or replace</li> <li>-Replace if necessary</li> </ul>
Tie rod hits trailing arm	<ul style="list-style-type: none"> <li>-Steering arm installed incorrectly</li> <li>-Tie rod ends worn</li> </ul>	<ul style="list-style-type: none"> <li>-Index correctly in relation to spindle</li> <li>-Replace if necessary</li> </ul>
Steering has excessive freeplay	<ul style="list-style-type: none"> <li>-Steering bellcrank bushing worn or loose</li> <li>-Drag link worn or loose</li> <li>-Steering post loose</li> <li>-Steering post bushings worn</li> <li>-Tie rod ends worn</li> <li>-Spindle bushings worn</li> </ul>	<ul style="list-style-type: none"> <li>-Tighten or replace if necessary</li> <li>-Tighten or replace if necessary</li> <li>-Tighten as needed</li> <li>-Replace if necessary</li> <li>-Tighten as needed</li> <li>-Replace if necessary</li> </ul>
Front end bounces or sags	<ul style="list-style-type: none"> <li>-IFS shock spring preload too soft</li> <li>-Improper shock charge or valving (if so equipped)</li> </ul>	<ul style="list-style-type: none"> <li>-Adjust spring tension on shocks</li> <li>-Recharge, service, or replace shocks</li> </ul>

\*Some machines with a wide front end may experience darting while following narrower machines on a trail. This is caused by the skis moving in and out of the narrower track left by the previous machine.