



# 2015 RZR 900 Service Manual

## FOREWORD

The information printed within this publication includes the latest product information at time of print. The most recent version of this Service Manual is available in electronic format at [www.polarisdealers.com](http://www.polarisdealers.com).

This Service Manual is designed primarily for use by certified Polaris Master Service Dealer® technicians in a properly equipped shop and should be kept available for reference. All references to left and right side of the vehicle are from the operator's perspective when seated in a normal riding position.

Some procedures outlined in this manual require a sound knowledge of mechanical theory, tool use, and shop procedures in order to perform the work safely and correctly. Technicians should read the text and be familiar with the service procedures before starting any repair. Certain procedures require the use of special tools. Use only the proper tools as specified. If you have any doubt as to your ability to perform any of the procedures outlined in this Service Manual, contact an authorized dealer for service.

We value your input and appreciate any assistance you can provide in helping make these publications more useful. Please provide any feedback you may have regarding this manual. Authorized dealers can submit feedback using 'Ask Polaris'. Click on 'Ask Polaris', and then click on 'Service Manual / Service Literature Question'.

Consumers, please provide your feedback in writing to: Polaris Industries Inc. ATTN: Service Publications Department, 2100 Hwy 55, Medina, MN 55340.

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## **UNDERSTANDING SAFETY LABELS AND DIRECTIONS**

Throughout this manual, important information is brought to your attention by the following symbols:



SAFETY ALERT WARNING indicates a potential hazard that may result in severe injury or death to the operator, bystander or person(s) inspecting or servicing the vehicle.



SAFETY ALERT CAUTION indicates a potential hazard that may result in minor personal injury or damage to the vehicle.

**CAUTION**

CAUTION indicates special precautions that must be taken to avoid vehicle damage or property damage.

### **NOTE:**

NOTE provides key information by clarifying instructions.

### **IMPORTANT:**

IMPORTANT provides key reminders during disassembly, assembly and inspection of components.



## **TRADEMARKS**

POLARIS ACKNOWLEDGES THE FOLLOWING PRODUCTS MENTIONED IN THIS MANUAL:

Loctite, Registered Trademark of the Loctite Corporation

Nyogel, Trademark of Wm. F. Nye Co.

Fluke, Registered Trademark of John Fluke Mfg. Co.

Mity-Vac, Registered Trademark of Neward Enterprises, Inc.

Torx, Registered Trademark of Textron

Hilliard, Trademark of the Hilliard Corporation

Warn, Trademark of Warn Industries

FOX, Registered Trademark of FOX RACING SHOXS

RydeFX, Registered Trademark of ArvinMeritor

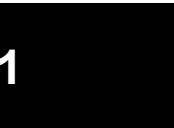
Some Polaris factory publications can be downloaded from [www.polarisindustries.com](http://www.polarisindustries.com), purchased from [www.purepolaris.com](http://www.purepolaris.com) or by contacting the nearest Polaris dealer.



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# GENERAL INFORMATION

## VEHICLE IDENTIFICATION

### Model Number Designation

Example: A15SEA57AD

GROUP	MODEL YEAR		MAKE / CHASSIS CODE			ENGINE CODE		REGION	OPTION
1st	2nd	3rd	4th*	5th*	6th*	7th*	8th*	9th	10th**
A	1	5	S	E	A	5	7	A	D

\* = digits that would transfer to 17 digit VIN and are used in digits 4-8 respectively

\*\* = 10th digit will be used on color/featured versions of models (not including the base)

First 3 digits and 10th digit are used in model number only. They are not used with the 17 digit VIN.

Digits 1 through 8 determine Digital Wrench calibration.

### Vehicle Identification Number (VIN) Designation (2015+)

Example: 4XARH57A0F3000000

WORLD MFG. ID			VEHICLE DESCRIPTORS						VEHICLE IDENTIFIERS							
			CHASSIS	DRIVELINE	ENGINE SIZE	ENGINE MODIFIER	CATEGORY	CHECK DIGIT	MODEL YEAR *	MFG. LOCATION	INDIVIDUAL SERIAL NO.					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
4	X	A	R	H	5	7	A	0	F	3	0	0	0	0	0	0

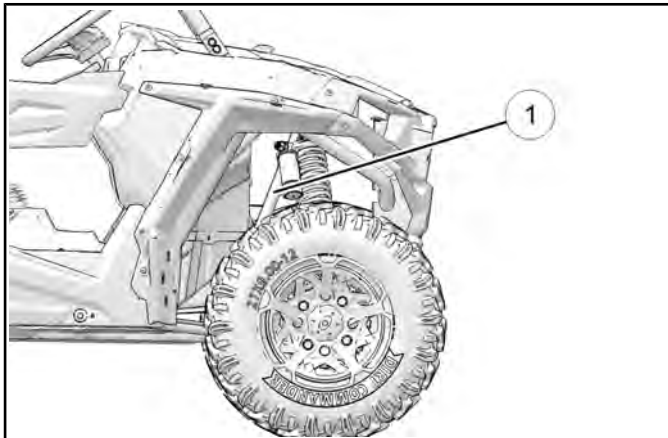
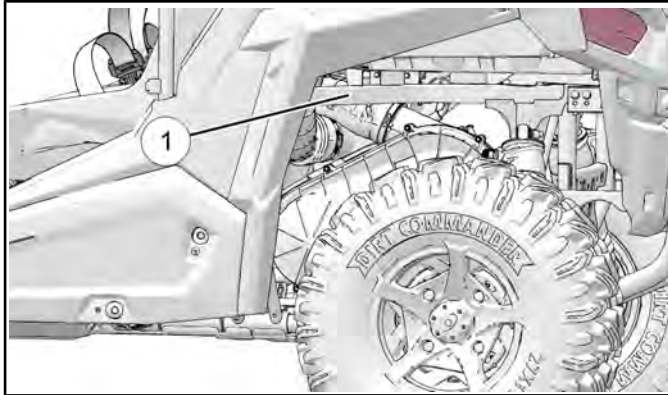
\* Model Year: A = 2010; B = 2011; C = 2012; D = 2013; E = 2014; F = 2015

## GENERAL INFORMATION

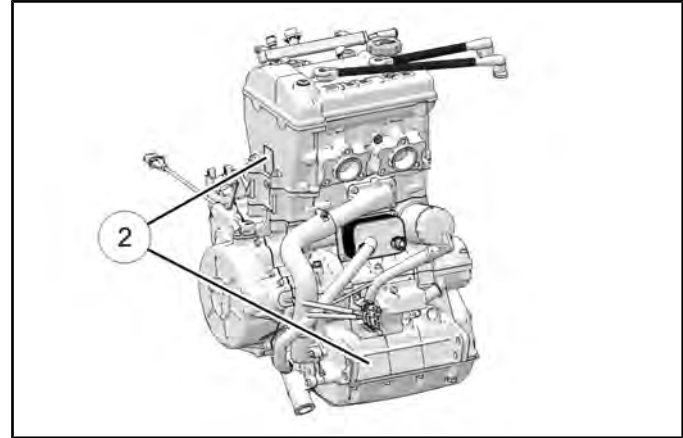
### Vehicle and Engine Serial Number Location

Whenever corresponding about a Polaris ORV, refer to the vehicle identification number (VIN) and the engine serial number.

The VIN can be found stamped on a portion of the left rear upper frame and also on a decal on the front frame support behind the lower shock mounting location ①.



The engine serial number can be found on a decal applied to the front of the engine crankcase ② or stamped into the crankcase on the PTO side of the engine.



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# GENERAL INFORMATION

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## MISC. INFORMATION

### Publication Numbers

MODEL	OWNER'S MANUAL	PARTS MANUAL
2015 RZR 900 / EPS (50")	9925322	9925324
2015 RZR 900 XC	9925631	9925324
2015 RZR S 900 / EPS (60")	9925322	9925792

**NOTE:** When ordering service parts be sure to use the correct parts manual.

Polaris factory publications can be found at [www.polaris.com](http://www.polaris.com) or purchased from [www.purepolaris.com](http://www.purepolaris.com).

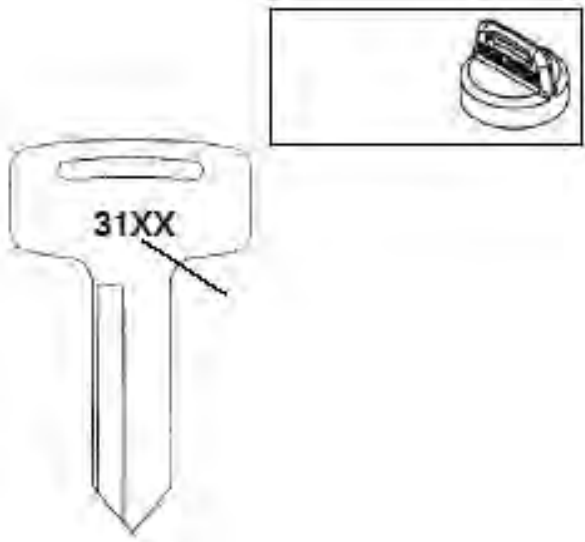


# GENERAL INFORMATION

## Replacement Keys

Replacement keys can be made from the original key. To identify which series the key is, take the first two digits on the original key and refer to the chart to the right for the proper part number.

1

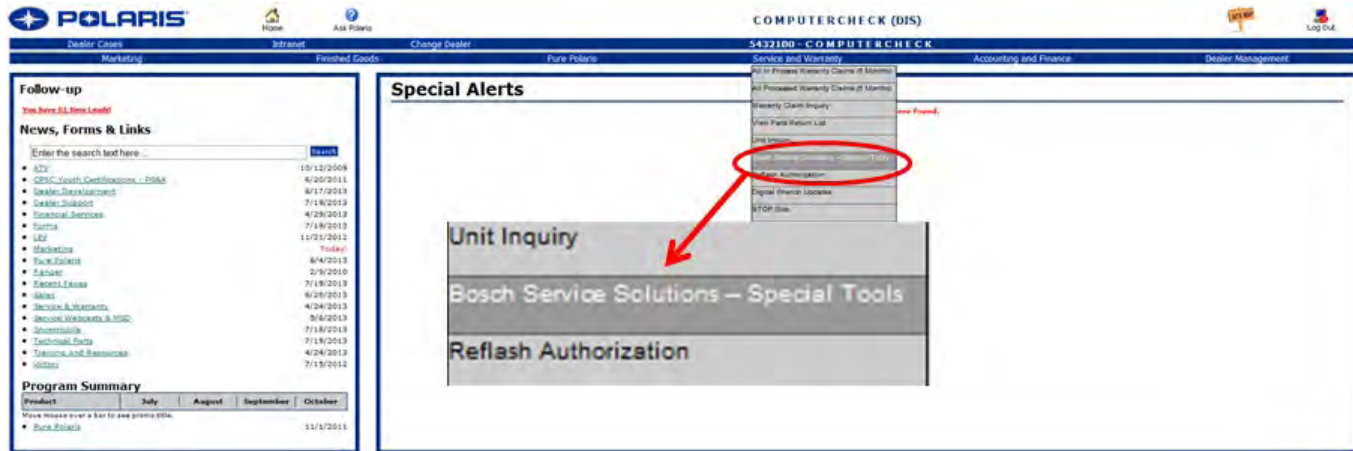
	SERIES#	PART NUMBER
	20	4010278
21	4010278	
22	4010321	
23	4010321	
27	4010321	
28	4010321	
31	4110141	
32	4110148	
67	4010278	
68	4010278	

# GENERAL INFORMATION


## SPECIAL TOOLS

Special tools may be required while servicing this vehicle. Some of the tools listed or depicted are mandatory, while other tools may be substituted with a similar tool, if available. Polaris recommends the use of Polaris Special Tools when servicing any Polaris product. Dealers may order special tools through Polaris' official tool supplier.


**Bosch Automotive Service Solutions:**  
1-800-345-2233 or <http://polaris.service-solutions.com/>



HOME | HOW TO ORDER | ORDER FORM | WARRANTY | CONTACT US | CREDIT APPLICATION |
VIEW CART




**SPECIAL SERVICE TOOLS**



**KENT-MOORE**


- ATV
- COMMERCIAL
- SIDE X SIDE
- SNOWMOBILE
- VICTORY
- LEV/GEM
- PERSONAL WATERCRAFT
- DIAGNOSTIC SOFTWARE
- GENERAL TOOLS
- TOOL NEWS
- PROMOTIONS
- NEW DEALER KIT



Welcome to the Polaris & Victory  
Special Service Tools Site

SPX Corporation's  
Service Solutions  
*business becomes*  
Bosch Automotive  
Service Solutions

Click For  
More Info



Invented for life

This site offers an exclusive line of special service tools and diagnostic product designed specifically to reduce labor times and ensure a quality repair - maximizing your dealership ROI.

Take a moment to browse the site as we are continuously updating it with improved tool information. Also, be sure to watch for newly released tools appearing in the New Tools Section just to the right.

If you have any questions or need more information than provided on your Polaris & Victory on-line catalog, please call **1-800-345-2233**.

PRODUCT SEARCH

BY PART NUMBER ?

 🔍

BY KEYWORD

 🔍

ORDER ITEMS

0 ITEMS  
\$0.00

VIEW CART

NEW TOOLS

PORT RELIEF  
PRESSURE TOOL  
PU-51225

SERVICE KIT FOR  
REFRIGERANT  
RECOVERY,  
RECYCLING, AND  
RECHARGING MACHINE  
PU-51021-1



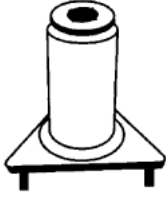
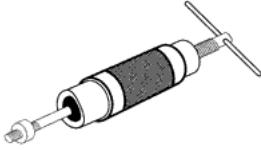

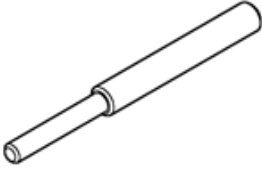

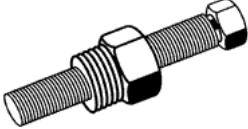

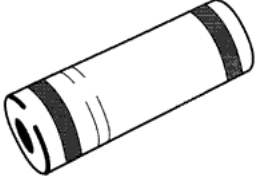
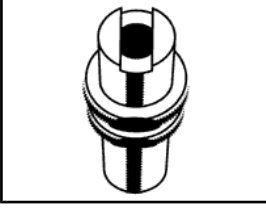
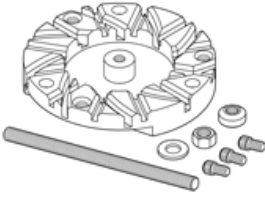
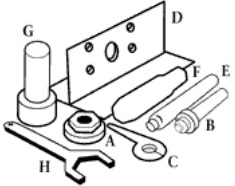
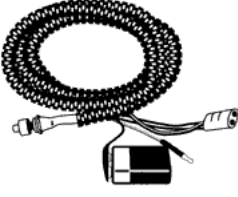
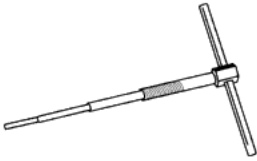
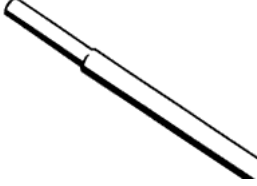



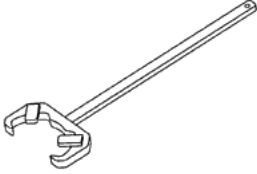
REFRIGERANT  
RECOVERY,  
RECYCLING, AND  
RECHARGING MACHINE  
PU-51021

DRIVE CONTROL  
ADJUSTMENT WRENCH  
PU-51261

SHOCK pre-LOAD  
WRENCH  
PV-43507-A

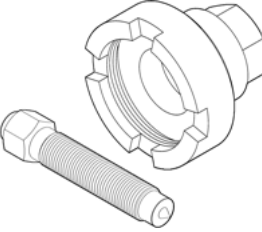
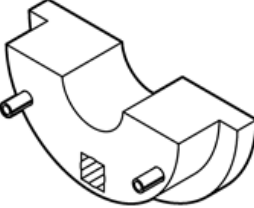


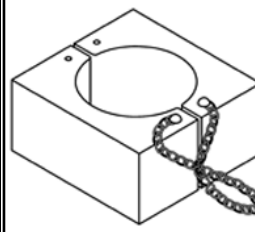


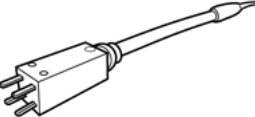
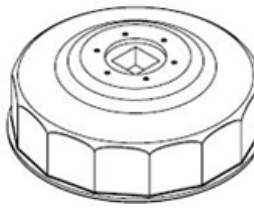


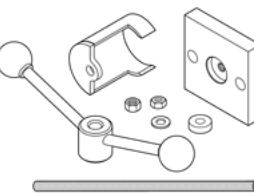
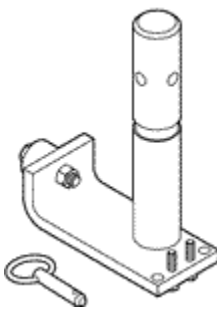
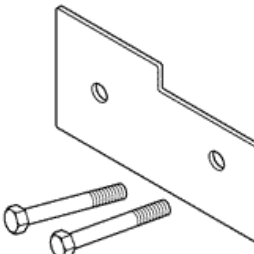
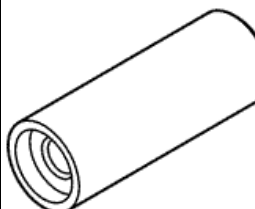
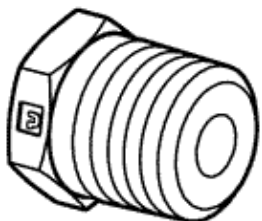
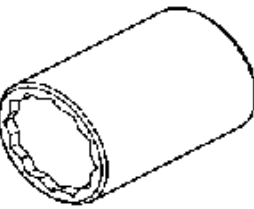
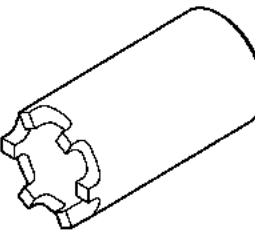
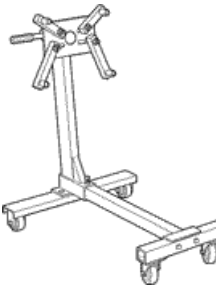
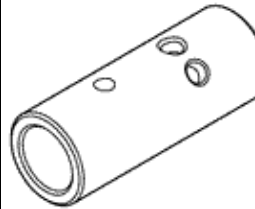
MORE

# GENERAL INFORMATION

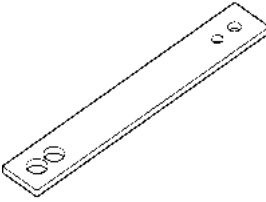
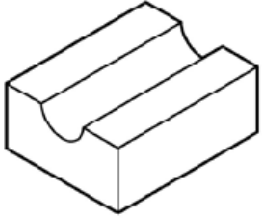
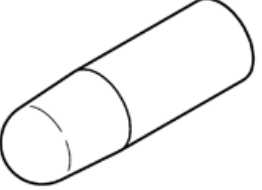
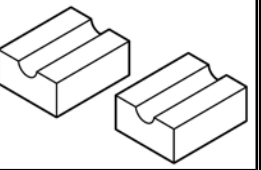
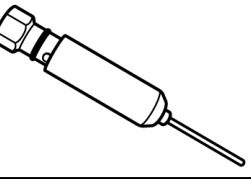
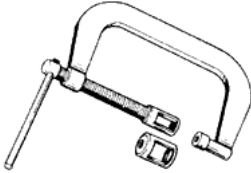
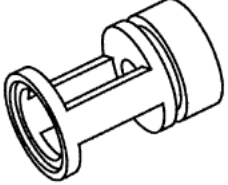



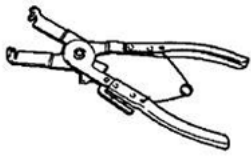
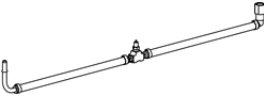
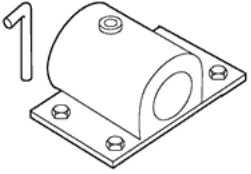
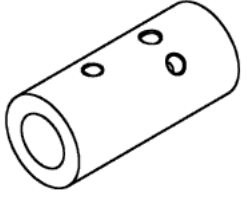
<p><b>2200421</b> Gas Shock Recharging Kit</p> 	<p><b>2460761</b> Hall Sensor Probe Harness</p> 	<p><b>2870341-A</b> Drive Clutch Spider Remover/Installer</p> 	<p><b>2870386</b> Piston Pin Puller</p> 	<p><b>2870630</b> Timing Light</p> 
<p><b>2870910-A</b> Roller Pin Tool</p> 	<p><b>2870975</b> Mity-Vac Pressure Test Tool</p> 	<p><b>2871056</b> Driven Clutch Puller</p> 	<p><b>2871226</b> Clutch Bushing Replacement Tool Kit</p> 	<p><b>2871282</b> Transmission Seal Driver (50 MM)</p> 
<p><b>2871351</b> IFP Depth Tool</p> 	<p><b>2871358-B</b> Drive Clutch Holding Fixture</p> 	<p><b>2871702</b> Shaft Drive Transmission and Front Gearcase Tool Kit</p> 	<p><b>2871745</b> Static Timing Light Harness</p> 	<p><b>2872085</b> Drive Clutch Puller</p> 
<p><b>2872608</b> Roll Pin Removal Tool (27")</p> 	<p><b>2876389</b> Combination Pliers</p> 	<p><b>2877408</b> Spanner Wrench / Clutch Spreader</p> 	<p><b>8700226</b> CV Boot Clamp Pliers (ear)</p> 	<p><b>9314177-A</b> Drive Clutch Holding Tool</p> 

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# GENERAL INFORMATION

<p><b>PA-49316</b> Water Pump Drive &amp; Rotor Removal Tool</p> 	<p><b>PA-50231</b> Snorkel Driver</p> 	<p><b>PS-45908</b> T-Handle Tool</p> 	<p><b>PU-43506-A</b> Fuel Pressure Gauge Kit</p> 	<p><b>PU-45281-A</b> Shock Body Holding Tool</p> 
<p><b>PU-47471</b> Smartlink Module Kit</p> 	<p><b>PU-48951</b> CV Boot Clamp Pliers (Stepless)</p> 	<p><b>PU-49466</b> Relay Bypass</p> 	<p><b>PU-50105</b> Oil Filter Wrench</p> 	<p><b>PU-50296</b> Battery Tester</p> 
<p><b>PU-50338</b> Hydrometer</p> 	<p><b>PU-50518</b> Clutch Compressor</p> 	<p><b>PU-50562</b> Engine Stand Adapter</p> 	<p><b>PU-50563</b> Cylinder Holding &amp; Camshaft Timing Plate</p> 	<p><b>PU-50564</b> Water Pump Seal Installer</p> 
<p><b>PU-50565</b> Oil Pressure Gauge Adapter (1/2 NPT)</p> 	<p><b>PU-50566</b> Transmission Nut Socket</p> 	<p><b>PU-50578</b> Clutch Spider Nut Socket</p> 	<p><b>PU-50624</b> Rolling Engine Stand</p> 	<p><b>PU-50625</b> Engine Stand Adapter Sleeve (2")</p> 

# GENERAL INFORMATION

<p><b>PU-50658</b> Clutch Center Distance Tool</p> 	<p><b>PU-50931</b> Shock Rod Holding Tool (3/4")</p> 	<p><b>PU-50939</b> Shock Seal Protector Sleeve (5/8")</p> 	<p><b>PU-51024</b> Shock Rod Holding Tool</p> 	<p><b>PU-51039</b> Gas Shock Fill Tool</p> 
<p><b>PV-1253</b> Valve Spring Compressor</p> 	<p><b>PV-43513-A</b> Valve Spring Compressor Adapter</p> 	<p><b>PV-43526</b> Connector Test Kit</p> 	<p><b>PV-43531</b> Oil Pressure gauge</p> 	<p><b>PV-43568</b> Fluke Multimeter</p> 
<p><b>PV-43570</b> Piston Ring Compressor Pliers</p> 	<p><b>PV-48656</b> Fuel Pressure Gauge Adapter</p> 	<p><b>PW-47053</b> Bench Mount Engine Stand</p> 	<p><b>PW-47054</b> Engine Stand Adapter Sleeve (2 3/8")</p> 	

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## GENERAL INFORMATION

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### GENERAL SPECIFICATIONS

#### RZR 900 / RZR 900 EPS Specifications

CATEGORY	DIMENSION / CAPACITY
Length	107" / 271.8 cm
Width	50" / 127cm
Height	69.5" / 176.5cm
Wheel Base	79" / 200 cm
Ground Clearance	10-11" / 25.4-27.9 cm
Dry Weight	1148 lbs. / 521 kg
Gross Vehicle Weight	1969 lbs. / 893 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	740 lbs. / 336.4 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	1500 lbs (680 kg)
Hitch Tongue Capacity	150 lbs (68 kg)



# GENERAL INFORMATION

1

ENGINE	
Platform	Domestic Twin Cyl., 4-Stroke, DOHC
Engine Displacement	875 cc
Number of Cylinders	2
Bore & Stroke	93 x 64.4 mm
Compression Ratio	10.5:1
Engine Idle Speed	1250 +/- 100 RPM
Engine Max Speed	8300 RPM
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	PS4
Oil Capacity	2.5 qts. (2.4 L)
Coolant Capacity	5.0 qt (4.7 L)

FUEL SYSTEM	
Type	Bosch ME17 EFI
Fuel Delivery	Electronic Fuel Pump (in-tank)
Fuel Pressure	58 ± 2 PSI (400 ± 14 kPa)
Fuel Capacity / Requirement	9.5 gal. (36 L) 87 Octane (minimum)

ELECTRICAL	
Alternator Max Output	560 Watts @ 3000 RPM
Lights: Main Headlights	Dual Beam 55/60W Halogen
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	ME17 ECU
Spark Plug / Gap	NGK MR7F/ 0.7–0.8 mm
Battery / Amp Hr	12v Flooded, 575 CCA
DC Outlet	Standard 12 Volt
Relays	Fan, EFI, Fuel Pump, Chassis, EPS (if appl.)
Circuit Breaker	20A Cooling Fan
Fuses	10A EFI 10A Key 10A Term 10A Accessory 10A Drive 15A Lights 20A EPS (if appl.)

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Sequence	In Line Shift - P / R / N / L / H
Transmission Gear Ratios:	
High	10.4:1
Low	18.8:1
Reverse	22.92:1
Front Gearcase Lubricant Requirement	Demand Drive 7.5 oz. (222 ml)
Transmission Lubricant Requirement	Full Synthetic AGL 44 oz. (1300 mL)

STEERING / SUSPENSION	
Toe Out	1/8 - 3/16" (3.2 - 4.8 mm)
Front Suspension	Independent Dual A-arm Sachs Shocks
Front Travel	10" (25.4 cm)
Rear Suspension	Independent Dual A-arm Sachs Shocks
Rear Travel	10" (25.4 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES		
Front Rim / Size	Steel 12 x 6	
Rear Rim / Size	Steel 12 x 8	
Front Tire Make / Model / Size	PXT 26 x 8 R12	
Rear Tire Make / Model / Size	PXT 26 x 9 R12	
Tire Air Pressure	Front	10 psi (69 kPa)
	Rear	12 psi (83 kPa)
Brake System Front & Rear	Foot Actuated 4 Wheel Hydraulic – Dual Bore Caliper	
Brake Fluid	DOT 4	

For clutch specifications / High Altitude setup, see PVT System chapter – Clutch Charts, page 5.3

# GENERAL INFORMATION

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## RZR 900 XC Specifications

CATEGORY	DIMENSION / CAPACITY
Length	108" / 274.3 cm
Width	55" / 139.7 cm
Height	70.5" / 179 cm
Wheel Base	79" / 200 cm
Ground Clearance	12.5" / 31.75 cm
Dry Weight	1247 lbs. / 566 kg
Gross Vehicle Weight	2068 lbs. / 938 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	740 lbs. / 336 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	1500 lbs (680 kg)
Hitch Tongue Capacity	150 lbs (68 kg)





# GENERAL INFORMATION

1

ENGINE	
Platform	Domestic Twin Cyl., 4-Stroke, DOHC
Engine Displacement	875 cc
Number of Cylinders	2
Bore & Stroke	93 x 64.4 mm
Compression Ratio	10.5:1
Engine Idle Speed	1250 +/- 100 RPM
Engine Max Speed	8300 RPM
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	PS4
Oil Capacity	2.5 qts. (2.4 L)
Coolant Capacity	5.0 qt (4.7 L)

FUEL SYSTEM	
Type	Bosch ME17 EFI
Fuel Delivery	Electronic Fuel Pump (in-tank)
Fuel Pressure	58 ± 2 PSI (400 ± 14 kPa)
Fuel Capacity / Requirement	9.5 gal. (36 L) 87 Octane (minimum)

ELECTRICAL	
Alternator Max Output	560 Watts @ 3000 RPM
Lights: Main Headlights	Dual Beam 55/60W Halogen
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	ME17 ECU
Spark Plug / Gap	NGK MR7F/ 0.7–0.8 mm
Battery / Amp Hr	12v Flooded, 575 CCA
DC Outlet	Standard 12 Volt
Relays	Fan, EFI, Fuel Pump, Chassis, EPS
Circuit Breaker	20A Cooling Fan
Fuses	10A EFI 10A Key 10A Term 10A Accessory 10A Drive 15A Lights 20A EPS

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Sequence	In Line Shift - P / R / N / L / H
Transmission Gear Ratios:	
High	10.4:1
Low	18.8:1
Reverse	22.92:1
Front Gearcase Lubricant Requirement	Demand Drive 7.5 oz. (222 ml)
Transmission Lubricant Requirement	Full Synthetic AGL 44 oz. (1300 mL)

STEERING / SUSPENSION	
Toe Out	1/8 - 3/16" (3.2 - 4.8 mm)
Front Suspension	Independent Dual A-arm FOX 2.0"
Front Travel	10" (25.4 cm)
Rear Suspension	Independent Dual A-arm FOX 2.0"
Rear Travel	10" (25.4 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES		
Front Rim / Size	Aluminum 14 x 7	
Rear Rim / Size	Aluminum 14 x 8	
Front Tire Make / Model / Size	GBC Dirt Commander 27 x 9 R14	
Rear Tire Make / Model / Size	GBC Dirt Commander 27 x 11 R14	
Tire Air Pressure	Front	10 psi (69 kPa)
	Rear	12 psi (83 kPa)
Brake System Front & Rear	Foot Actuated 4 Wheel Hydraulic – Dual Bore Caliper	
Brake Fluid	DOT 4	

For clutch specifications / High Altitude setup, see PVT System chapter – Clutch Charts, page 5.3

## GENERAL INFORMATION

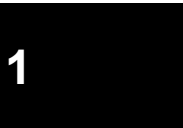
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### RZR S 900 Specifications

CATEGORY	DIMENSION / CAPACITY
Length	108" / 274.3 cm
Width	60" / 152.4 cm
Height	72" / 182.9 cm
Wheel Base	79" / 200 cm
Ground Clearance	12.5" / 31.75 cm
Dry Weight	1208 lbs. / 548 kg
Gross Vehicle Weight	2029 lbs. / 920 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	740 lbs. / 336 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	1500 lbs (680 kg)
Hitch Tongue Capacity	150 lbs (68 kg)



# GENERAL INFORMATION



ENGINE	
Platform	Domestic Twin Cyl., 4-Stroke, DOHC
Engine Displacement	875 cc
Number of Cylinders	2
Bore & Stroke	93 x 64.4 mm
Compression Ratio	10.5:1
Engine Idle Speed	1250 +/- 100 RPM
Engine Max Speed	8300 RPM
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	PS4
Oil Capacity	2.5 qts. (2.4 L)
Coolant Capacity	5.0 qt (4.7 L)

FUEL SYSTEM	
Type	Bosch ME17 EFI
Fuel Delivery	Electronic Fuel Pump (in-tank)
Fuel Pressure	58 ± 2 PSI (400 ± 14 kPa)
Fuel Capacity / Requirement	9.5 gal. (36 L) 87 Octane (minimum)

ELECTRICAL	
Alternator Max Output	560 Watts @ 3000 RPM
Lights: Main Headlights	Dual Beam 55/60W Halogen
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	ME17 ECU
Spark Plug / Gap	NGK MR7F / 0.7-0.8 mm
Battery / Amp Hr	12v Flooded, 575 CCA
DC Outlet	Standard 12 Volt
Relays	Fan, EFI, Fuel Pump, Chassis, EPS (if appl.)
Circuit Breaker	20A Cooling Fan
Fuses	10A EFI 10A Key 10A Term 10A Accessory 10A Drive 15A Lights 20A EPS (if appl.)

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Sequence	In Line Shift - P / R / N / L / H
Transmission Gear Ratios:	
High	10.4:1
Low	18.8:1
Reverse	22.92:1
Front Gearcase Lubricant Requirement	Demand Drive 7.5 oz. (222 ml)
Transmission Lubricant Requirement	Full Synthetic AGL 44 oz. (1300 mL)

STEERING / SUSPENSION	
Toe Out	1/8 - 3/16" (3.2 - 4.8 mm)
Front Suspension	Independent Dual A-arm FOX 2.0"
Front Travel	10" (25.4 cm)
Rear Suspension	Independent Dual A-arm FOX 2.0"
Rear Travel	10" (25.4 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES		
Front Rim / Size	Aluminum 12 x 6	
Rear Rim / Size	Aluminum 12 x 8	
Front Tire Make / Model / Size	GBC Dirt Commander 27 x 9 R12	
Rear Tire Make / Model / Size	GBC Dirt Commander 27 x 11 R12	
Tire Air Pressure	Front	12 psi (83 kPa)
	Rear	14 psi (97 kPa)
Brake System Front & Rear	Foot Actuated 4 Wheel Hydraulic – Dual Bore Caliper	
Brake Fluid	DOT 4	

For clutch specifications / High Altitude setup, see PVT System chapter – Clutch Charts, page 5.3

# GENERAL INFORMATION

## MISC. SPECIFICATIONS AND CHARTS

### Master Torque Table

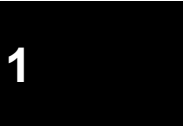
ITEM	TORQUE
A-Arm Mounting Fasteners	42 ft-lb (57 Nm)
Air Box Mounting Fasteners	8 ft-lb (11 Nm)
Ball Joint Fasteners	42 ft-lb (57 Nm)
Battery Bracket Fasteners	8 ft-lb (11 Nm)
Battery Terminal Fasteners	60 in-lb (7 Nm)
Bearing Carrier Mounting Fasteners (rear)	42 ft-lb (57 Nm)
Body / Floor Screws (T-40)	8 ft-lb (11 Nm)
Brake Disc Mounting Bolts	18 ft-lb (24 Nm)
Brake Bleed Screws	48 in-lb (5 Nm)
Brake Caliper Mounting Bolts (front)	30 ft-lb (42 Nm)
Brake Caliper Mounting Bolts (rear)	46 ft-lb (62 Nm)
Brake Disc Scraper	7 ft-lb (11 Nm)
Brake Junction Block	35 in-lb (4 Nm)
Brake Line Banjo Bolts	15 ft-lb (20 Nm)
Brake Line Flare Fittings	15 ft-lb (20 Nm)
Brake Pedal Mount Bracket Bolts	18 ft-lb (24 Nm)
Brake Switch	15 ft-lb (20 Nm)
Cab Frame Bolts	40 ft-lb (54 Nm)
Cam Chain Tensioner	29 ft-lb (40 Nm)
Camshaft Carrier Bolts	7 ft-lb (10 Nm)
Camshaft Sprocket Bolts	11 ft-lb (15 Nm)
Clutch Cover(inner) Screws	10 ft-lb (14 Nm)
Clutch Cover (outer) Screws	54 in-lb (5 Nm)
Connecting Rod Bolts	Step 1: 9 ft-lb (12 Nm) Step 2: 22 ft-lb (30 Nm) Step 3: Tighten add'n 90°
Coolant Bleed Screw	89 in-lb (10 Nm)
Coolant Temperature Sensor	17 ft-lb (23 Nm)
CPS Retaining Bolt	9 ft-lb (12 Nm)
Crankcase Bolts M10	Torque in sequence Step 1: 9 ft-lb (12 Nm) Step 2: 21 ft-lb (28 Nm) Step 3: Tighten add'n 90°
Crankcase Bolts M8	26 ft-lb (35 Nm)

ITEM	TORQUE
Crankcase Bolts M6	9 ft-lb (12 Nm)
Crankcase Oil Gallery Plug	11 ft-lbs (15 Nm)
Cylinder Head Bolts	Torque in sequence Step 1: 9 ft-lbs (12 Nm) Step 2: 26 ft-lb (35 Nm) Step 3: Additional 180° Step 4: M6 bolts: 7 ft-lb (10 Nm)
Differential Cover Screws	22 ft-lb (30 Nm)
Door Fasteners	8 ft-lb (11 Nm)
Drive Clutch Retaining Bolt	96 ft-lb (130 Nm)
Drive Clutch Cover Plate Screw	8 ft-lb (11 Nm)
Drive Clutch Shift Weight Fasteners	20 in-lb (2 Nm)
Drive Clutch Spider	290 ft-lb (393 Nm) (Apply 0.4 mL Loctite® 620™)
Drive Clutch Spider Jam Nut	250 ft-lb (339 Nm) (Apply 0.1 mL Loctite® 620™)
Driven Clutch Retaining Bolt	38 ft-lb (52 Nm)
Driven Clutch Spring Retainer Screws (non-EBS)	12 ft-lb (16 Nm)
Driven Clutch Helix Screws (EBS)	48 in-lb (5 Nm)
ECU Mounting Screws	24 in-lb (3 Nm)
Engine Mount / Isolator (front)	40 ft-lbs (54 Nm)
Engine Mount to Frame Fasteners	22 ft-lb (30 Nm)
Engine Oil Plug	12 ft-lbs (16 Nm)
Engine/Transmission Mounting Bolts	Step 1-2: 64 ft-lb (87 Nm) Step 3: 5 ft-lb (7 Nm) Step 4-7: 44 ft-lb (60 Nm) *see procedure for illustration
ETC Mounting Bolts	7 ft-lb (10 Nm)
Exhaust Head Pipe Bolts	18 ft-lb (24 Nm)
Flywheel Bolt	133 ft-lbs (180 Nm)
Frame Support (above engine)	22 ft-lb (30 Nm)
Front Bumper / Fender Screws	8 ft-lb (11 Nm)
Front Gearcase Cover Plate Screws	11 ft-lbs (15 Nm)

# GENERAL INFORMATION

ITEM	TORQUE
Front Gearcase Drain/Fill Plugs	<b>10 ft-lbs (14 Nm)</b>
Front Gearcase Mounting Bolts	<b>33 ft-lbs (45 Nm)</b>
Fuel Pump PFA Nut	<b>70 ft-lbs (95 Nm)</b>
Fuel Rail Mounting Screws	<b>7 ft-lb (10 Nm)</b>
Fuel Tank Block-off Panel	<b>8 ft-lbs (11 Nm)</b>
Fuel Tank Strap Screw	<b>8 ft-lbs (11 Nm)</b>
Harness Bracket Screws	<b>35 in-lb (4 Nm)</b>
Hip Bolster Bolts	<b>16 ft-lb (22 Nm)</b>
Hose Clamp	<b>35 in-lb (4 Nm)</b>
Hub Castle Nut (front and rear)	<b>110 ft-lbs (149 Nm)</b>
Ignition Coil Mounting Fasteners	<b>75 in-lb (9 Nm)</b>
Intake Manifold Mount Screw (lower)	<b>22 ft-lb (30 Nm)</b>
Intake Manifold to Engine Fasteners	<b>17 ft-lb (23 Nm)</b>
Master Cylinder Mount Bolts	<b>23 ft-lbs (31 Nm)</b>
Oil Cooler Bolts	<b>7 ft-lb (10 Nm)</b>
Oil Pump Mounting Bolts	<b>7 ft-lbs (10 Nm)</b>
Oil Pump Pickup Fastener	<b>7 ft-lb (10 Nm)</b>
Oil Sump Cover M8 Bolts	<b>26 ft-lb (35 Nm)</b>
Oil Sump Cover M6 Bolts	<b>9 ft-lb (12 Nm)</b>
Parking Brake Caliper Assembly Bolts	<b>37 ft-lb (50 Nm)</b>
Parking Brake Caliper Mount Bracket Bolts	<b>37 ft-lb (50 Nm)</b>
Parking Brake Disc Mounting Bolt	<b>14 ft-lb (20 Nm)</b>
Power Steering Cover Screws	<b>15 ft-lb (20 Nm)</b>
Power Steering Bracket to Frame Nuts	<b>16 ft-lb (22 Nm)</b>
Power Steering Unit to Mount Bracket	<b>30 ft-lb (41 Nm)</b>
Prop Shaft Support Bearing Fasteners	<b>33 ft-lb (45 Nm)</b>
Radiator Mounting Bracket (Upper)	<b>8 ft-lb (11 Nm)</b>
Seat Belt Mounting Fasteners	<b>40 ft-lbs (54 Nm)</b>
Seat Fasteners	<b>4 ft-lb (5 Nm)</b>
Seat Frame Fasteners (front)	<b>14 ft-lb (19 Nm)</b>

ITEM	TORQUE
Seat Frame Fasteners (rear)	<b>30 ft-lb (41 Nm)</b>
Shift Cable Bracket Bolts	<b>17 ft-lb (23 Nm)</b>
Shift Cable Jam Nut	<b>18 ft-lb (24 Nm)</b>
Shift Cable Mounting Fasteners	<b>13 ft-lb (18 Nm)</b>
Shock Mounting Fasteners	<b>42 ft-lb (57 Nm)</b>
Skid Plate Fasteners	<b>8 ft-lbs (11 Nm)</b>
Spark Plug	<b>7 ft-lbs (10 Nm)</b>
Speed Sensor Screw	<b>12 ft-lb (16 Nm)</b>
Stabilizer Bar Linkage (front)	<b>40 ft-lb (54 Nm)</b>
Stabilizer Bar Mounting Bracket Bolts (front)	<b>16 ft-lb (22 Nm)</b>
Stabilizer Bar Linkage (rear)	<b>40 ft-lbs (54 Nm)</b>
Stabilizer Bar Mounting Bracket Bolts (rear)	<b>17 ft-lb (23 Nm)</b>
Starter Cable Nuts	<b>30 in-lb (4 Nm)</b>
Starter Mounting Bolts	<b>7 ft-lb (10 Nm)</b>
Starter One-Way Clutch Screws	<b>9 ft-lb (12 Nm)</b>
Stator Cover Screws	<b>9 ft-lb (12 Nm)</b>
Steering Tilt Shock Fastener	<b>7 ft-lb (10 Nm)</b>
Steering Pivot Fasteners	<b>40 ft-lb (54 Nm)</b>
Steering Rack Mounting Bolts	<b>16 ft-lbs (22 Nm)</b>
Steering Shaft to EPS Unit	<b>15 ft-lbs (20 Nm)</b>
Steering Shaft to Steering Rack	<b>48 ft-lb (65 Nm)</b>
Steering Wheel Nut	<b>65 ft-lbs (88 Nm)</b>
Thermostat Cover Bolts	<b>7 ft-lb (10 Nm)</b>
Throttle Pedal Mounting Fasteners	<b>8 ft-lb (11 Nm)</b>
Tie Rod End to Knuckle	<b>30 ft-lbs (41 Nm) + 90°</b>
Tie Rod Jam Nuts	<b>14 ft-lbs (19 Nm)</b>
Transmission Bell Crank Nut	<b>18 ft-lb (24 Nm)</b>
Transmission Case Screws	<b>20 ft-lbs (27 Nm)</b>
Transmission Drain / Fill Plugs	<b>14 ft-lbs (19 Nm)</b>
Transmission Isolator Bolt (rear)	<b>33 ft-lb (45 Nm)</b>
Transmission Rear Mount Bracket Fasteners	<b>22 ft-lb (30 Nm)</b>



## GENERAL INFORMATION

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ITEM	TORQUE
Transmission Joint Bracket Bolts	44 ft-lb (60 Nm)
Transmission Park Flange Screws	10 ft-lb (14 Nm)
Transmission Sector Gear Cover	12 ft-lb (16 Nm)
Transmission Shift Fork Screws	10 ft-lb (14 Nm)
Transmission Snorkel Tube Locking Screw	10 ft-lb (14 Nm)
Valve Cover Bolts	7 ft-lbs (10 Nm)
Visor Mounting Screws	8 ft-lb (11 Nm)
Voltage Regulator Fasteners	5 ft-lb (7 Nm)
Water Pump Impeller	7 ft-lb (10 Nm) (Apply Loctite® 204™ to bolt threads)
Water Pump Cover Bolts	7 ft-lb (10 Nm) (Apply Loctite® 204™ to bolt threads)
Wheel Lug Nuts	Aluminum: 120 ft-lbs (163 Nm) Steel: 60 ft-lb (81 Nm)

# GENERAL INFORMATION

## Conversion Table

UNIT OF MEASURE	MULTIPLIED BY	CONVERTS TO
ft-lbs	x 12	= in-lbs
in-lbs	x 0.0833	= ft-lbs
ft-lbs	x 1.356	= Nm
in-lbs	x 0.0115	= kg-m
Nm	x 0.7376	= ft-lbs
kg-m	x 7.233	= ft-lbs
kg-m	x 86.796	= in-lbs
kg-m	x 10	= Nm
inch	x 25.4	= mm
mm	x 0.03937	= inch
inch	x 2.54	= cm
mile (mi)	x 1.6	= km
km	x 0.6214	= mile
ounces (oz)	x 28.35	= grams (g)
fluid ounces (fl oz)	x 29.57	= cubic centimeters (cc)
cubic centimeters (cc)	x .03381	= fluid ounces
grams (g)	x 0.035	= ounces
pounds (lb)	x 0.454	= kg
kilogram (kg)	x 2.2046	= lbs
cubic inches (cu in)	x 16.387	= cc
cubic centimeters (cc)	x 0.061	= cubic inches
US quarts	x 0.946	= liters (L)
liters (L)	x 1.057	= US quarts
US gallons	x 3.785	= liters (L)
liters (L)	x 0.264	= US gallons
PSI	x 6.895	= kilopascals (kPa)
kilopascals (kPa)	x 0.145	PSI
$\pi (3.14) \times \text{Radius}^2 \times \text{Height} =$		= cylinder volume
°C to °F:	$9/5 (°C + 32)$	= °F
°F to °C:	$5/9 (°F - 32)$	= °C

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## GENERAL INFORMATION

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### Standard Bolt Torque Specification

BOLT SIZE	GRADE 2 FT. LBS. (NM)	GRADE 5 FT. LBS. (NM)	GRADE 8 FT. LBS. (NM)
1/4-20	5 (7)	8 (11)	12 (16)
1/4-28	6 (8)	10 (14)	14 (19)
5/16-18	11 (15)	17 (23)	25 (35)
5/16-24	12 (16)	19 (26)	29 (40)
3/8-16	20 (27)	30 (40)	45 (62)
3/8-24	23 (32)	35 (48)	50 (69)
7/16-14	30 (40)	50 (69)	70 (97)
7/16-20	35 (48)	55 (76)	80 (110)
1/2-13	50 (69)	75 (104)	110 (152)
1/2-20	55 (76)	90 (124)	120 (166)

### Metric Bolt Torque Specification

BOLT SIZE	GRADE				
	4.6	4.8	8.8 / 8.9	10.9	12.9
	FT.— LBS. (NM) DRY THREADS				
M3	0.3 (0.5)	0.5 (0.7)	1 (1.3)	1.5 (2)	1.5 (2)
M4	0.8 (1.1)	1 (1.5)	2 (3)	3 (4.5)	4 (5)
M5	1.5 (2.5)	2 (3)	4.5 (6)	6.5 (9)	7.5 (10)
M6	3 (4)	4 (5.5)	7.5 (10)	11 (15)	13 (18)
M8	7 (9.5)	10 (13)	18 (25)	26 (35)	33 (45)
M10	14 (19)	18 (25)	37 (50)	55 (75)	63 (85)
M12	26 (35)	33 (45)	63 (85)	97 (130)	11 (150)
M14	37 (50)	55 (75)	103 (140)	151 (205)	177 (240)
M16	59 (80)	85 (115)	159 (215)	232 (315)	273 (370)
M18	81 (110)	118 (160)	225 (305)	321 (435)	376 (510)



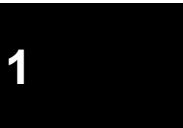
# GENERAL INFORMATION

## SAE Tap / Drill Sizes

THREAD SIZE	DRILL SIZE	THREAD SIZE	DRILL SIZE
#0-80	3/64	1/2-13	27/64
#1-64	53	1/2-20	29/64
#1-72	53	9/16-12	31/64
#2-56	51	9/16-18	33/64
#2-64	50	5/8-11	17/32
#3-48	5/64	5/8-18	37/64
#3-56	45	3/4-10	21/32
#4-40	43	3/4-16	11/16
#4-48	42	7/8-9	49/64
#5-40	38	7/8-14	13/16
#5-44	37	1-8	7/8
#6-32	36	1-12	59/64
#6-40	33	1 1/8-7	63/64
#8-32	29	1 1/8-12	1 3/64
#8-36	29	1 1/4-7	1 7/64
#10-24	24	1 1/4-12	1 11/64
#10-32	21	1 1/2-6	1 11/32
#12-24	17	1 1/2-12	1 27/64
#12-28	4.6 mm	1 3/4-5	1 9/16
1/4-20	7	1 3/4-12	1 43/64
1/4-28	3	2-4 1/2	1 25/32
5/16-18	F	2-12	1 59/64
5/16-24	I	2 1/4-4 1/2	2 1/32
3/8-16	O	2 1/2-4	2 1/4
3/8-24	Q	2 3/4-4	2 1/2
7/16-14	U	3-4	2 3/4
7/16-20	25/64		

## Metric Tap / Drill Sizes

TAP SIZE	DRILL SIZE	DECIMAL	NEAREST FRACTION
3 x .50	#39	0.0995	3/32
3 x .60	3/32	0.0937	3/32
4 x .70	#30	0.1285	1/8
4 x .75	1/8	0.125	1/8
5 x .80	#19	0.166	11/64
5 x .90	#20	0.161	5/32
6 x 1.00	#9	0.196	13/64
7 x 1.00	16/64	0.234	15/64
8 x 1.00	J	0.277	9/32
8 x 1.25	17/64	0.265	17/64
9 x 1.00	5/16	0.3125	5/16
9 x 1.25	5/16	0.3125	5/16
10 x 1.25	11/32	0.3437	11/32
10 x 1.50	R	0.339	11/32
11 x 1.50	3/8	0.375	3/8
12 x 1.50	13/32	0.406	13/32
12 x 1.75	13/32	0.406	13/32



# GENERAL INFORMATION

## Decimal Equivalents

FRACTION	DECIMAL	MM TO INCHES
1/64	0.0156"	
1/32	0.0312"	1 mm = 0.0394"
3/64	0.0469"	
1/16	0.0625"	
5/64	0.0781"	2 mm = 0.0787"
3/32	0.0938"	
7/64	0.1094"	3 mm = 0.1181"
1/8	0.1250"	
9/64	0.1406"	
5/32	0.1563"	4 mm = 0.1575"
11/64	0.1719"	
3/16	0.1875"	5 mm = 0.1969"
13/64	0.2031"	
7/32	0.2188"	
15/64	0.2344"	6 mm = 0.2362"
1/4	0.25"	
17/64	0.2656"	7 mm = 0.2756"
9/32	0.2813"	
19/64	0.2969"	
5/16	0.3125"	8 mm = 0.3150"
21/64	0.3281"	
11/32	0.3438"	9 mm = 0.3543"
23/64	0.3594"	
3/8	0.375"	
25/64	0.3906"	10 mm = 0.3937"
13/32	0.4063"	
27/64	0.4219"	11 mm = 0.4331"
7/16	0.4375"	
29/64	0.4531"	
15/32	0.4688"	12 mm = 0.4724"
31/64	0.4844"	
1/2	0.500"	13 mm = 0.5118"
33/64	0.5156"	
17/32	0.5313"	
35/64	0.5469"	14 mm = 0.5512"
9/16	0.5625"	
37/64	0.5781"	15 mm = 0.5906"
19/32	0.5938"	
39/64	0.6094"	
5/8	0.625"	16 mm = 0.6299"

FRACTION	DECIMAL	MM TO INCHES
41/64	0.6406"	
21/32	0.6563"	17 mm = 0.6693"
43/64	0.6719"	
11/16	0.6875"	
45/64	0.7031"	18 mm = 0.7087"
23/32	0.7188"	
47/64	0.7344"	19 mm = 0.7480"
3/4	0.750"	
49/64	0.7656"	
25/32	0.7813"	20 mm = 0.7874"
51/64	0.7969"	
13/16	0.8125"	21 mm = 0.8268"
53/64	0.8281"	
27/32	0.8438"	
55/64	0.8594"	22 mm = 0.8661"
7/8	0.875"	
57/64	0.8906"	23 mm = 0.9055"
29/32	0.9063"	
59/64	0.9219"	
15/16	0.9375"	24 mm = 0.9449"
61/64	0.9531"	
31/32	0.9688"	25 mm = 0.9843"
63/64	0.9844"	
1	1.000"	

**CHAPTER 2  
MAINTENANCE**

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    BREAK-IN PERIOD ..... 2.3

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## PERIODIC MAINTENANCE CHART

### Periodic Maintenance Overview

Inspection, adjustment and lubrication of important components are explained in the periodic maintenance chart.

Inspect, clean, lubricate, adjust and replace parts as necessary. When inspection reveals the need for replacement parts, use genuine Pure Polaris parts available from your Polaris dealer.

2

**NOTE: Service and adjustments are critical. If you're not familiar with safe service and adjustment procedures, have a qualified dealer perform these operations.**

Maintenance intervals in the following chart are based upon average riding conditions and an average vehicle speed of approximately 10 miles per hour. Vehicles subjected to severe use must be inspected and serviced more frequently.

### Severe Use Definition

- Frequent immersion in mud, water or sand
- Racing or race-style high RPM use
- Prolonged low speed, heavy load operation
- Extended idle
- Short trip cold weather operation

Pay special attention to the oil level. A rise in oil level during cold weather can indicate contaminants collecting in the oil sump or crankcase. Change oil immediately if the oil level begins to rise. Monitor the oil level, and if it continues to rise, discontinue use and determine the cause or see your dealer.

### Break-In Period

The break-in period consists of the first 25 hours of operation. Careful treatment of a new engine and drive components will result in more efficient performance and longer life for these components.

- Drive vehicle slowly at first while varying the throttle position. Do not operate at sustained idle.
- Perform regular checks on fluid levels and other areas outlined on the daily pre-ride inspection checklist.
- Change both the engine oil and filter after 25 hours or one month.
- See "Owner's Manual" for additional break-in information.

### Maintenance Chart Key

The following symbols denote potential items to be aware of during maintenance:

■ = **CAUTION: Due to the nature of these adjustments, it is recommended this service be performed by an authorized Polaris dealer.**

► = **SEVERE USE ITEM: See information provided above.**

E = **Emission Control System Service (California).**

**NOTE: Inspection may reveal the need for replacement parts. Always use genuine Polaris parts.**



Improperly performing the procedures marked ■ could result in component failure and lead to serious injury or death. Have an authorized Polaris dealer perform these services.

# MAINTENANCE

## Pre-Ride - 50 Hour Maintenance Interval

ITEM	MAINTENANCE INTERVAL (WHICHEVER COMES FIRST)			REMARKS	
	HOURS	CALENDAR	MILES (KM)		
	Steering	-	-	Inspect or adjust as needed. See Pre-Ride Checklist on Page 2.10.	
	Front / Rear Suspension	-	-		
	Tires	-	-		
	Brake Fluid Level	-	-		
	Brake Pedal Travel	-	-		
	Brake System	-	-		
	Wheels / Fasteners	-	-		
	Frame Fasteners	-	-		
	Engine Oil Level	-	-		
▶ E	Intake Baffle Box Drain	-	Daily	-	Inspect drain at the bottom of the air intake baffle box for obstructions
	Coolant Level	-	Daily	-	Check level daily
	Suspension Bushings	-	Daily	-	Lubricate daily or after each use in mud or water
	Spark Arrestor	-	Daily	-	Clean daily when driving in mud and water; replace a cracked or damaged arrestor before operating
	Head Lights / Tail Lights	-	Daily	-	Check operation
▶	Power Steering (if equipped)	-	Daily	-	Turn key on, check for smooth operation
▶ ■	Brake Pad Wear / Inspect Parking Brake Pads (INT'L)	10 H	Monthly	100 (160)	Inspect periodically
	Fuel System	25 H	Monthly	-	Inspect; cycle key to pressurize fuel pump; check lines and fittings for leaks and abrasion
▶ ■	Parking Brake Cable Adjustment (INT'L)	25 H	-	-	Inspect; adjust tension after first 25 hours
▶ E	Air Filter	-	Weekly	-	Inspect; replace as needed
▶ E	Engine Breather	25 H	Monthly	150 (250)	Inspect; clean
	Battery	25 H	Monthly	250 (400)	Check terminals; clean; test
▶ E	Engine Oil & Filter Change (Break-In Period)	25 H	1 M	-	Perform a break-in oil and filter change at 25 hours or one month; perform every 50 hours or 6 months thereafter
▶	Front Gearcase Lubricant (Demand Drive)	25 H	1 M	250 (400)	Initial fluid level inspection; add lubricant if needed
▶	Transmission Lubricant (AGL)	25 H	1 M	250 (400)	Initial fluid level inspection; add lubricant if needed
▶	General Lubrication	50 H	3 M	500 (800)	Lubricate all fittings, pivots, cables, etc.
■ E	Throttle Cable / Throttle Pedal	50 H	6 M	500 (800)	Inspect; adjust; replace if necessary
E	Throttle Body Intake Ducts/ Flange	50 H	6 M	500 (800)	Inspect ducts for proper sealing / air leaks
	Shift Cable / Linkage	50 H	6 M	500 (800)	Inspect; adjust as needed
■	Steering	50 H	6 M	500 (800)	Lubricate (if applicable)
▶	Front / Rear Suspension	50 H	6 M	500 (800)	Lubricate (if applicable)

▶ Perform these procedures more often for vehicles subjected to severe use.

E Emission Control System Service (California)

■ Have an authorized Polaris dealer perform these services.

## 2.4

## 50 - 500 Hour Maintenance Interval

ITEM	MAINTENANCE INTERVAL (WHICHEVER COMES FIRST)			REMARKS
	HOURS	CALENDAR	MILES (KM)	
■ Cooling System	50 H	6 M	500 (800)	Inspect coolant strength seasonally; pressure test system yearly
■ Drive Belt	50 H	6 M	1000 (1600)	Inspect; replace as needed
▶ Engine Oil Lines/Fasteners	50 H	6 M	1000 (1600)	Inspect for leaks and loose fittings
▶ Engine Oil/Filter Change	100 H	6 M	1000 (1600)	Perform a break-in oil change at 25 hours or one month
▶ Parking Brake Cable Adjustment (INT'L)	100 H	6 M	1000 (1600)	Inspect; adjust tension as needed
▶ Front Gearcase Lubricant (Demand Drive)	100 H	12 M	1000 (1600)	Change lubricant
▶ Transmission Lubricant (AGL)	100 H	12 M	1000 (1600)	Change lubricant
■ E Fuel System	100 H	12 M	1000 (1600)	Check for leaks at fill cap, fuel line / rail, and fuel pump.
■ E Spark Plug Inspection	100 H	12 M	1000 (1600)	Inspect; replace as needed; torque to specification
▶ Radiator	100 H	12 M	1000 (1600)	Inspect; clean external surfaces
▶ Cooling Hoses	100 H	12 M	1000 (1600)	Inspect for leaks; pressure test system
▶ Engine Mounts	100 H	12 M	1000 (1600)	Inspect, torque to specification
▶ Exhaust Silencer / Pipe	100 H	12 M	1000 (1600)	Inspect
▶ Wiring	100 H	12 M	1000 (1600)	Inspect for wear, routing, security; inspect connectors subjected to water, mud, etc.
■ Clutches (Drive and Driven)	100 H	12 M	1000 (1600)	Inspect; clean; replace worn parts
■ Front Wheel Bearings	100 H	12 M	1000 (1600)	Inspect; replace as needed
▶ Shocks	100 H	-	-	Visually inspect shock seals
▶ Shocks	-	12 M	1500 (2400)	Change shock oil and inspect seals
■ Brake Fluid	200 H	24 M	2000 (3200)	Change every two years (DOT 4)
▶ Spark Arrestor	200 H	24 M	2000 (3200)	Clean daily when driving in mud and water; replace a cracked or damaged arrestor before operating
■ E Valve Clearance	500 H	-	5000 (8000)	Inspect; adjust as needed
■ E Spark Plug Replacement	500 H	36 M	5000 (8000)	Replace; torque to specification
▶ Coolant	-	60 M	-	Replace coolant
■ Toe Adjustment	-	-	-	Inspect periodically; adjust when parts are replaced
▶ Headlight Aim	-	-	-	Adjust as needed

▶ Perform these procedures more often for vehicles subjected to severe use.

E Emission Control System Service (California)

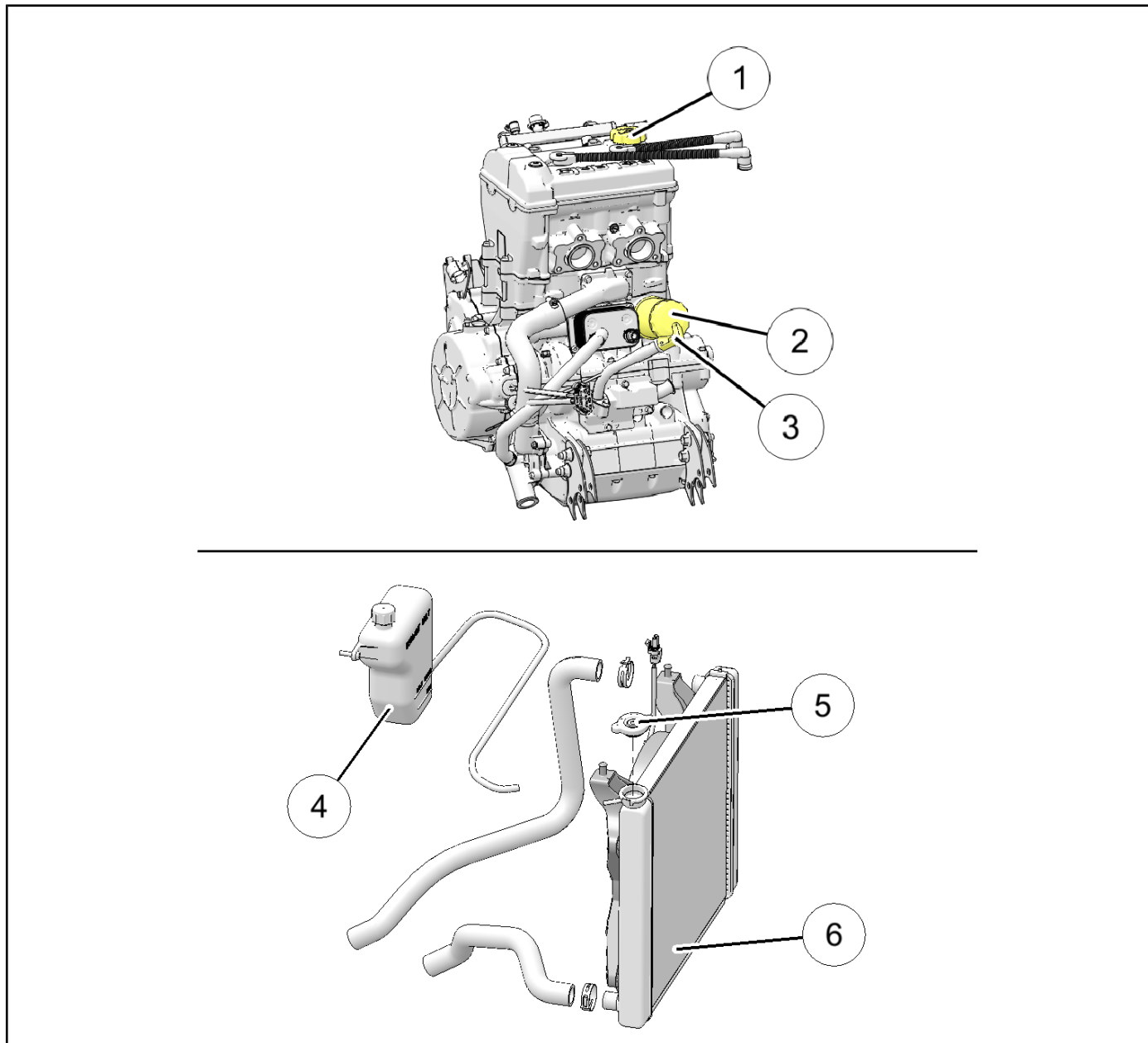
■ Have an authorized Polaris dealer perform these services.

# MAINTENANCE

## Maintenance Quick Reference

ITEM	LUBE REC.	METHOD	FREQUENCY*
<b>Oil Fill Cap</b> ①: <b>Oil Filter</b> ② / <b>Dipstick</b> ③: - Behind Engine Access Panel	Polaris PS-4 or Polaris PS-4 Extreme Duty	Remove cargo box panel and add oil to proper level on dipstick	Perform a break-in oil and filter change at 25 hrs or one month; perform every 50 hrs thereafter
<b>Engine Coolant Reservoir</b> ④ <b>Radiator Cap</b> ⑤ <b>Radiator</b> ⑥	Polaris 50/50 Coolant	Remove hood panel. Maintain coolant level in coolant reservoir bottle and radiator.	Check level daily; change coolant every two years

\* More often under severe use, such as operation in water or under severe loads.



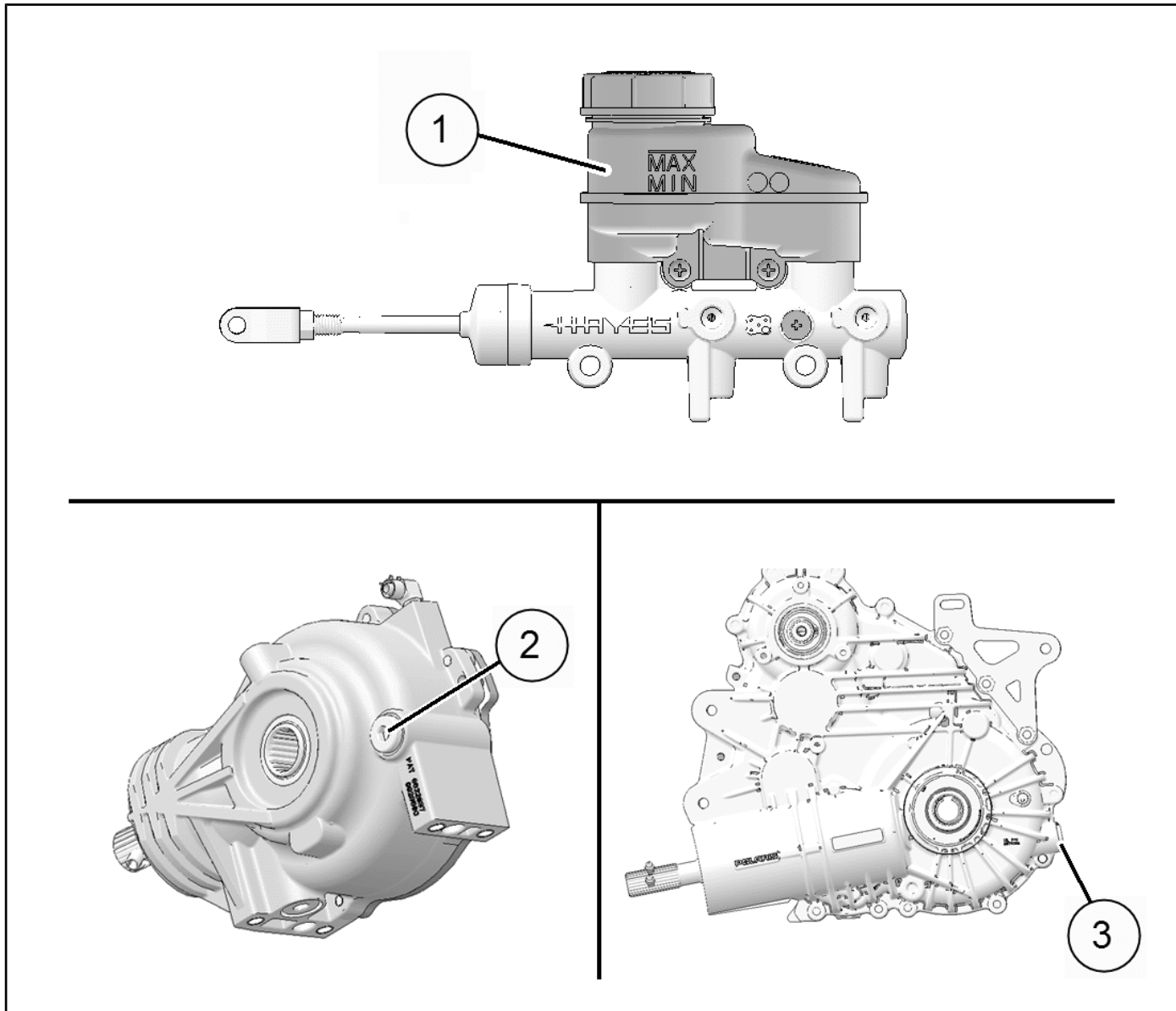


# MAINTENANCE

ITEM	LUBE REC.	METHOD	FREQUENCY*
Brake Fluid	Polaris DOT 4 Brake Fluid	Maintain fluid level between "MAX" and "MIN" lines on the master cylinder reservoir ①	Check level during pre-ride inspection; change fluid every two years
Front Gearcase	Polaris Demand Drive	Add lubricant until it is visible at the fill hole threads ② ≈ 7.5 oz. (222 mL)	Initial level check at 25 hours or 1 month; Change lubricant at 100 hours or every 12 months, whichever comes first
Transmission	Polaris AGL	Add lubricant until it is visible at the fill hole threads ③	

2

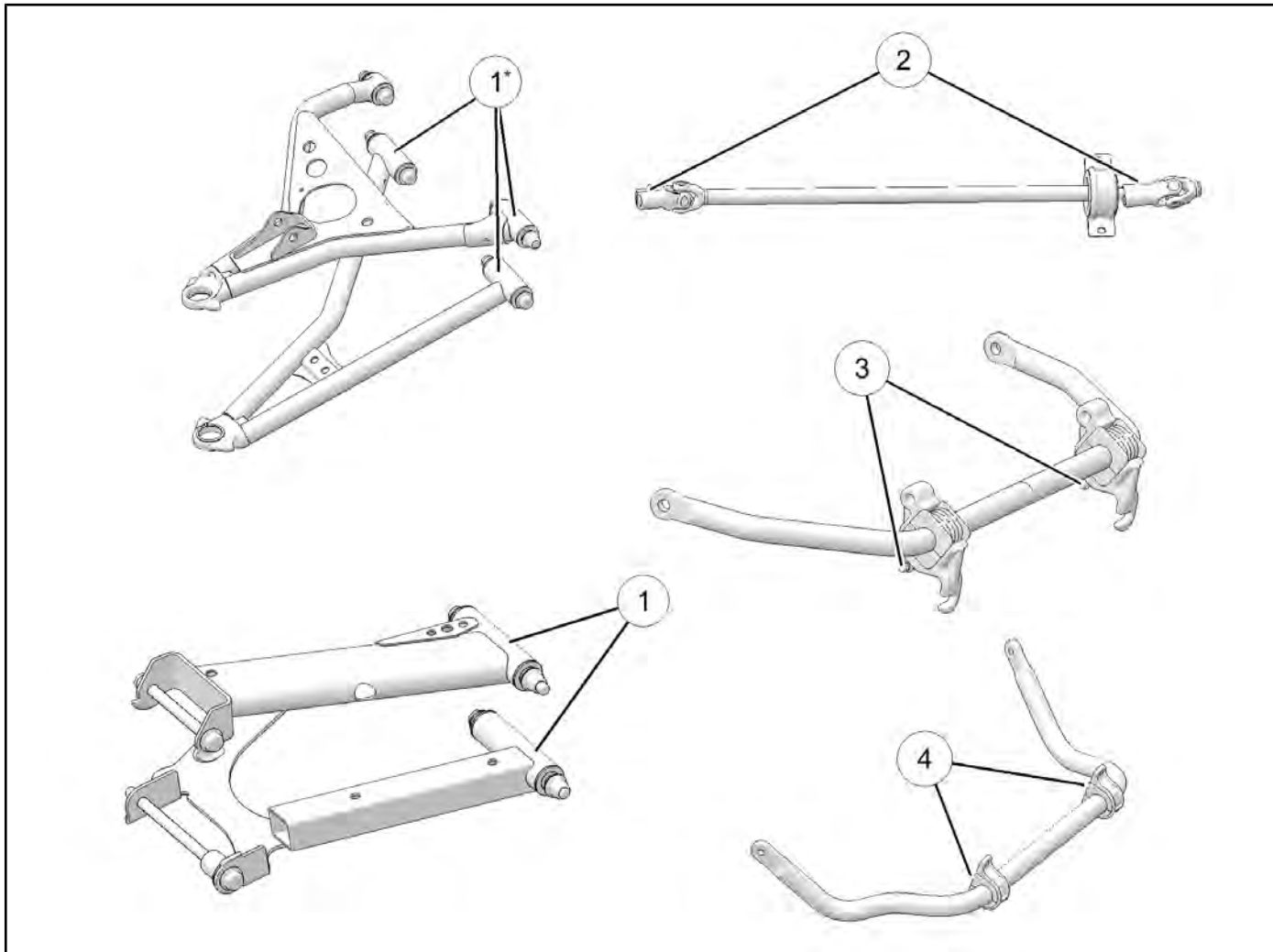
\* More often under severe use, such as operation in water or under severe loads.



# MAINTENANCE

## Grease Lubrication Points

ITEM	METHOD	LUBE	FREQUENCY
Control Arm Pivot Bushings	Grease 3 fittings ① on each side	Polaris All Season Grease	Grease fittings every 500 miles (800 km); Grease before long periods of storage, and after thoroughly washing or submerging the vehicle. Apply grease until all traces of water has been purged out at each of these areas.
Prop Shaft Yokes	Grease middle and rear fittings ②	Polaris Premium U- Joint Grease	
Front Stabilizer Bar Bushings (50" and XC)	Grease the fitting on each side ③	Polaris All Season Grease	
Rear Stabilizer Bar Bushings	Grease 2 fittings ④ through the skid plate access holes on each side	Polaris All Season Grease	



\*There is no grease point on the front upper control arm rear mount.

## GENERAL VEHICLE INSPECTION AND MAINTENANCE

### Pre-Ride / Daily Inspection

Perform the following pre-ride inspection daily, and when servicing the vehicle at each scheduled maintenance.

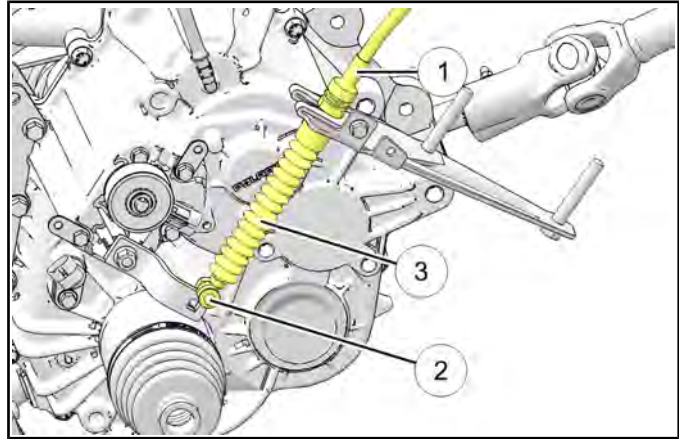
- Engine Oil - Check for proper level on dipstick (see Chapter 2 – Engine Oil Level, page 2.14)
- Tires - check condition and pressures
- Fuel tank - fill to proper level
- All brakes - check operation and fluid level and adjustment (includes parking brake on INT'L Model)
- Headlights/Taillights/Brakelights - also check operation of all indicator lights, instrument cluster and switches
- Ignition switch - check for proper function
- Wheels - check for tightness of wheel nuts and axle nuts; check to be sure axle nuts are secured by cotter pins
- Engine Intake Pre-Filter - Inspect pre-filter and clean with soapy water and low pressure compressed air if necessary
- PVT Intake Pre-Filter - Inspect pre-filter and clean with soapy water and low pressure compressed air if necessary
- Steering - check for free operation noting any unusual looseness in any area
- Loose parts - visually inspect vehicle for any damaged or loose nuts, bolts or fasteners
- Engine coolant - check for proper level at the recovery bottle
- Drive Shaft Boots - Inspect inner and outer boots for tears or damage on both front and rear drive shafts
- Check all front and rear suspension components for wear or damage.

### Shift Cable Inspection / Adjustment

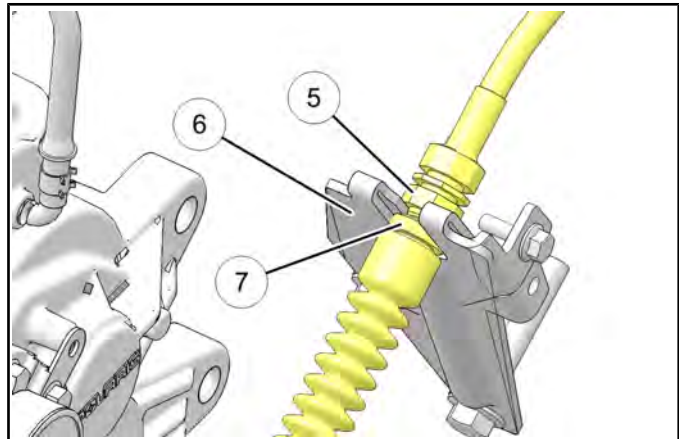
Shift cable adjustment may be necessary if symptoms include:

- No gear position or AWD display on instrument cluster
- Ratcheting noise on deceleration
- Inability to engage into a gear
- Excessive gear lash (noise)
- Gear selector moving out of desired range

1. Locate the shift cable ① attached to the transmission case in the right rear wheel well area.
2. Inspect shift cable, clevis pin, pivot bushings ②, and dust boot ③. Replace if worn or damaged.



3. If adjustment is required, loosen the lower jam nut ⑤ and pull the cable out of the mount ⑥ to move the upper jam nut ⑦.



4. Adjust the shift cable so there is the same amount of cable travel when shifting slightly past HIGH gear and PARK.
5. Thread the upper or lower jam nut as required to obtain proper cable adjustment.

**NOTE: This procedure may require a few attempts to obtain the proper adjustment.**

6. Once the proper adjustment is obtained, place the shift cable and upper jam nut into the mount. Tighten the lower jam nut against the mount.
7. Start engine and shift through all gears to ensure the shift cable is properly adjusted. If transmission still ratchets after cable adjustment, the transmission will require service.

# MAINTENANCE

## FUEL SYSTEM

### Fuel System

#### WARNING

Gasoline is extremely flammable and explosive under certain conditions.

Always stop the engine and refuel outdoors or in a well ventilated area.

Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.

Do not overfill the tank. Do not fill the tank neck.

If you get gasoline in your eyes or if you swallow gasoline, seek medical attention immediately.

If you spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing.

Never start the engine or let it run in an enclosed area. Engine exhaust fumes are poisonous and can result in loss of consciousness or death in a short time.

Never drain the fuel when the engine is hot. Severe burns may result.

### Fuel Tank Vent Line

Symptoms of a restricted fuel tank vent include the following: collapsing fuel tank, engine miss or hesitation, loss of engine performance or high exhaust temperatures.

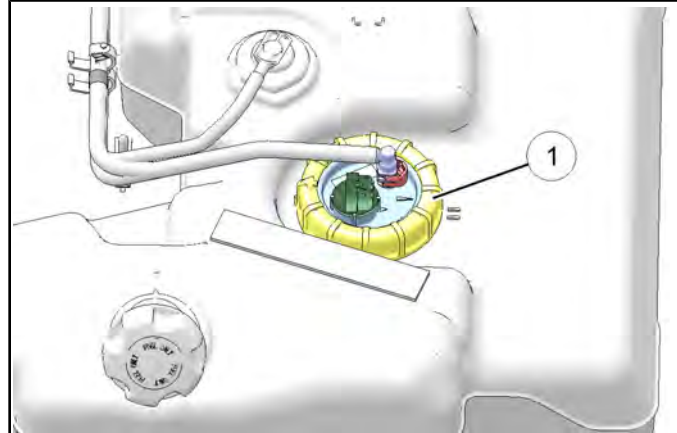
1. Remove the seats and the engine service panel.
2. Check the fuel tank vent line for signs of wear, deterioration or damage. Replace vent line if necessary.
3. Be sure the vent line is routed properly and secured with cable tie(s).

**NOTE: Make sure vent line is not kinked or pinched.**

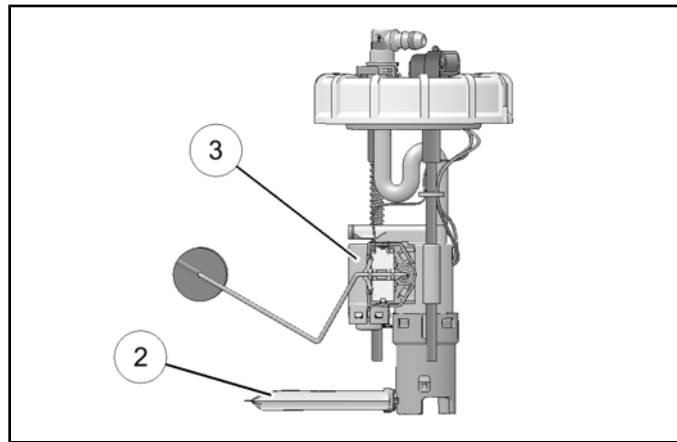
### Fuel Pump / Fuel Filter

The fuel pump assembly ① is located in the fuel tank under the passenger seat.

The RZR 900 EFI engine uses a serviceable, high-volume, high-pressure, fuel pump that includes a preliminary filter ② and an internal fine filter ③ located before the pump regulator.



**NOTE: Neither filter is serviceable individually. Must replace the fuel pump as an assembly.**



Refer to Chapter 4 for Fuel Pump Replacement, page 4.22 and all other information related to the EFI System.

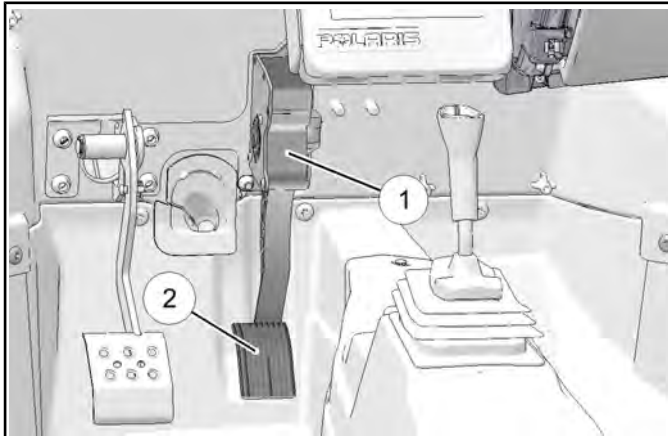
## Fuel Lines

1. Check the quick connect fuel line ① at the fuel tank for signs of wear, deterioration, damage or leakage. Replace line if necessary.
2. Locate the fuel supply fitting ② going to the fuel rail by removing the cargo box access panel. Check the line and quick-connect fitting for signs of wear, deterioration, damage or leakage. Replace line if necessary.
3. Be sure fuel lines are routed and retained properly.

**IMPORTANT: Lines should not be kinked or pinched.**

## Throttle Pedal Inspection

This vehicle is equipped with a Pedal Position Sensor ① used to detect when the throttle pedal ② is pushed or released.



The throttle pedal should move freely and always return to its idle state (no throttle) when released.

Check throttle pedal periodically.



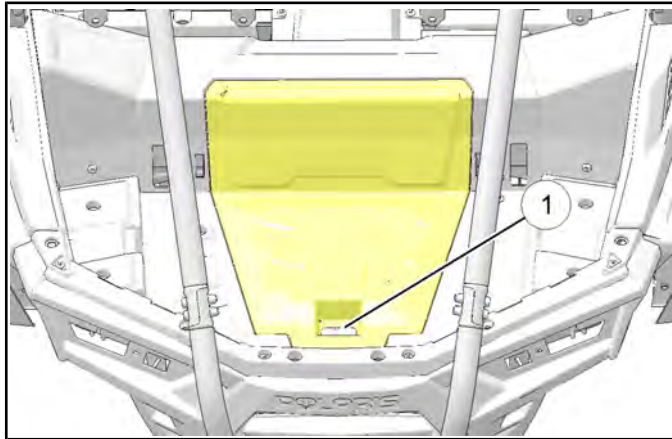
# MAINTENANCE

## ENGINE SYSTEM

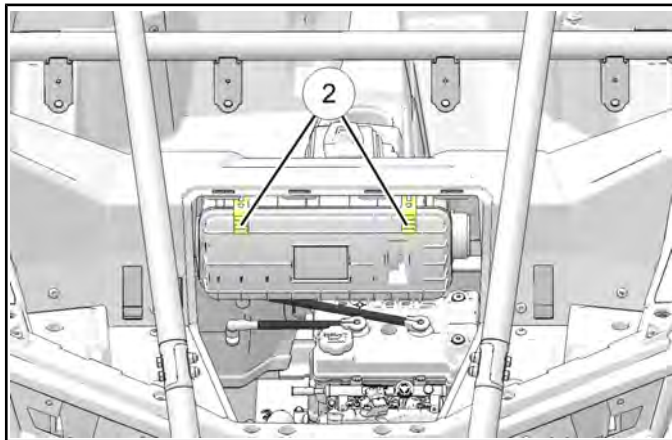
### Engine Air Filter Service

Inspect the air filter at the intervals outlined in the Periodic Maintenance Chart. In extremely dusty conditions, air filter replacement will be required more often.

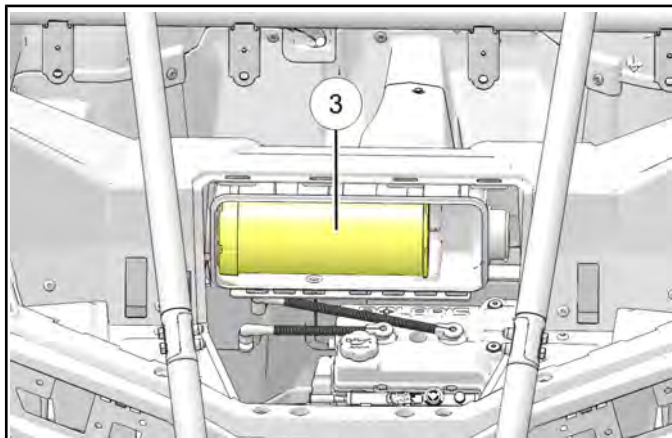
1. Remove the cargo box access panel ①.



2. Disengage the two cover straps ②.



3. Pull cover rearward far enough to remove air filter ③.



4. Inspect the air box for oil or water deposits. Wipe away any deposits with a clean shop towel.

**NOTE: If the filter has been soaked with fuel or oil it must be replaced.**

5. Inspect the air filter and replace if necessary.

**NOTE: DO NOT attempt to clean the air filter.**

6. Place the air filter into the air box and reinstall the air box cover.

**NOTE: Be sure the lower tabs on the air box cover are properly engaged into the airbox.**

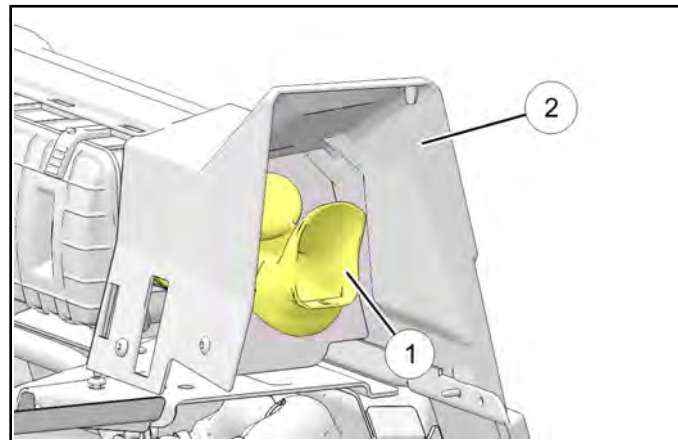
7. Engage the cover straps.

8. Reinstall the cargo box access panel.

### Intake Duct Inspection

It is recommended that the intake be inspected daily.

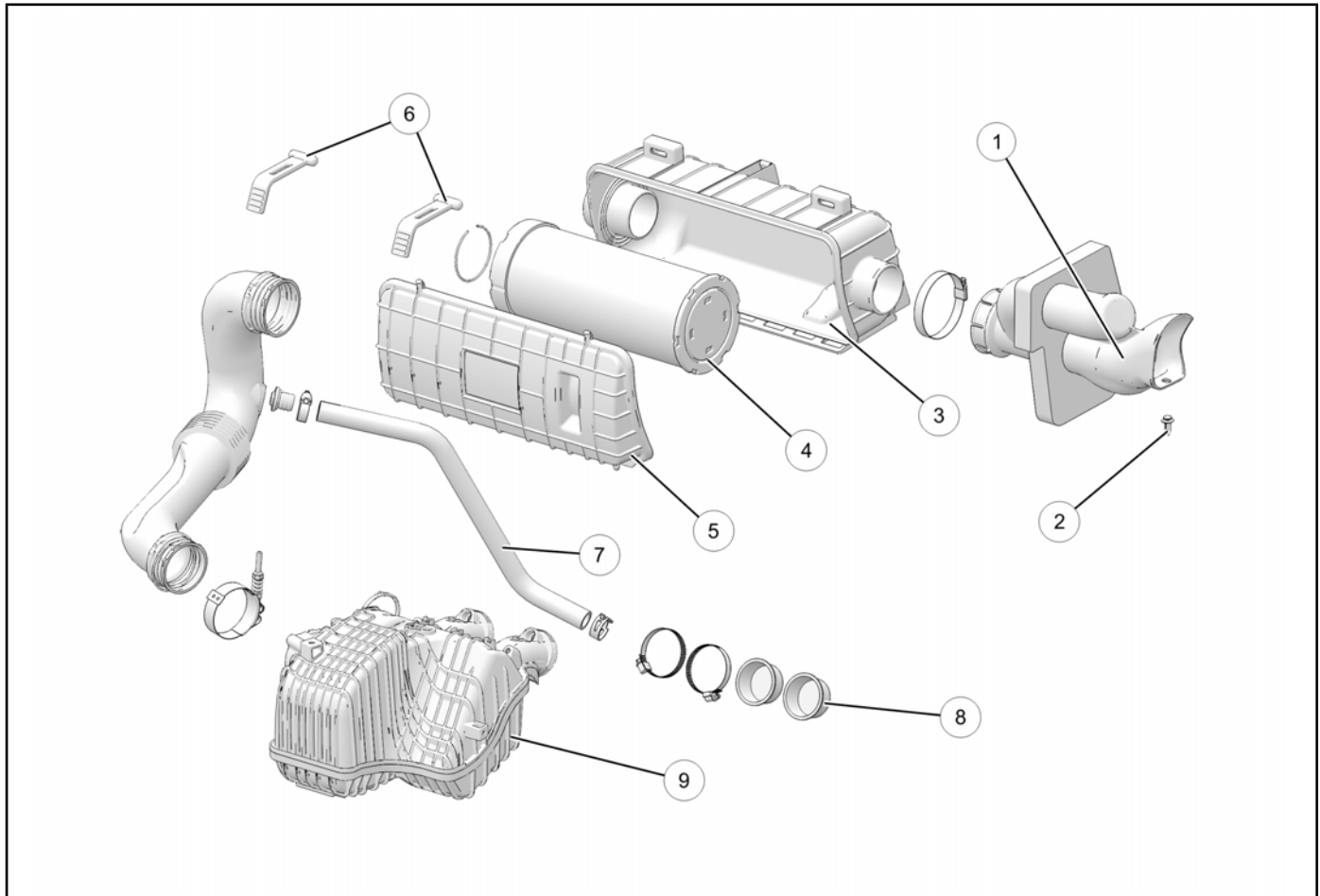
1. Access the air intake duct ① underneath the intake doghouse cover 2.



2. Check the area for debris.

3. Remove the air box cover and clean out any debris.

Air Box / Filter Assembly View



2

① Intake Airbox Hose	⑥ Airbox Clips
② Drain Cap	⑦ Vent Hose
③ Airbox	⑧ Intake Tubes
④ Air Filter	⑨ Engine Intake Housing
⑤ Airbox Cover	

# MAINTENANCE


## Engine Oil Level

The RZR 900 engine has a wet-sump design, meaning the engine oil is contained in the bottom of the crankcase. To check the oil level, follow the procedure listed below:

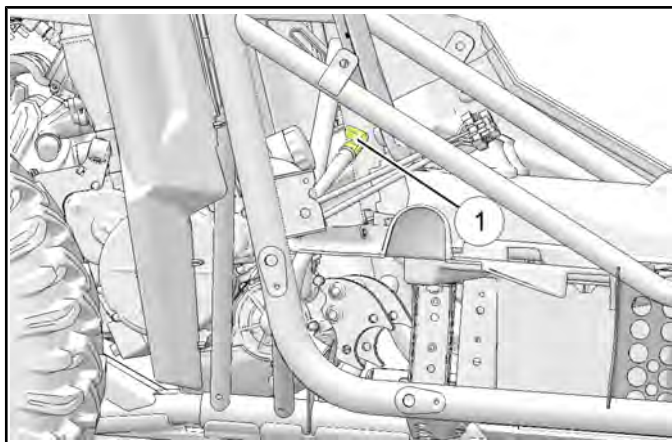
Access the oil dipstick through the opening in front of the passenger rear tire.

Access the oil fill cap through the cargo box access panel.

Polaris recommends the use of PS-4 Synthetic or PS-4 Extreme Duty Synthetic 4-Cycle Engine Oil.


<b>Recommended Engine Oil:</b>
<b>PS-4 (PN 2876244)</b> <i>Ambient Temp Range: -35° F to 100° F</i>
<b>PS-4 Extreme Duty (PN 2878920)</b> <i>Ambient Temp Range: 0° F to 120° F</i>
<b>Capacity: 2.5 Quarts (2.4 L)</b>

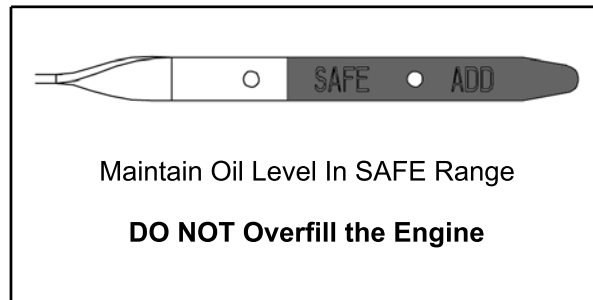
1. Position vehicle on a level surface and place the transmission in PARK.
2. Stop the engine and allow it to cool down before removing the dipstick.
3. Remove the access panel between the seats to access the dipstick.
4. Unlock the dipstick lever ①. Remove the dipstick and wipe it dry with a clean cloth.



5. Reinstall the dipstick and push it into place. Do not lock the dipstick.

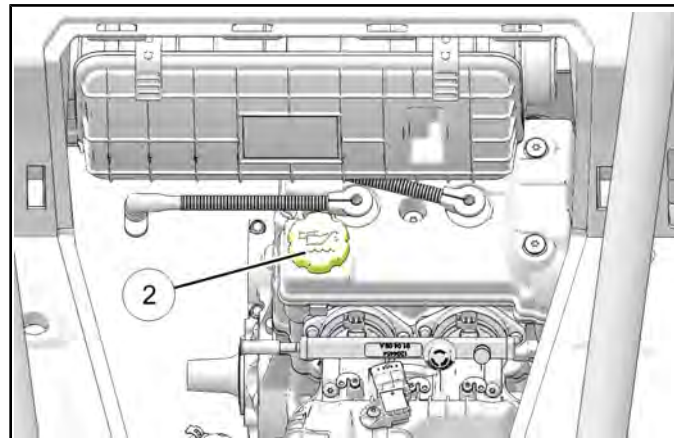
**NOTE: Make certain the dipstick is inserted all the way into the dipstick tube to keep the depth of the dipstick consistent.**

6. Remove the dipstick and check the oil level.
7. Add the recommended oil as necessary to bring the oil level within the SAFE range on dipstick. Do not overfill (see NOTE below).



**NOTE: A rising oil level between checks during cold weather operation can indicate contaminants such as gas or moisture collecting in the crankcase. If the oil level is over the upper mark, change the oil immediately.**

8. Add engine oil through the oil fill cap ② located on top of the valve cover, under the cargo box access panel.



9. When finished, reinstall dipstick and lock the lever.



## Engine Oil and Filter Change

Always change engine oil and filter at the intervals outlined in the Periodic Maintenance Chart. Always change the oil filter whenever changing the engine oil.

The engine oil dipstick is located on the front side of the engine. Access the dipstick through the engine service panel.

The engine oil fill cap is located on top of the valve cover. Access the oil fill cap through the cargo box access panel.

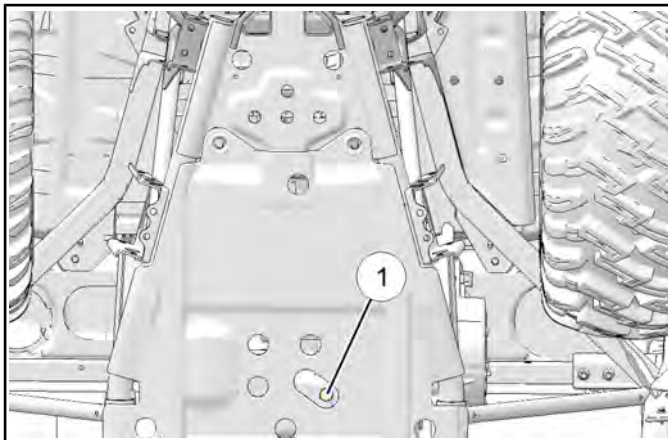
The crankcase drain plug is located on the bottom of the crankcase. Access the drain plug through the skid plate access hole located directly under the crankcase.

1. Position vehicle on a level surface and place the transmission in PARK.
2. Stop the engine and allow it to cool down.
3. Clean the area around the crankcase drain plug.

### CAUTION

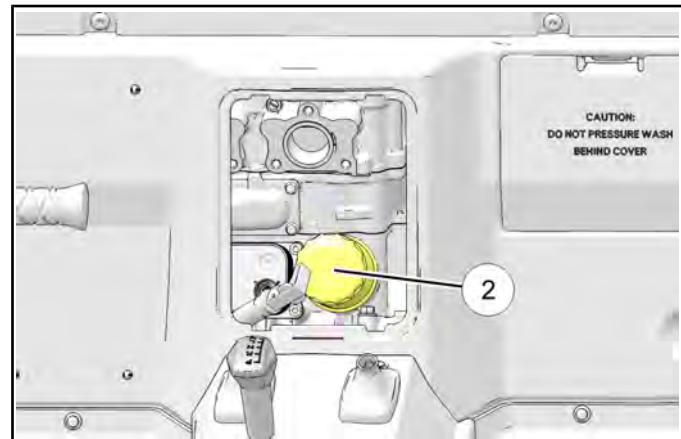
Use caution when performing this procedure. Do not allow hot engine oil to come into contact with skin, as serious burns may result.

4. Place a drain pan under the engine crankcase and remove the drain plug ①. Allow the oil to drain completely.



5. Remove the seats and engine service panel to access the oil filter.

6. Using the Oil Filter Wrench (PU-50105), turn the oil filter ② counter-clockwise to remove it.



**Oil Filter Wrench:**  
PU-50105: 2.5" (64 mm)

7. Using a clean dry cloth, clean the filter sealing surface on the engine crankcase.
8. Lubricate the O-ring on the new oil filter with a film of fresh engine oil. Check to make sure the O-ring is in good condition. Install it by hand until the O-ring contacts the sealing surface, then turn an additional 1/2 turn.



**Oil Filter Torque:**  
Turn by hand until filter O-ring contacts sealing surface, then turn an additional 1/2 turn.

9. Replace the sealing washer on drain plug.

**NOTE:** The sealing surface on the drain plug should be clean and free of burrs, nicks or scratches.



10. Reinstall the engine crankcase drain plug. Torque drain plug to specification.



**Engine Oil Drain Plug:**  
12 ft-lbs (16 Nm)

## MAINTENANCE


11. Remove oil fill cap (see Chapter 2 – Engine Oil Level, page 2.14). Fill engine with 2.5 quarts (2.4 L) of recommended engine oil.

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<b>Recommended Engine Oil:</b> <b>PS-4 (PN 2876244)</b> <i>Ambient Temp Range: -35° F to 100° F</i>
<b>PS-4 Extreme Duty (PN 2878920)</b> <i>Ambient Temp Range: 0° F to 120° F</i>
<b>Capacity: 2.5 Quarts (2.4 L)</b>

12. Verify the transmission is still in PARK.
13. Start the engine and allow it to idle for 30 seconds.
14. Stop the engine and inspect for oil leaks. Wait at least 15 seconds before removing the dipstick.
15. Unlock the dipstick lever. Remove the dipstick and wipe it dry with a clean cloth (see Chapter 2 – Engine Oil Level, page 2.14).
16. Reinstall the dipstick and push it into place. Do not lock the dipstick.

**NOTE: Make certain the dipstick is inserted all the way into the dipstick tube to keep the depth of the dipstick consistent.**

17. Remove the dipstick and check the oil level.
18. Add the recommended oil as necessary to bring the oil level within the SAFE range on dipstick. Do not overfill.

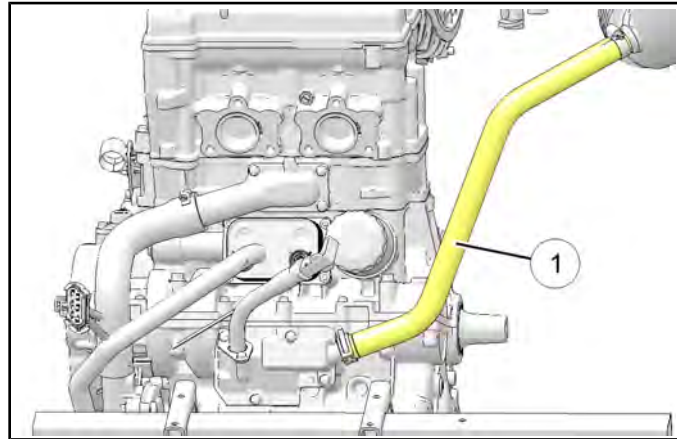

Maintain Oil Level In SAFE Range
<b>DO NOT Overfill the Engine</b>

19. When finished, reinstall the oil fill cap, oil dipstick and lock the lever.
20. Reinstall the cargo box access panel, engine service panel and seats.
21. Dispose of used oil and filter properly.

### Crankcase Breather Hose Inspection

The engine crankcase is equipped with a breather hose. Inspect the breather hose for possible kinks or wear. The hose is form fitted for proper fit.

Follow the breather hose ① from the crankcase to the engine intake duct.



**NOTE: Make sure hoses are not kinked or pinched.**

### Engine Cylinder Leak-down Test

A cylinder leak-down test is the best indication of engine condition. Follow tester manufacturer's instructions to perform a cylinder leak-down test. Never use high pressure leakage testers as crankshaft seals may dislodge and leak.

**Cylinder Leakage Service Limit: 20%**

**If leakage exceeds service limit, inspect the engine for the cause.**

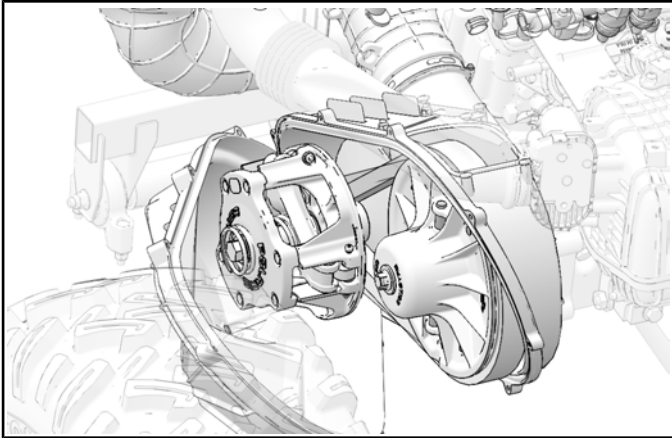
### Valve Clearance Inspection

**NOTE: Valve clearance inspection should be performed on a cold engine, at room temperature.**

**IMPORTANT: Do not rotate the engine backwards. The timing chain may jump teeth and lead to poor performance.**

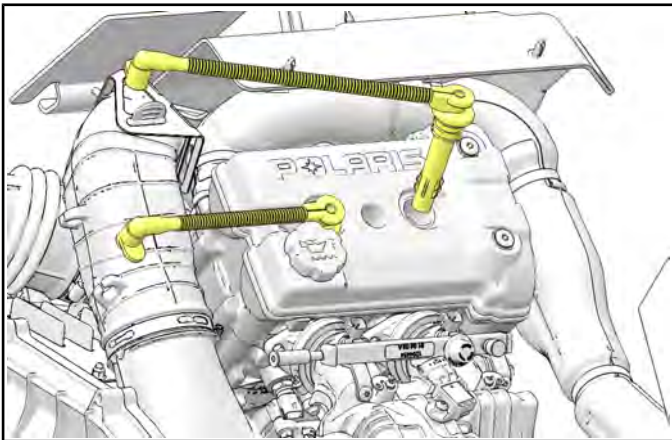
1. Remove the driver's seat. Disconnect the negative (-) battery cable.
2. Remove the engine access panel.
3. Remove eight screws retaining the outer clutch cover.

4. Maneuver the outer clutch cover to allow access to the drive clutch, in order to rotate the engine.

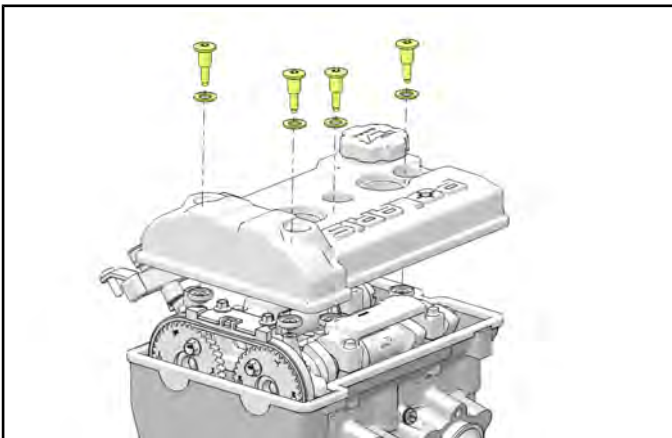


**NOTE:** Removal of left rear wheel or left rear shock is **NOT** necessary to perform this procedure.

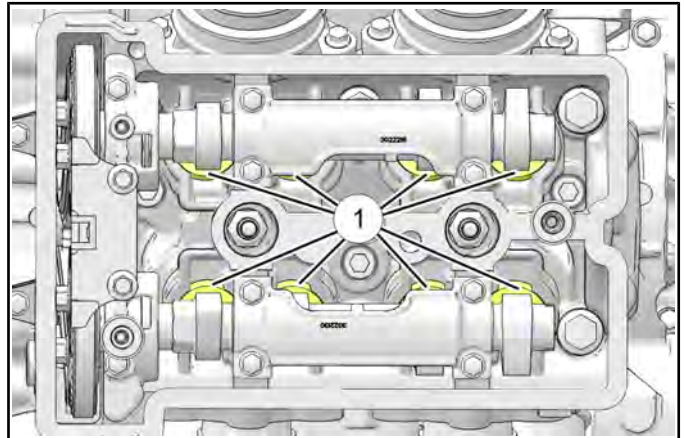
5. Remove the spark plug wires to gain access to valve cover as shown below.



6. Remove the four T40 bolts retaining the valve cover.

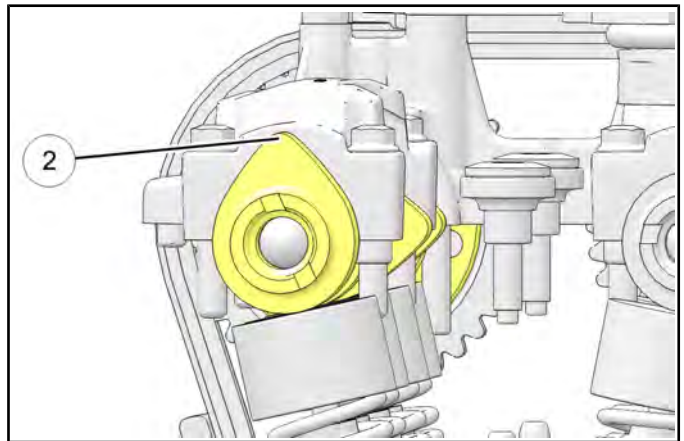


7. The engine will need to be rotated four times to inspect all eight valve clearances ①. Two valves can be measured at each camshaft lobe position.



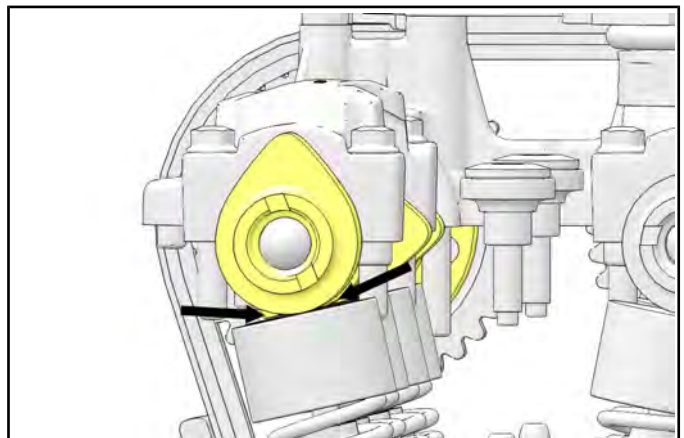
2

8. Rotate the drive clutch counter-clockwise until the cam lobes ② above the valves you are inspecting are facing up.



**IMPORTANT:** Do not rotate the engine backwards. The timing chain may jump teeth and lead to poor performance.

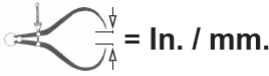
9. Measure the valve clearance using a feeler gauge.




## MAINTENANCE

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10. If the valve clearance is out of specification, proceed to Chapter 3 – Valve Clearance Adjustment, page 3.82.


Intake Valve Clearance (cold): <b>.006 ± .002" (0.15 ± 0.05 mm)</b>
Exhaust Valve Clearance (cold): <b>.008 ± .002" (0.20 ± 0.05 mm)</b>

11. Repeat steps 18-20 until all eight valves have been inspected.
12. If previously removed, apply anti-seize compound to the spark plug threads and reinstall the spark plugs. Torque spark plugs to specification.


Spark Plug Torque: <b>7 ft-lbs (10 Nm)</b>


13. Inspect the valve cover seal and replace if necessary.
14. Install **NEW** isolators on the valve cover bolts. Install the valve cover and the four T40 bolts. Torque bolts to specification.


Valve Cover Bolts: <b>7 ft-lbs (10 Nm)</b>

15. Install the spark plug wires back into their correct location.
16. Install the push rivet that retains the heat shield to the frame cross member.
17. Install the spark plug wires. Ensure wires are installed on their proper cylinder spark plug and pushed down all the way so they engage onto the spark plugs.

**NOTE: The engine will misfire if the spark plug wires are installed incorrectly. The spark plug wires are marked with PTO and MAG and should be installed to the corresponding cylinder.**

18. Install outer clutch cover and eight retaining screws. Torque screws to specification.


Outer Clutch Cover Screws: <b>54 in-lb (5 Nm)</b>

19. Connect the negative (-) battery cable to the battery and install the seat.
20. Start the engine to ensure proper operation.
21. Install the engine access panel.



## TRANSMISSION AND FRONT GEARCASE

### Specification Chart

GEARCASE	LUBRICANT	CAPACITY	FILL / DRAIN PLUG TORQUE
Transmission	AGL	without turf mode: 44 oz. (1300 ml)	14 ft-lbs (19 Nm)
		with turf mode: 40.5 oz. (1200 mL)	
Front Gearcase	Demand Drive	8.5oz. (250 ml)	10 ft-lbs (14 Nm)

2

### Transmission Lubrication

**NOTE:** It is important to follow the transmission maintenance intervals described in the Periodic Maintenance Chart. Regular lubricant level inspections should be performed as well.

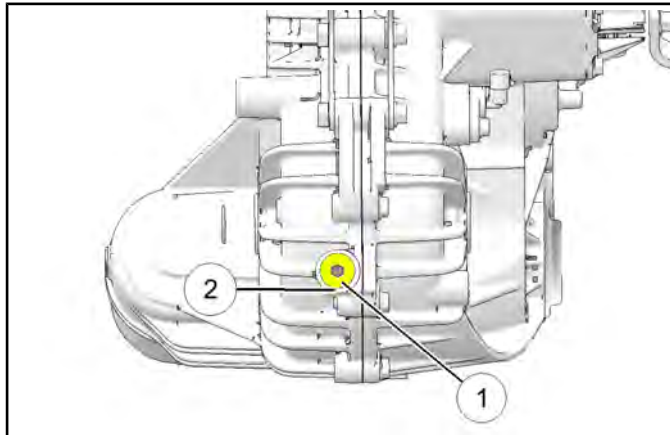
The transmission lubricant level should be checked and changed in accordance with the maintenance schedule.

- Be sure vehicle is positioned on a level surface when checking or changing the lubricant.
- Check vent hose to be sure it is routed properly and unobstructed.

### Transmission Lubricant Level Check

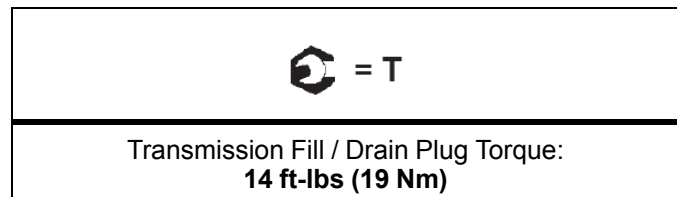
The fill plug is located on the rear portion of the transmission gearcase. Access the fill plug at the rear of the vehicle. Maintain lubricant level even with the bottom of the fill plug hole.

1. Position vehicle on a level surface.
2. Remove the fill plug ① and check the lubricant level.



3. If lubricant level is not even with bottom threads ②, add recommended lubricant as needed. Do not overfill.

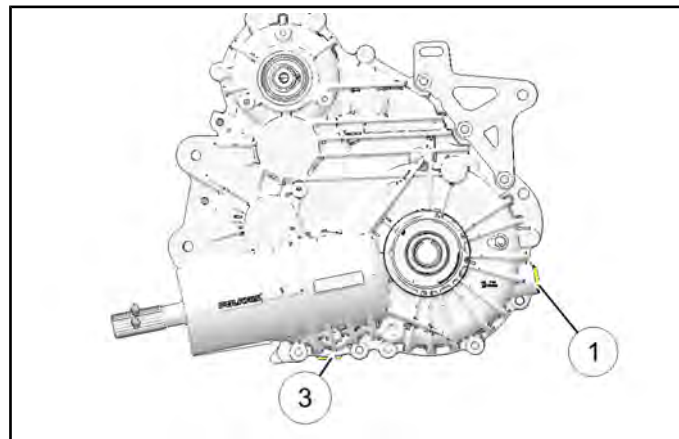
4. Reinstall the fill plug and torque to specification.



### Transmission Lubricant Change

The drain plug is located on the bottom of the transmission gearcase. Access the drain plug through the drain hole in the skid plate.


5. Remove the fill plug.
6. Place a drain pan under the transmission drain plug.
7. Remove drain plug ③ and allow lubricant to drain completely.




8. Clean the drain plug magnetic surface.
9. Reinstall the drain plug and torque to specification.

# MAINTENANCE

10. Add the recommended amount of lubricant through the fill plug hole. Maintain the lubricant level at the bottom of the fill plug hole when filling the transmission. Do not overfill.


<b>Recommended Transmission Lubricant:</b> AGL (PN 2878068) (Quart)
<b>Capacity (without Turf mode):</b> 44 oz. (1300 ml)
<b>Capacity (with Turf mode):</b> 40.5 oz. (1200 ml)

11. Reinstall the fill plug and torque to specification.

 = T
Transmission Fill / Drain Plug Torque: <b>14 ft-lbs (19 Nm)</b>

12. Check for leaks. Dispose of used lubricant properly.

## Front Gearcase Lubrication

**NOTE:** It is important to follow the front gearcase maintenance intervals described in the Periodic Maintenance Chart. Regular fluid level inspections should be performed as well.

The front gearcase fluid level should be checked and changed in accordance with the maintenance schedule.

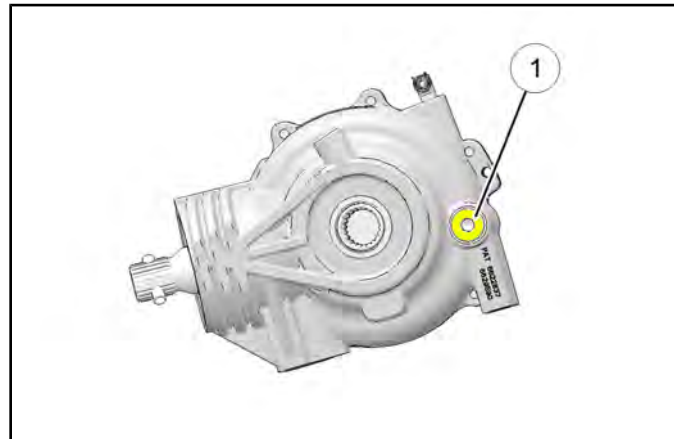
- Be sure vehicle is positioned on a level surface when checking or changing the fluid.
- Check vent hose to be sure it is routed properly and unobstructed.

### Front Gearcase Fluid Level Check

The fill plug is located on the bottom right side of the front gearcase. Access the fill plug through the right front wheel well. Maintain fluid level even with the bottom of the fill plug hole.


1. Position vehicle on a level surface.

2. Remove the fill plug ① and check the fluid level.



3. If fluid level is not even with the bottom threads, add the recommended fluid as needed. Do not overfill.

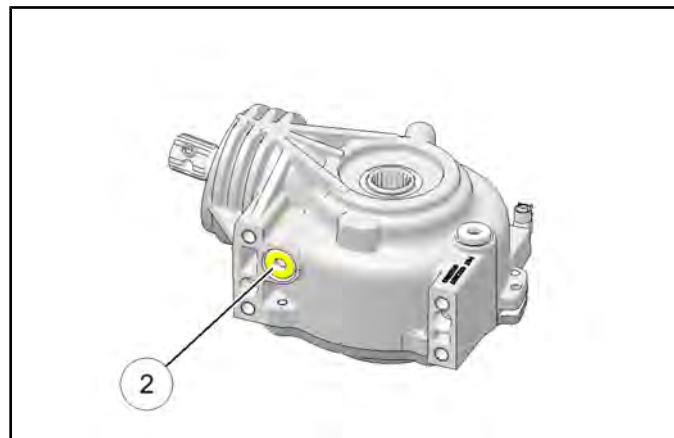
4. Reinstall the fill plug and torque to specification.

 = T
Front Gearcase Fill / Drain Plug Torque: <b>10 ft-lbs (14 Nm)</b>

### Front Gearcase Fluid Change:

The drain plug is located on the bottom of the front gearcase. Access the drain plug through the access hole in the frame underneath the front gearcase.

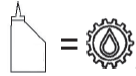
5. Remove the fill plug.
6. Place a drain pan under the front gearcase drain plug.
7. Remove the drain plug ② and allow fluid to drain completely.



8. Clean the drain plug magnetic surface.

9. Reinstall the drain plug and torque to specification.

10. Add the recommended amount of fluid through the fill hole. Maintain the fluid level even with the bottom threads of the fill plug hole.



**Recommended Front Gearcase Fluid:**  
Polaris Demand Drive  
(PN 2877922) (Quart)  
**Capacity:** □ 7.5 oz. (222 mL)

11. Reinstall the fill plug and torque to specification.



Front Gearcase Fill / Drain Plug Torque:  
**10 ft-lbs (14 Nm)**

12. Check for leaks. Dispose of used fluid properly.

# MAINTENANCE

## COOLING SYSTEM

### Cooling System Overview

The engine coolant level is controlled, or maintained, by the recovery system. The recovery system components are the recovery bottle, radiator filler neck, radiator pressure cap and connecting hose.

As coolant operating temperature increases, the expanding (heated) excess coolant is forced out of the radiator past the pressure cap and into the recovery bottle. As engine coolant temperature decreases the contracting (cooled) coolant is drawn back up from the tank past the pressure cap and into the radiator.

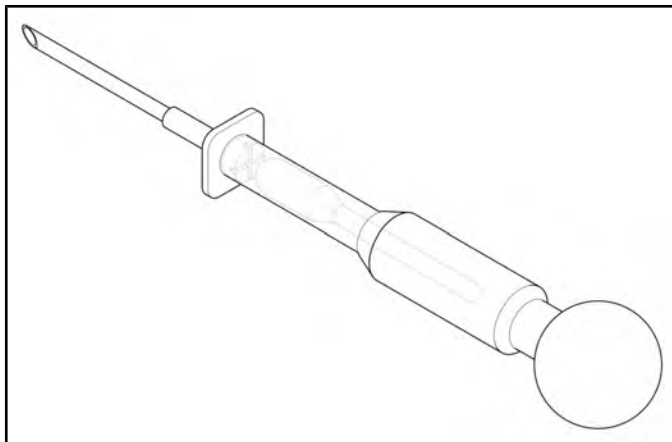
**NOTE: Some coolant level drop on new machines is normal as the system is purging itself of trapped air. Observe coolant levels often during break-in period.**

**Overheating of engine could occur if air is not fully purged from system.**

**Polaris Premium 50/50 Antifreeze is premixed and ready to use. Do not dilute with water.**

### Coolant Strength

Test the strength of the coolant using an antifreeze hydrometer.

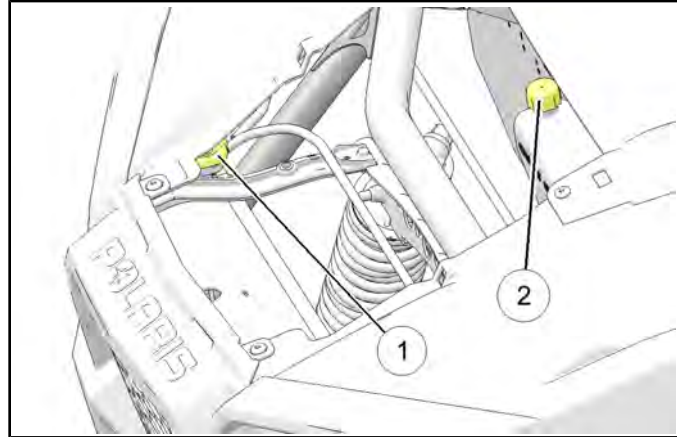


- A 50/50 mixture of antifreeze and distilled water will provide the optimum cooling, corrosion protection, and antifreeze protection.
- Do not use tap water, straight antifreeze or straight water in the system. Tap water contains minerals and impurities which build up in the system.
- Straight water or antifreeze may cause the system to freeze, corrode, or overheat.

**Recommended Coolant:  
Polaris Premium Pre-Mixed Antifreeze  
(PN 2880514) (Quart)  
(PN 2880513) (Gallon)**

### Coolant Level Inspection

The pressure cap ① and recovery bottle ② are located under the front hood of the vehicle. The coolant level must be maintained between the minimum and maximum levels indicated on the recovery bottle.



With the engine at operating temperature, the coolant level should be between the upper and lower marks on the coolant recovery bottle. If not, perform the following procedure:

1. Position the vehicle on a level surface.
2. If the coolant level is below the MIN line, inspect the coolant level in the radiator.

**NOTE: If overheating is evident, allow system to cool completely and check coolant level in the radiator and inspect for signs of trapped air in system.**

### WARNING

Never remove the pressure cap when the engine is warm or hot. Escaping steam can cause severe burns. The engine must be cool before removing the pressure cap.

3. Remove the pressure cap. Using a funnel, add coolant to the top of the filler neck.
4. Reinstall the pressure cap.

**NOTE: Use of a non-standard pressure cap will not allow the recovery system to function properly.**

5. Remove recovery bottle cap and add coolant using a funnel.



6. Fill recovery bottle to MAX level with recommended coolant or 50/50 mixture of antifreeze and distilled water.

**Recommended Coolant:**  
**Polaris Premium Pre-Mixed Antifreeze**  
 (PN 2880514) (Quart)  
 (PN 2880513) (Gallon)

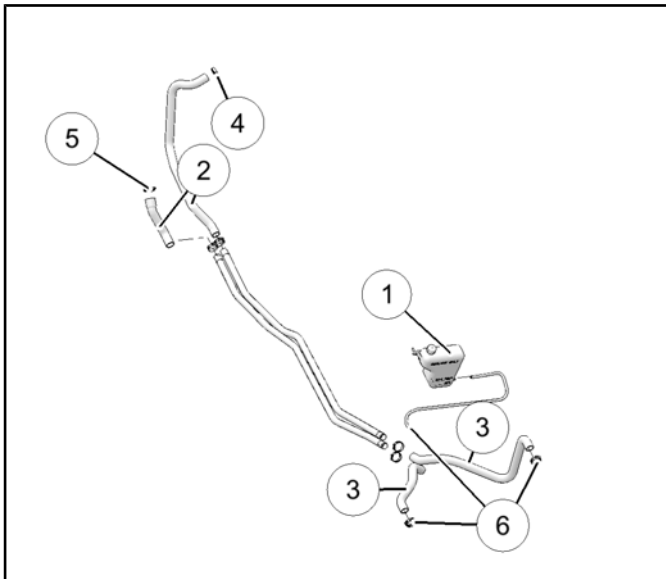
7. Reinstall the recovery bottle cap.
8. If coolant was required, start engine and check for leaks. Make sure radiator fins are clean to prevent overheating.

### Cooling System Pressure Test

Refer to ENGINE COOLING SYSTEM, page .

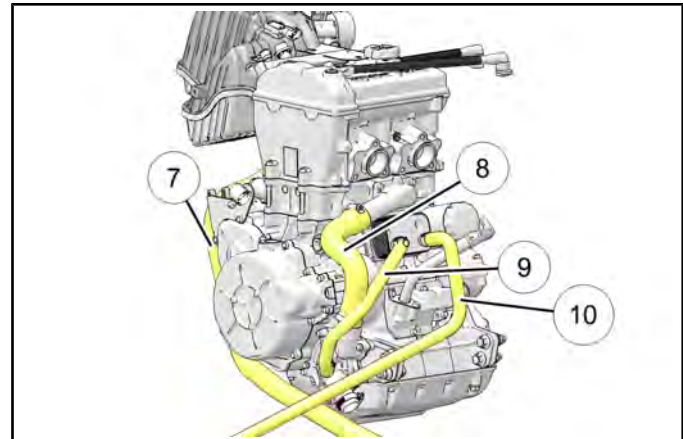
### Cooling System Hose Inspection

1. Inspect all vehicle hoses for cracks, deterioration, abrasion or leaks. Replace if necessary.



- |                         |
|-------------------------|
| ① Recovery Bottle       |
| ② Engine Hoses          |
| ③ Radiator Hoses        |
| ④ To Thermostat Housing |
| ⑤ To Water Pump         |
| ⑥ To Radiator           |

2. Inspect all engine hoses for cracks, deterioration, abrasion or leaks. Replace if necessary.



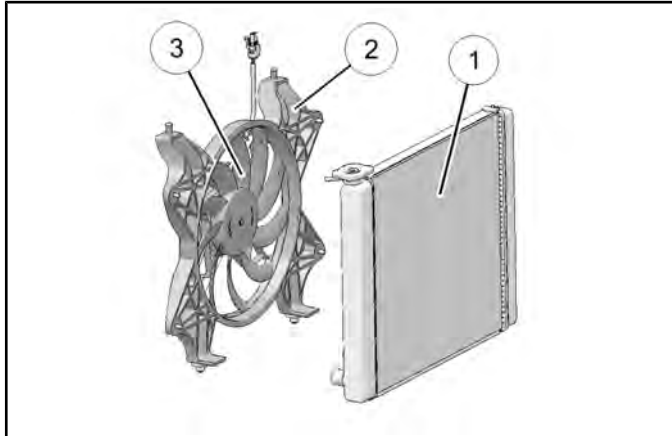
- |                          |
|--------------------------|
| ⑦ Bypass Hose            |
| ⑧ Water Pump Outlet Hose |
| ⑨ Oil Cooler Inlet Hose  |
| ⑩ Oil Cooler Outlet Hose |

3. Check tightness and condition of all hose spring clamps. Replace if necessary.

# MAINTENANCE

## Radiator Inspection / Cleaning

1. Check radiator air passages for restrictions or damage.



① Radiator

② Shroud

③ Fan

2. Carefully straighten any bent radiator fins.
3. Remove any obstructions with low pressure compressed air or low pressure water.

### CAUTION

Washing the vehicle with a high-pressure washer could damage the radiator fins and impair the radiators effectiveness. Use of a high-pressure washer is not recommended.

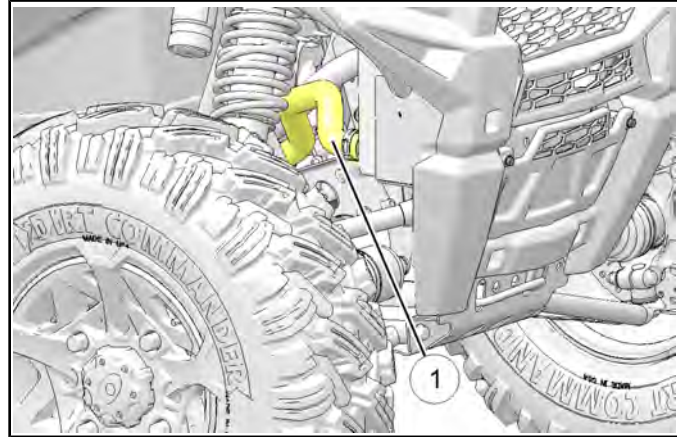
## Coolant Drain / Fill

1. Remove the front hood.

### WARNING

Never drain the coolant when the engine and radiator are warm or hot. Hot coolant can cause severe burns. Allow engine and radiator to cool.

2. Slowly remove the pressure cap to relieve any cooling system pressure.
3. Place a suitable drain pan underneath the radiator fitting on the front right side of the vehicle.
4. Drain the coolant from the radiator by removing the lower coolant hose from the radiator as shown ①.



5. Allow coolant to drain completely. Properly dispose of the used coolant.
6. Reinstall coolant hose and reposition the spring clamp.
7. Remove the pressure cap. Using a funnel, add the recommended coolant to the top of the filler neck and fill the recovery bottle to the MAX level.
8. Refer to Chapter 3 – Cooling System Bleeding, page 3.15.

**Recommended Coolant:**  
**Polaris Premium Pre-Mixed Antifreeze**  
**(PN 2880514) (Quart)**  
**(PN 2880513) (Gallon)**

## PVT SYSTEM

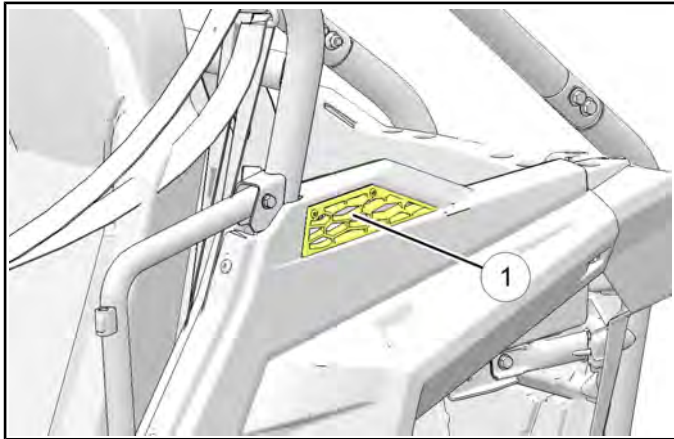
### Drive Clutch / Driven Clutch / Belt Service

Refer to Chapter 5 – PVT System for servicing the belt and drive/driven clutches.

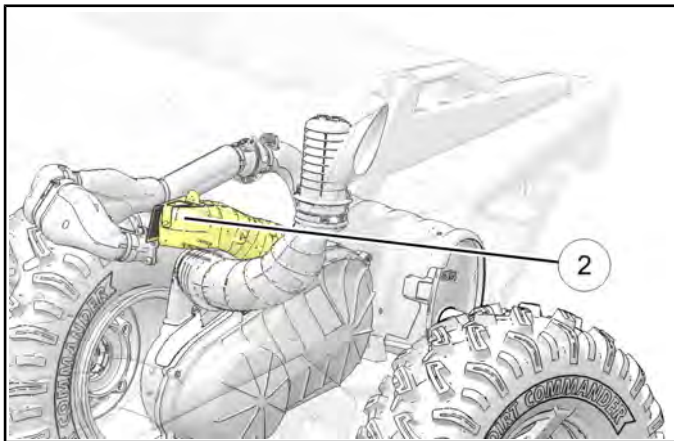
### PVT Duct Cleaning

It is recommended that the PVT intake be inspected occasionally. The PVT ducts should be inspected using the following procedure:

1. The PVT intake screen ① is located just above the left rear wheel fender.



2. Remove the two screws retaining the screen and inspect inside for signs of debris.
3. Inspect the PVT exhaust duct and grate ②, found near the exhaust head pipe. Clean the grate so air can flow through unrestricted.



**IMPORTANT:** The PVT intake and exhaust ducts **MUST** be checked for debris in the event of a belt failure.

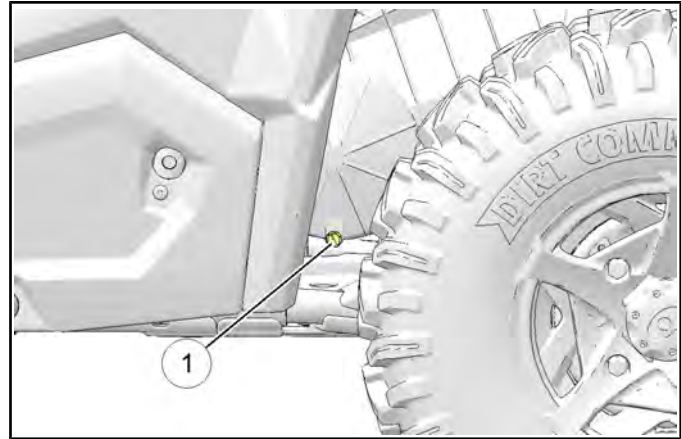
### PVT Drying

**NOTE:** After operating in water, the vehicle's PVT system should be checked immediately. Use the following instructions to dry it out before operating.

2

The PVT drain plug is located at the bottom of the outer clutch cover. Access the drain plug through the left rear wheel well.

1. Using a flat blade screwdriver, remove the PVT drain plug ① and O-ring from the outer clutch cover.



2. Allow the water to drain out completely.
  3. Reinstall the drain plug and O-ring.
  4. Place the transmission in PARK, apply the brake and start the engine.
  5. Apply varying throttle for 10-15 seconds to expel the moisture and air-dry the belt and clutches.
- NOTE:** Do not hold the throttle pedal wide open for more than 5 seconds.
6. Allow the engine RPM to return to idle, then shift the transmission into low gear.
  7. Test the PVT system for belt slippage. If the belt slips, repeat the process or remove the outer clutch cover to inspect the PVT system.

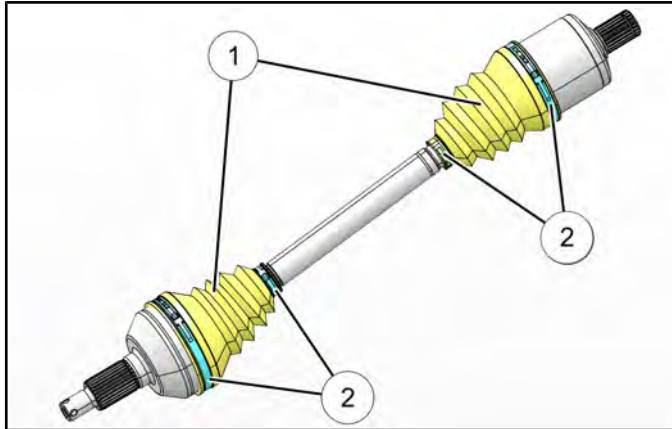
**NOTE:** If the vehicle has ingested a large amount of water into the PVT system and has not been operated for a period of time, be sure to check the PVT system components for water damage.

# MAINTENANCE

## FINAL DRIVE / WHEEL AND TIRE

### Drive Shaft Boot Inspection

Inspect the front and rear drive shaft boots ① for damage, tears, wear or leaking grease. If the boots exhibit any of these symptoms, they should be replaced. Check to see the boot clamps ② are properly positioned. Refer to DRIVE SHAFT CV JOINT / BOOT REPLACEMENT , page for drive shaft boot replacement.



### Wheel and Hub Torque Table

ITEM	SPECIFICATION
Wheel Nuts	Aluminum: 120 ft-lbs (163 Nm) Steel: 60 ft-lb (81 Nm)
Hub Retaining Nuts (Front and Rear)	110 ft-lbs (149 Nm)

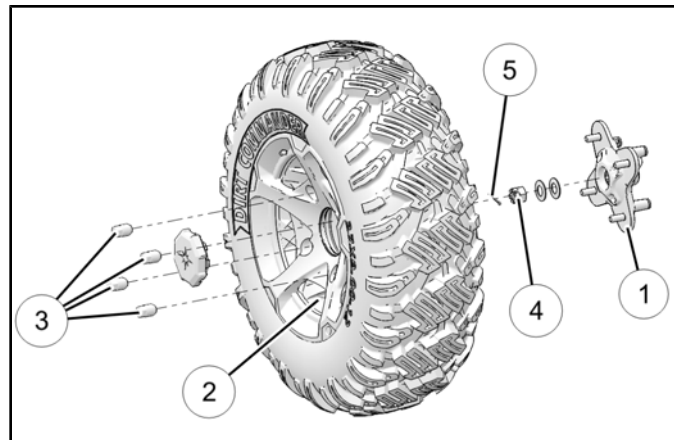
**NOTE:** Do not lubricate the stud or the lug nut.

### Wheel Removal

1. Position the vehicle on a level surface.
2. Place the transmission in PARK and stop the engine.
3. Loosen the wheel nuts slightly. If wheel hub removal is required, remove the wheel cap, cotter pin and loosen the hub nut slightly.
4. Elevate the appropriate side of the vehicle by placing a suitable stand under the frame.
5. Remove the wheel nuts and remove the wheel.

### Wheel Installation

1. Verify the transmission is still in PARK.
2. Place the wheel in the correct position on the wheel hub ①. Be sure the valve stem ② is toward the outside and rotation arrows on the tire point toward forward rotation.
3. Attach the wheel nuts ③ and finger tighten them.
4. Carefully lower the vehicle to the ground.
5. Torque the wheel nuts and/or hub nut ④ to the proper torque specification. Wheel and Hub Torque Table, page 2.26
6. If hub nut was removed, install a new cotter pin ⑤ after the hub nut has been tightened. If the holes do not line up, turn the hub nut counter-clockwise until the cotter pin can be installed.




### CAUTION

If wheels are improperly installed it could affect vehicle handling and tire wear. On vehicles with tapered wheel nuts, make sure tapered end of nut goes into taper on wheel.

## Tire Inspection

- Improper tire inflation may affect vehicle maneuverability.
- When replacing a tire always use original equipment size and type.
- The use of non-standard size or type tires may affect vehicle handling.

 <b>WARNING</b>
<p>Operating with worn tires will increase the possibility of the vehicle skidding easily with possible loss of control.</p> <p style="text-align: center;">Worn tires can cause an accident.</p> <p>Always replace tires when the usable tread depth has worn out.</p>

## Tire Pressure

Remove the valve stem cap and check tire pressure using the tire pressure gauge included in the vehicle's tool kit.

<b>CAUTION</b>
<p>Maintain proper tire pressure. Refer to the warning tire pressure decal applied to the vehicle.</p>

### Tire Pressure (cold)

	FRONT	REAR
<i>RZR 900</i>	10 psi (69 kPa)	12 psi (83 kPa)
<i>RZR XC 900</i>	10 psi (69 kPa)	12 psi (83 kPa)
<i>RZR S 900</i>	10 psi (69 kPa)	14 psi (97 kPa)

# MAINTENANCE

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## ELECTRICAL / IGNITION SYSTEM

### Battery Maintenance

Keep battery terminals and connections free of corrosion. If cleaning is necessary, remove the corrosion with a stiff wire brush. Wash with a solution of one tablespoon baking soda and one cup water. Rinse well with tap water and dry off with clean shop towels. Coat the terminals with dielectric grease or petroleum jelly.



#### WARNING

##### **CALIFORNIA PROPOSITION 65 WARNING:**

Batteries, battery posts, terminals and related accessories contain lead and lead compounds, and other chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

WASH HANDS AFTER HANDLING.



#### WARNING

Battery electrolyte is poisonous. It contains sulfuric acid. Serious burns can result from contact with skin, eyes or clothing. Antidote:

**External:** Flush with water.

**Internal:** Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Call physician immediately.

**Eyes:** Flush with water for 15 minutes and get prompt medical attention.

Batteries produce explosive gases.  
Keep sparks, flame, cigarettes, etc. away. Ventilate when charging or using in an enclosed space. Always shield eyes when working near batteries.

KEEP OUT OF REACH OF CHILDREN.

### Battery Off Season Storage

Whenever the vehicle is not used for a period of two months or more, remove the battery from the vehicle, ensure that it is fully charged and store it out of the sun in a cool, dry place. Check battery voltage each month during storage or and recharge as needed to maintain a full charge.

**NOTE: Battery charge can be maintained by using a Polaris battery tender charger or by charging once a month to make up for normal discharge. Battery tenders can be left connected during the storage period and will automatically charge the battery if the voltage drops below a pre-determined point.**

**NOTE: Batteries must be fully charged before use or battery life will be reduced by 10-30% of full potential. Charge battery according to "Charging Procedure", page . Do not use the vehicle's stator/ alternator to charge a new battery.**



## Battery Charging

If battery voltage is less than 12.6 Vdc, the battery may need recharging. When using an automatic charger, refer to the charger manufacturer's instructions for recharging.

Do not exceed 6 amps when charging the battery.

**NOTE: Charge the battery using an automatic charger that will not exceed 14.6 Vdc. An automatic charger will signal when charging is complete.**

**Allow the battery to stand disconnected for at least 1-2 hours after being properly charged. If the voltage drops below 12.6 volts, charging was ineffective or the battery needs to be replaced.**

### WARNING

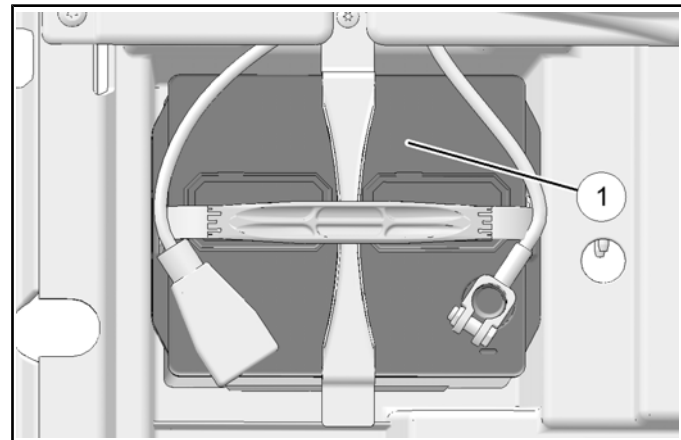
An overheated battery could explode, causing severe injury or death. Always watch charging times carefully. Stop charging if the battery becomes very warm to the touch. Allow it to cool before resuming charging.

STATE OF CHARGE	VOLTAGE (DC)	ACTION	CHARGE TIME
100%	12.8 or more	None, check again in 3 months	None Required
75% - 100%	12.6 - 12.8	May need slight charge	3 - 6 hrs
50% - 75%	12.3 - 12.6	Needs Charge	5 - 11 hrs
25% - 50%	12.0 - 12.3	Needs Charge	At least 13 hrs
0% - 25%	12.0 or less	Needs Charge	At least 20 hrs

**NOTE: Follow the charger instructions supplied by the manufacture regarding the order or connections, switch positions and when to connect the charger to an outlet.**

## Battery Removal

1. Remove the driver's seat to access the battery ①.



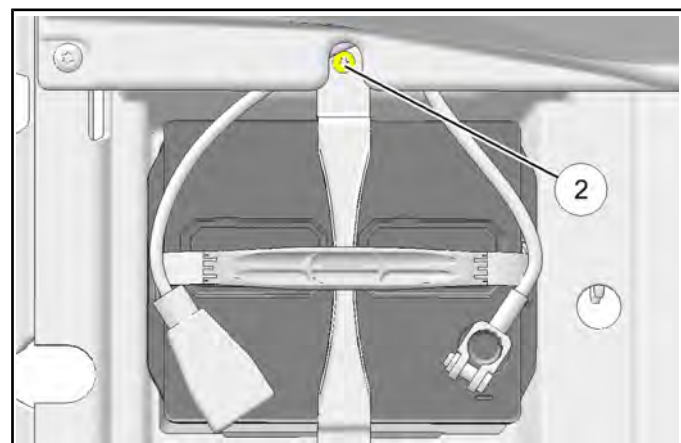
2

2. Disconnect the black (negative) battery cable.

### CAUTION

To reduce the chance of sparks: Whenever removing the battery, disconnect the black (negative) cable first. When reinstalling the battery, install the black (negative) cable last.

3. Disconnect the red (positive) battery cable.
4. Remove the battery hold-down bracket ②.



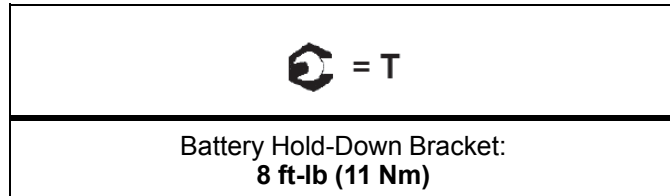
5. Lift the battery out of the vehicle.

# MAINTENANCE

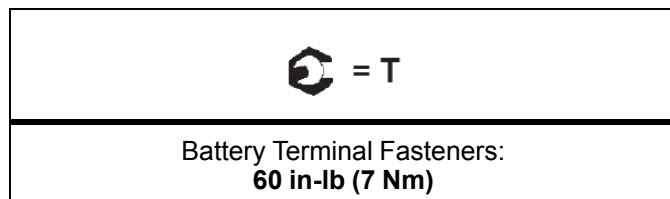
## Battery Installation

**NOTE:** Using a new battery that has not been fully charged can damage the battery and result in a shorter life. It can also hinder vehicle performance. Refer to **Battery Charging**, page 2.29 before installing the battery.

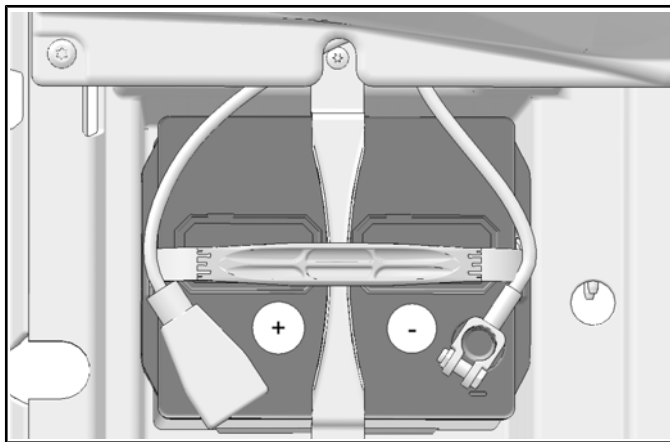
1. Ensure the battery is fully charged.
2. Place the battery in the battery holder and secure with hold-down bracket. Torque bracket fastener to specification.



3. Coat the terminals with dielectric grease or petroleum jelly.
4. Connect and tighten the red (positive) cable(s) first. Torque fasteners to specification.



5. Connect and tighten the black (negative) cable(s) last.

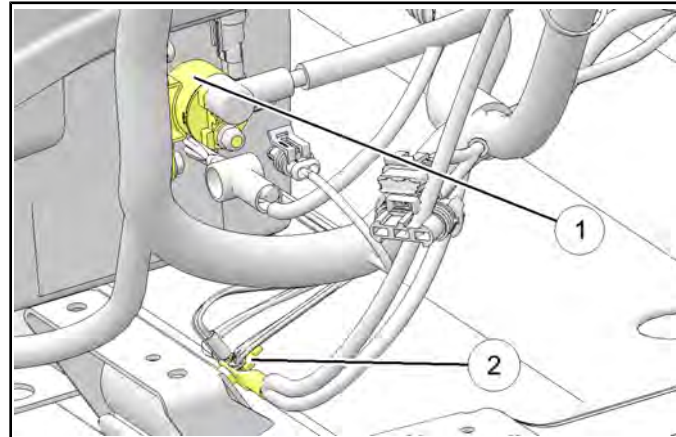


6. Verify that cables are properly routed and reinstall the driver's seat.

## Engine / Chassis Ground

Inspect the ground cable connections. Remove ground terminals and clean if necessary.

The chassis ground connection ①, located below the start solenoid ②, can be accessed through the left rear wheel area.



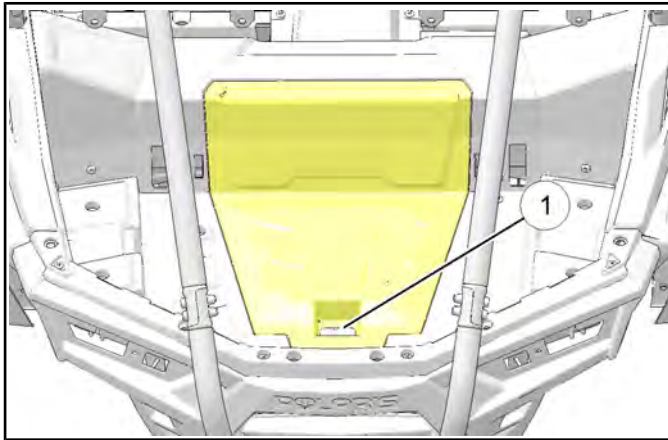
Inspect the chassis ground terminals. Be sure the grounds are clean and tight.



## Spark Plug Service

Inspect and replace the spark plugs at the intervals outlined in the Periodic Maintenance Chart.

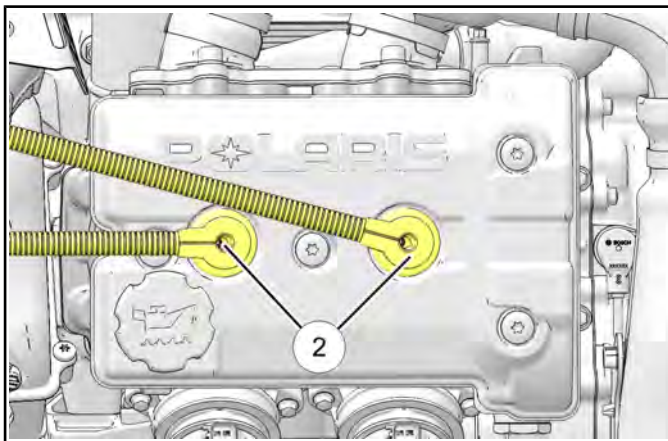
1. Remove the cargo box access panel ①.



### WARNING

A hot engine can cause serious burns. Allow engine to cool or wear protective gloves when removing the spark plugs.

2. Remove both spark plug caps ②.

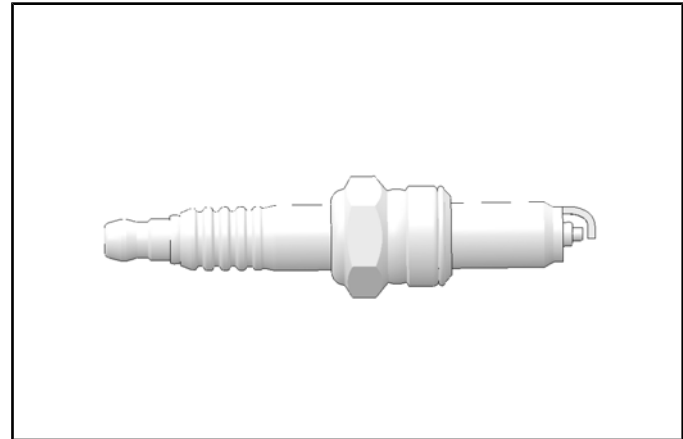


**NOTE:** Use MAG and PTO reference decals on spark plug wires for reassembly.

3. Clean out plug wells with compressed air to remove any loose dirt or debris.
4. Rinse plug wells with water and dry with compressed air.

**NOTE:** Spark plug wells have drain holes built into the cylinder head to allow water to drain out.

5. Remove spark plugs using a 5/8" spark plug socket with an extension.
6. Inspect electrodes for wear and carbon buildup. Look for a sharp outer edge with no rounding or erosion of the electrodes.



7. Clean with electrical contact cleaner or a glass bead spark plug cleaner only. **CAUTION:** A wire brush or coated abrasive should not be used.
8. Measure gap with a wire gauge. Adjust gap if necessary by carefully bending the side electrode.
9. If necessary, replace spark plug with proper type. **CAUTION:** Severe engine damage may occur if the incorrect spark plug is used.

**Recommended Spark Plug:  
Champion RG4YCX**

10. Apply anti-seize compound to the spark plug threads.
11. Install spark plugs and torque to specification.



**Spark Plug Torque:  
7 ft-lbs (10 Nm)**

12. Install the plug caps to the appropriate cylinder by referencing the MAG and PTO spark plug wire decals. Ensure wires are pushed down all the way so they engage onto the spark plugs.
13. Reinstall the cargo box access panel.

# MAINTENANCE

## STEERING SYSTEM

### Steering Inspection

The steering components should be checked periodically for loose fasteners, worn tie rod ends, ball joints and damage. Also check to make sure all cotter pins are in place. If cotter pins are removed, they must be replaced.

Replace any worn or damaged steering components. Steering should move freely through the entire range of travel without binding. Check routing of all cables, hoses, and wiring to be sure the steering mechanism is not restricted or limited.

**NOTE:** Check front end alignment whenever steering components are replaced.

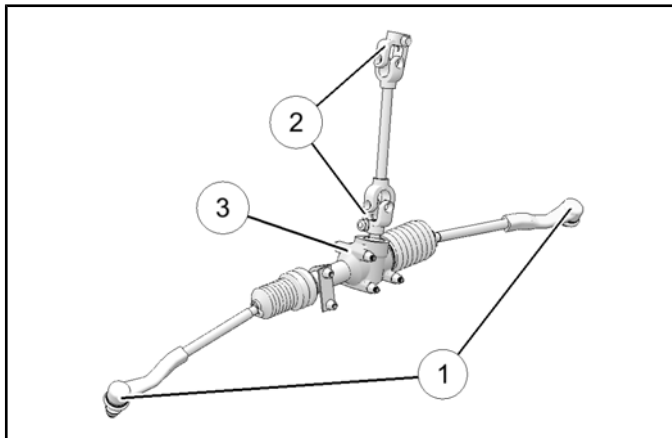
### WARNING

Due to the critical nature of the procedures outlined in this chapter, Polaris recommends steering component repair and adjustment be performed by an authorized Polaris MSD certified technician.

### Steering Wheel Free-play

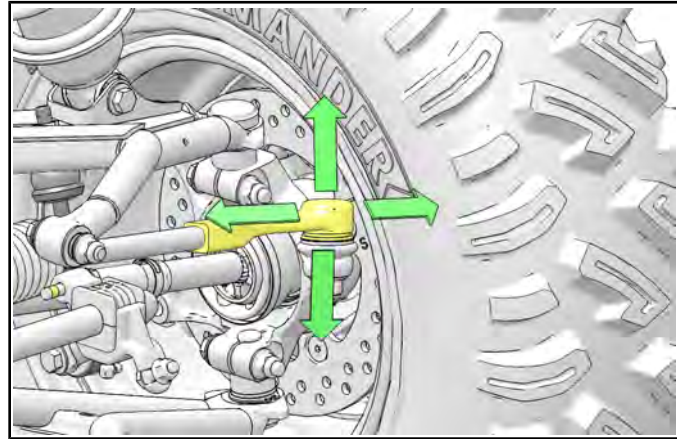
Check steering wheel for specified free-play and operation.

1. Position the vehicle on level ground.
2. Lightly turn the steering wheel left and right.
3. There should be 0.8-1.0" (20-25 mm) of free-play.
4. If there is excessive free-play or the steering feels rough, inspect the following components.
  - Tie Rod Ends ①
  - Steering Shaft U-Joints ②
  - Steering Rack ③

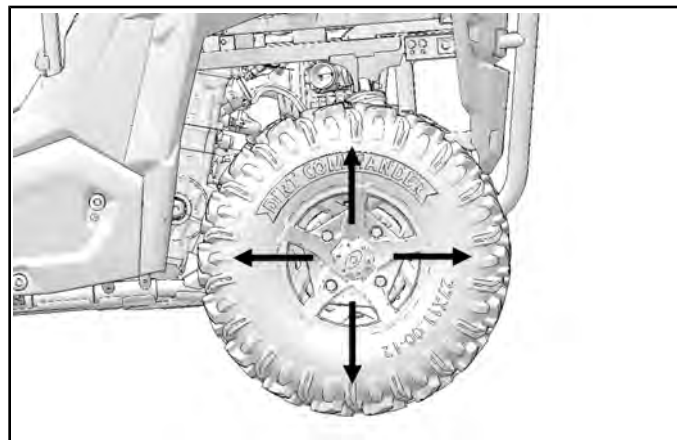


### Tie Rod End / Wheel Hub Inspection

- To check for play in the tie rod end, grasp the steering tie rod, pull in all directions feeling for movement.



- Replace any worn steering components. Steering should move freely through entire range of travel without binding.
- Elevate front end of machine so front wheels are off the ground. Check for any looseness in front wheel/hub assembly by grasping the tire firmly at top and bottom first, and then at front and rear. Try to move the wheel and hub by pushing inward and pulling outward.



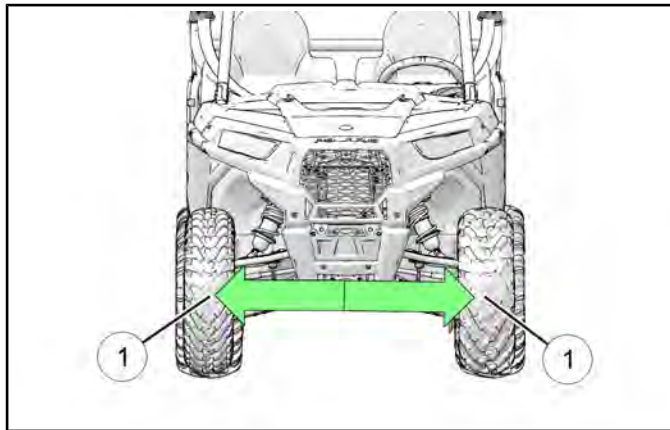
- If abnormal movement is detected, inspect the hub and wheel assembly to determine the cause (loose wheel nuts or loose front hub nut).
- Refer to Chapter 7 "Final Drive" for front hub service procedures.

## Wheel Toe Alignment Inspection

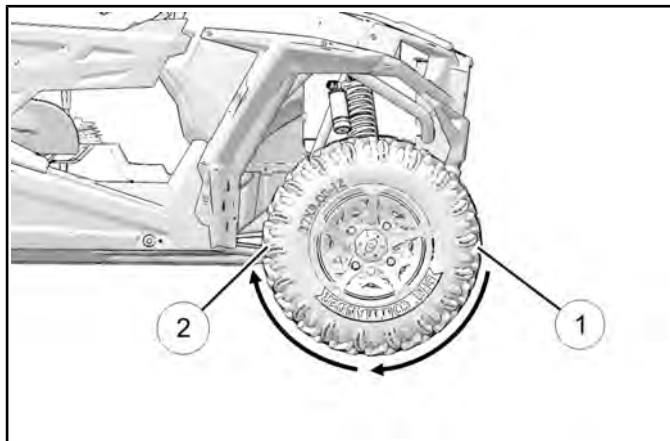
1. Place machine on a smooth level surface and set steering wheel in a straight ahead position. Secure the steering wheel in this position.
2. Place a chalk mark on the center line of the front tires at position ① approximately 10" (25.4 cm) from the floor or as close to the hub/axle center line as possible.

**NOTE:** It is important the height of both marks be equally positioned to get an accurate measurement.

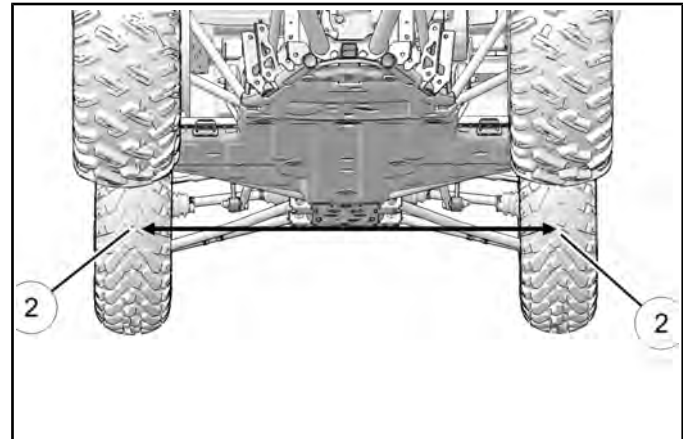
3. Measure the distance between the marks at position ① and record the measurement. Call this measurement A.



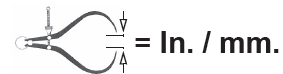
4. Rotate the tires 180° to position ② by moving the vehicle forward. Position chalk marks facing rearward, even with the hub/axle center line.



5. Again measure the distance between the marks at position ② and record. Call this measurement B.



6. Subtract measurement B from measurement A. The difference between measurements A and B is the vehicle toe alignment. The recommended vehicle toe tolerance is 1/8 to 3/16" (3.2 to 4.8 mm) toe out. This means the measurement at the front of the tire (A) is 1/8 to 3/16" (3.2 to 4.8 mm) wider than the measurement at the rear (B).



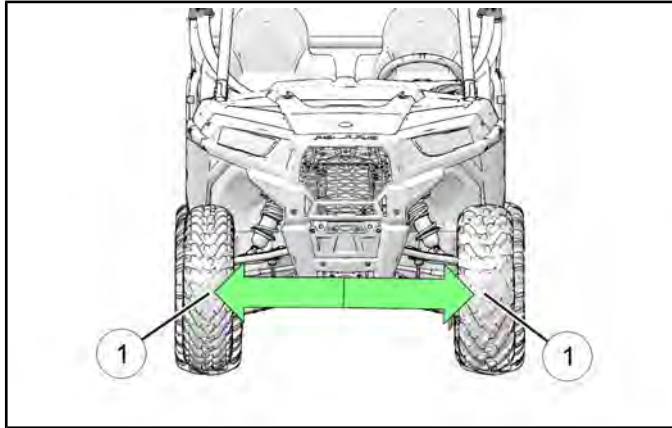
Wheel Toe-Out:  
1/8 to 3/16" (3.2 to 4.8 mm)

# MAINTENANCE

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## Wheel Toe Adjustment

If toe alignment is incorrect, repeat steps 3-5 of “Wheel Toe Alignment Inspection”, but instead measure the distance between each wheel and the vehicle center. This will tell you which tie rod needs adjusting.



**NOTE:** Be sure steering wheel is straight ahead before determining which tie rod needs adjustment.

### CAUTION

During tie rod adjustment, it is very important that the following precautions be taken when tightening tie rod end jam nuts.  
If the rod end is positioned incorrectly it will not pivot, and may break.

#### To adjust toe alignment:

- Hold tie rod end to keep it from rotating.
- Loosen jam nuts at both end of the tie rod.
- Shorten or lengthen the tie rod until alignment is as required to achieve the proper toe setting as specified in “Wheel Toe Alignment”.
- **IMPORTANT:** When tightening the tie rod end jam nuts, the rod ends must be held parallel to prevent rod end damage and premature wear. Damage may not be immediately apparent if done incorrectly.
- After alignment is complete, torque jam nuts to specification.



Tie Rod Jam Nut:  
**14 ft-lbs (19 Nm)**

**SUSPENSION SYSTEM**

**Spring Adjustment**

The front and rear shock absorber springs are adjustable by rotating the adjustment cam to change ride height.

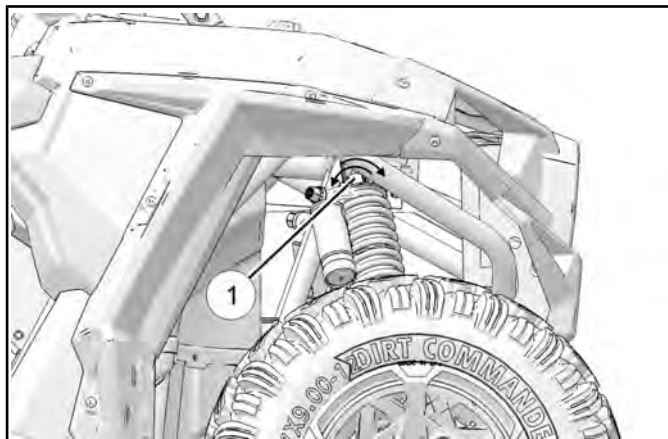
**⚠ WARNING**

Uneven adjustment may cause poor handling of the vehicle, which could result in an accident and serious injury or death. Always adjust both the left and right springs equally.

1. Position the vehicle on a level surface and stop the engine.
2. Raise and safely support front or rear of vehicle off the ground to allow the suspension to fully extend.

**NOTE: The tires should not be touching the ground.**

3. To adjust the suspension, rotate the adjustment cam ① clockwise to increase spring tension or counter-clockwise to decrease spring tension.



**Shock Spanner Wrench:  
PN 2877408**

4. Each notch of the adjustment will add 6% - 8% more preload to the spring over the primary position.

**Spring Adjustment (FOX)**

The front and rear shocks have a spring adjustment. Suspension springs may be adjusted to suit different riding conditions or vehicle payloads.

**⚠ WARNING**

Uneven adjustment may cause poor handling of the vehicle, which could result in an accident and serious injury or death. Always adjust both the left and right springs equally.

	<b>SPRING ADJUSTMENT - FACTORY SETTING ②</b>	
	<b>Front</b>	<b>Rear</b>
<b>XC</b>	4.41" (11.20 cm)	0.56" (1.42 cm)
<b>60"</b>	7.39" (18.77 cm)	2.80" (7.11 cm)

**NOTE: Refer to the shock illustrations within this procedure for spring measurement location.**

The factory setting is appropriate for nearly all riding conditions. Since this vehicle is equipped with full skid plates, adjustment is not necessary.

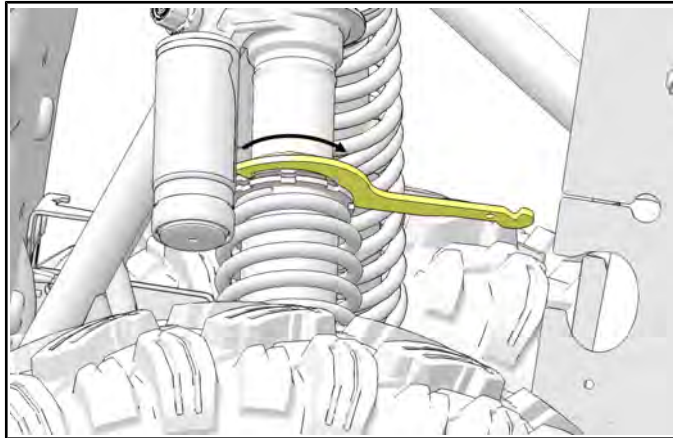
If desired, the spring setting may be adjusted to maintain vehicle clearance height when carrying loads.

1. Raise and safely support the front or rear of the vehicle off the ground to allow the suspension to fully extend.



# MAINTENANCE

- Loosen the upper jam nut adjustment ring using the spanner wrench (PN 2877408) included in the vehicle's tool kit.



**Shock Spanner Wrench:  
PN 2877408**

- Turn the lower adjustment ring ① clockwise to increase ride height or counter-clockwise to decrease ride height.



**IMPORTANT: DO NOT** increase the spring adjustment by more than one inch (25.4 mm) over the factory setting.

- Once you have obtained the correct ride height, hold the lower adjustment ring while tightening the upper adjustment ring to lock them in place.

**IMPORTANT:** Always return the spring to the factory setting ② after the load is removed from the vehicle. The increased suspension height will negatively impact vehicle stability when operating without a load.

## Shock Compression Adjustment (FOX)

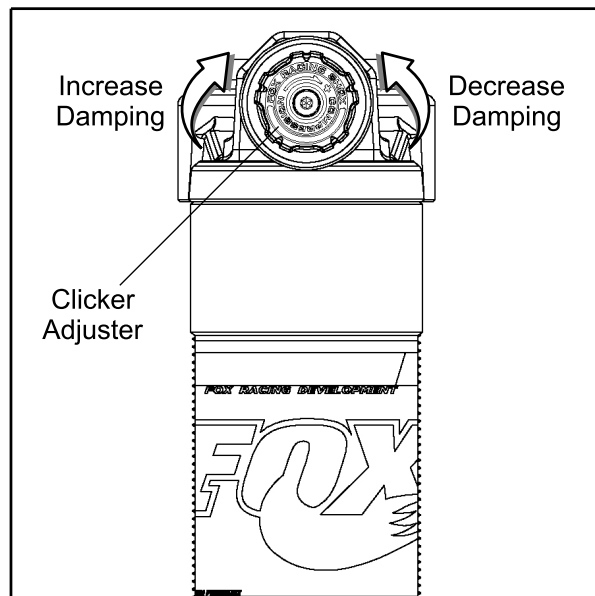
The compression damping adjustment is located on top of the shock 'Piggyback' reservoir of each shock.

Turn the clicker adjuster knob to make damping adjustments.

**NOTE:** When clicker adjuster is turned clockwise until it stops, damping is in the fully closed position.

Turn the clicker clockwise to increase compression damping. Turn the clicker counter-clockwise to decrease compression damping.

**NOTE:** The factory setting is 12 clicks from closed. Refer to the "Compression Adjustment Table".



## Compression Adjustment Table

SETTING	COMPRESSION DAMPING
Softest	Full counter-clockwise position
<b>FACTORY</b>	<b>12 clicks from closed</b>
Firmer	2 clicks from closed

## BRAKE SYSTEM

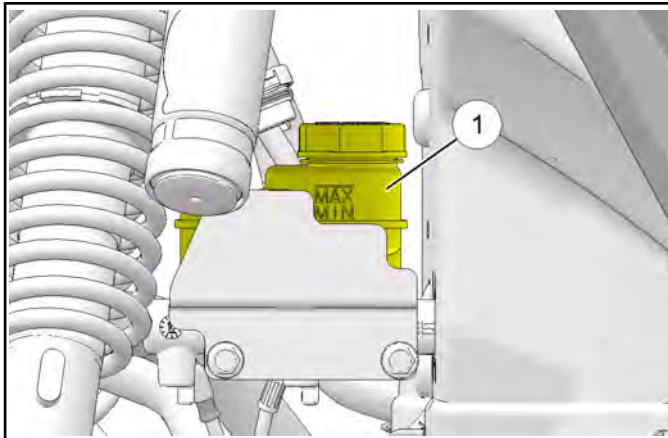
### Brake Fluid Inspection

Always check the brake pedal travel and inspect the brake fluid reservoir level before each operation. If the fluid level is low, add DOT 4 brake fluid only.

Brake fluid should be changed every two years. The fluid should also be changed anytime the fluid becomes contaminated, the fluid level is below the minimum level, or if the type and brand of the fluid in the reservoir is unknown.

The brake fluid master cylinder reservoir can be accessed through the left front wheel well.

1. Position the vehicle on a level surface.
2. Place the transmission in PARK.
3. View the brake fluid level in the reservoir ①. The level should be between the MAX and MIN level lines.

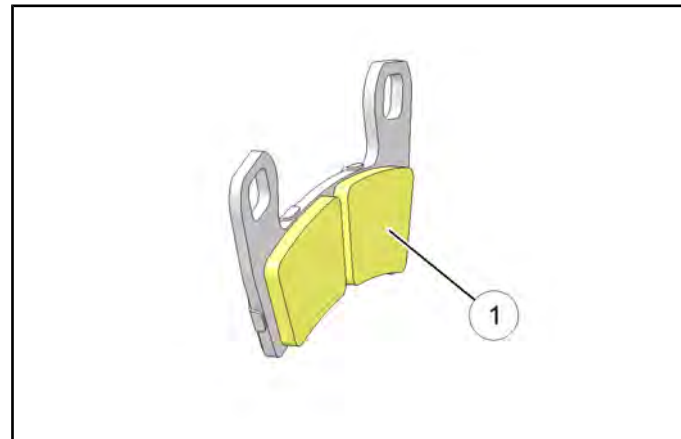


4. If the fluid level is lower than the MIN level line, add brake fluid until it reaches the MAX level line.
5. Install the reservoir cap and apply the brake pedal forcefully for a few seconds and check for fluid leakage around the master cylinder fittings and the brake caliper fittings.

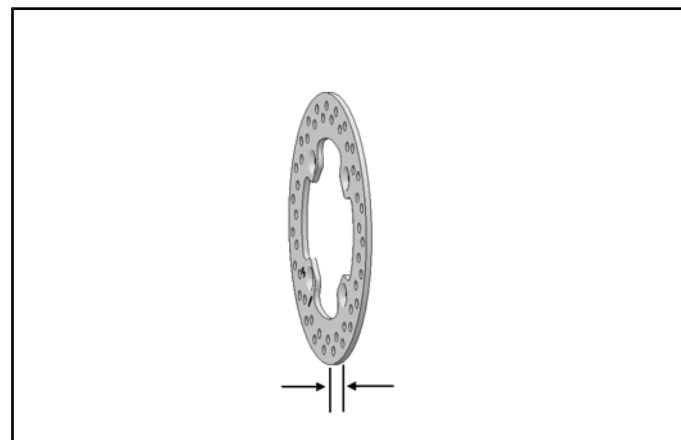
### Brake Pad / Disc Inspection

1. Check the brake pads for wear, damage, or looseness.
2. Inspect the brake pad surface for excessive wear.
3. Pads should be changed when the friction material ① is worn to 0.040" (1 mm).

2



4. Check surface condition of the brake discs.
5. Measure the thickness of the front and rear brake discs.
6. The disc(s) should be replaced if thickness is less than 0.170" (4.32 mm).



### Brake Hose and Fitting Inspection

Check brake system hoses and fittings for cracks, deterioration, abrasion, and leaks. Tighten any loose fittings and replace any worn or damaged parts.





# CHAPTER 3

## ENGINE / COOLING SYSTEM



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ENGINE / COOLING SYSTEM .....	3.87

## ENGINE / COOLING SYSTEM

### GENERAL INFORMATION

#### Special Tools

PART NUMBER	TOOL DESCRIPTION
2870975	Mity Vac Pressure Tester
PA-49316	Flywheel Puller
PU-50105	Oil Filter Wrench
PU-50562	Engine Stand Adapter (Mounts to Engine)
PU-50563	Cylinder Holding & Camshaft Timing Plate
PU-50564	Water Pump Mechanical Seal Installer
PU-50565	Oil Pressure Gauge Adapter
PU-50624	Engine Stand (2" Bore)
PU-50625	Engine Stand Sleeve Adapter
PU-50658	Clutch Center Distance Tool
PV-1253 or PV-4019	Valve Spring Compressor
PV-43513-A	Valve Spring Compressor Adapter
PV-43531	Oil Pressure Gauge
PV-43570-1	Piston Ring Compressor Pliers
PW-47053	Bench Mount Engine Stand Adapter

#### Bosch Automotive Service Solutions:

1-800-345-2233 or <http://polaris.service-solutions.com/>

#### Lubrication Specifications

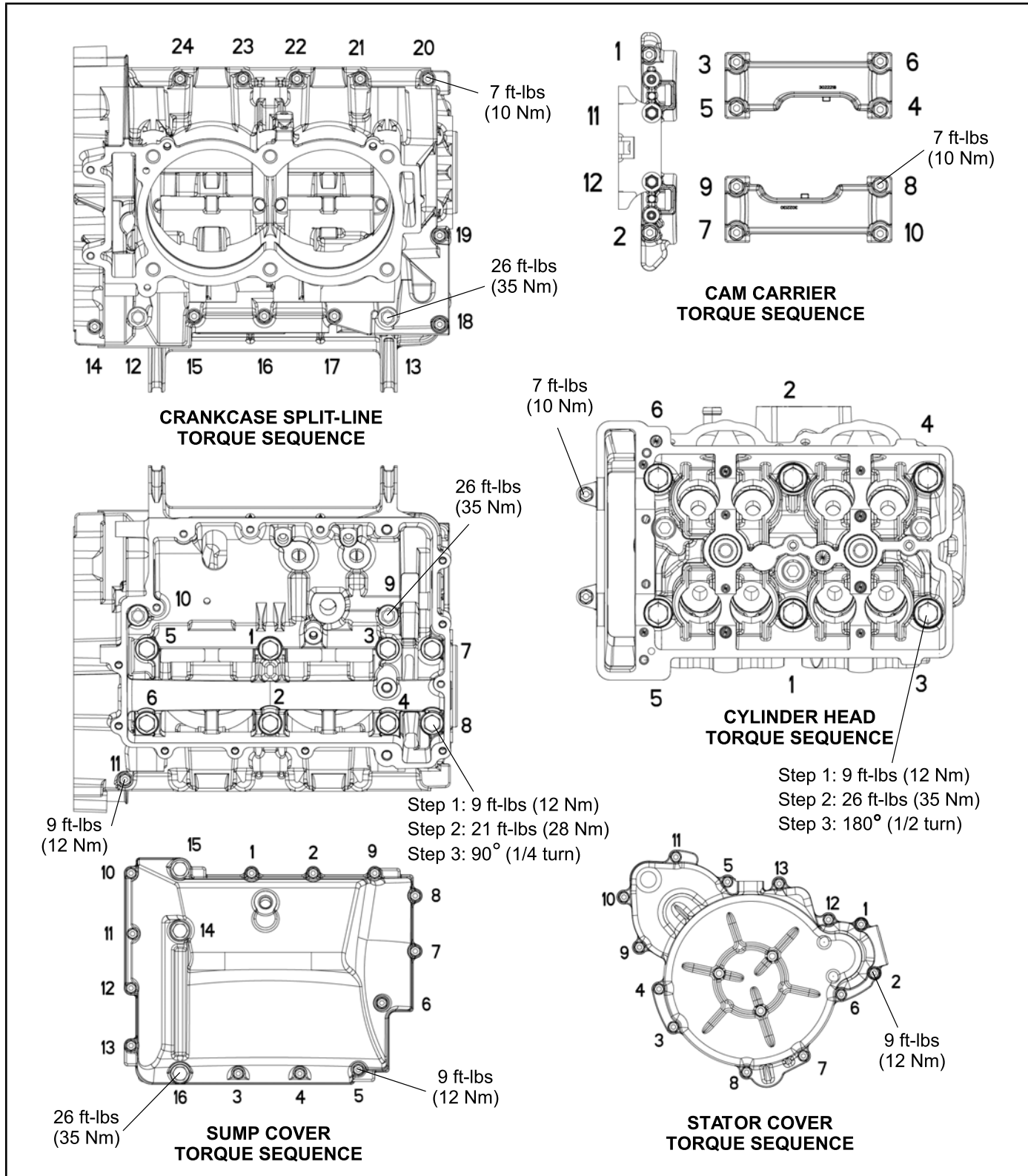
Oil Capacity*	≈ 2.5 Quarts (2.4 L)
Oil Filter Wrench	PU-50105 or 2.5" (64 mm)
Oil Filter	2540086
Oil Type <i>Ambient Temp Range:</i> -35° F to 100° F	PS-4 Synthetic Engine Oil 2876244 – Qt
Oil Type <i>Ambient Temp Range:</i> 0° F to 120° F	PS-4 Extreme Duty Synthetic Engine Oil 2878920 – Qt
Oil Pressure (idle)	at 70° F: 72 PSI
	at 220° F: 60 PSI

\* Additional oil may be required after complete engine disassembly. Check level after filling and add oil as needed.

3

# ENGINE / COOLING SYSTEM

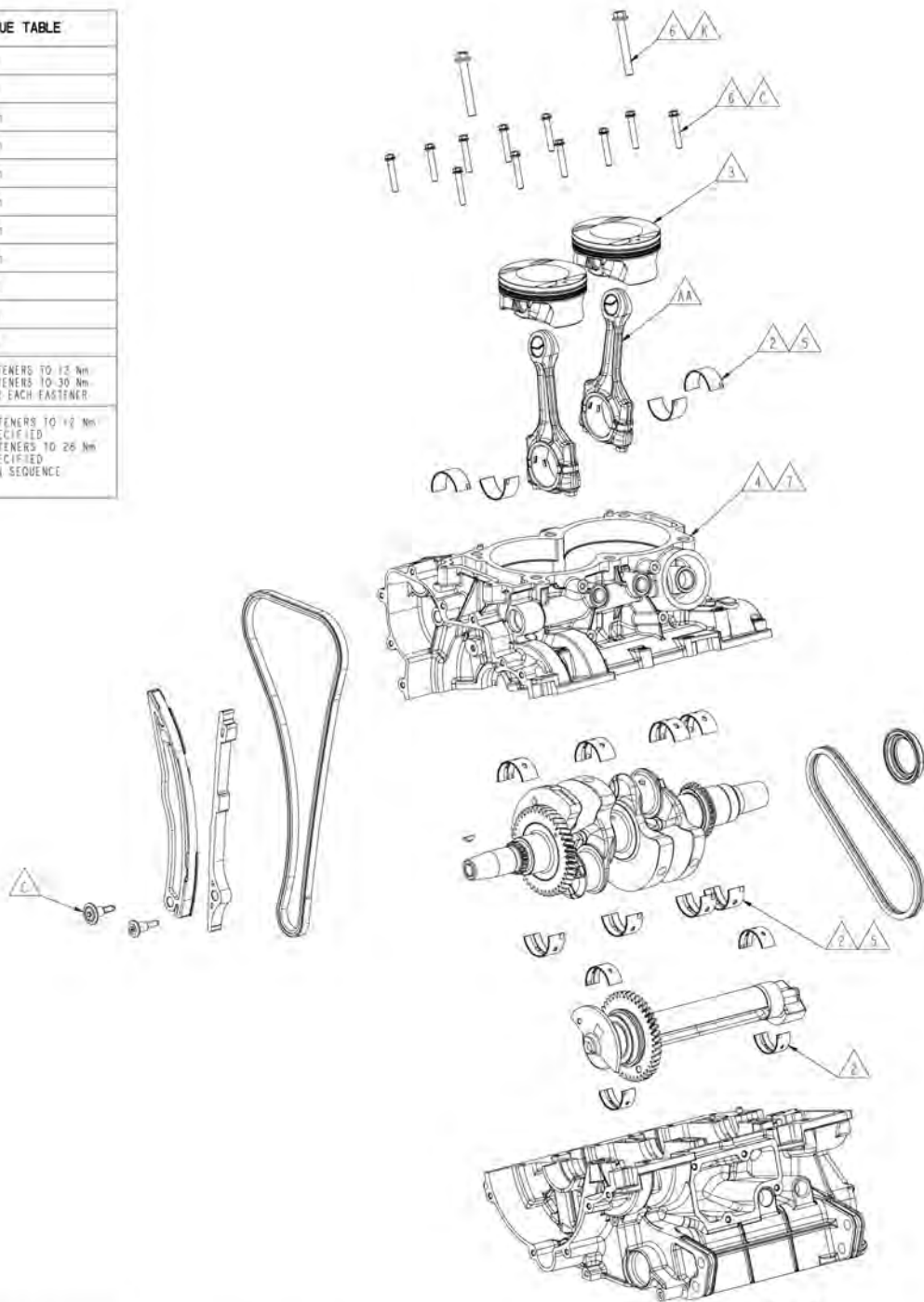
## Main Engine Components - Torque Specification and Sequence



# ENGINE / COOLING SYSTEM

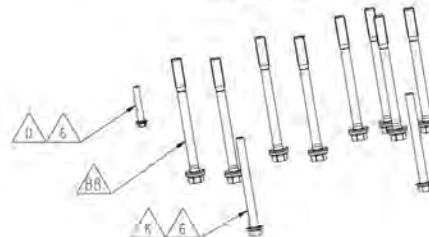
## Balance Shaft / Connecting Rods / Crankcase / Crankshaft / Pistons

FASTENER TORQUE TABLE	
A	6.5 ± 1.0 N·m
B	8.0 ± 1.0 N·m
C	10.0 ± 1.0 N·m
D	12.0 ± 1.0 N·m
E	16.0 ± 1.5 N·m
F	22.5 ± 2.5 N·m
G	24.0 ± 2.5 N·m
H	28.0 ± 3.0 N·m
I	35.0 ± 3.5 N·m
J	40.0 ± 4.0 N·m
M	7.8 ± 0.3 N·m
AA	1) TORQUE BOTH FASTENERS TO 12 Nm 2) TORQUE BOTH FASTENERS TO 30 Nm 3) COMPLETE 90° FOR EACH FASTENER
BB	1) TORQUE ALL FASTENERS TO 12 Nm IN SEQUENCE SPECIFIED 2) TORQUE ALL FASTENERS TO 26 Nm IN SEQUENCE SPECIFIED 3) COMPLETE 90° IN SEQUENCE SPECIFIED



### NOTES

- 2 APPLY ENGINE OIL OR WHITE LITHIUM GREASE TO INTERNAL BEARING SURFACE.
- 3 INSTALL CIRCLIP WITH OPEN END TOWARDS TOP OF PISTON - CHECK PREVIOUSLY INSTALLED CIRCLIP TO ENSURE THAT THE OPEN END IS THE SAME.
- 4 CLEAN WITH NON-RESIDUE DEGREASER OR ALCOHOL. SEAL MATING SURFACES WITH SEALANT. SEALANT MUST NOT BLOCK OIL PASSAGES.
- 5 SELECT PROPER BEARINGS PER CHART.
- 6 TORQUE IN SEQUENCE PER CRANKCASE, SPLIT VIEW.
- 7 INSURE THAT OIL DEFLECTOR IS PROPERLY POSITIONED IN UPPER CRANKCASE.



# ENGINE / COOLING SYSTEM

## Cylinder / Oil Cooler / Oil Filter / Oil Pump / Oil Sump / Water Pump

The diagram shows the following components and their assembly points:

- Cylinder Head:** Components labeled L and 5.
- Oil Cooler:** Components labeled H, I, B, and 4.
- Oil Filter:** Component labeled C.
- Oil Pump:** Component labeled 7.
- Oil Sump:** Components labeled 2, 3, 4, 6, and 7.
- Water Pump:** Components labeled C and 7.

FASTENER TORQUE TABLE	
A	6.5±1.0 N·m
B	8.0±1.0 N·m
C	10.0±1.0 N·m
D	12.0±1.0 N·m
E	16.0±1.5 N·m
F	22.5±2.5 N·m
G	24.0±2.5 N·m
H	28.0±3.0 N·m
K	35.0±3.5 N·m
L	40.0±4.0 N·m
M	2.8±0.3 N·m

**NOTES:**

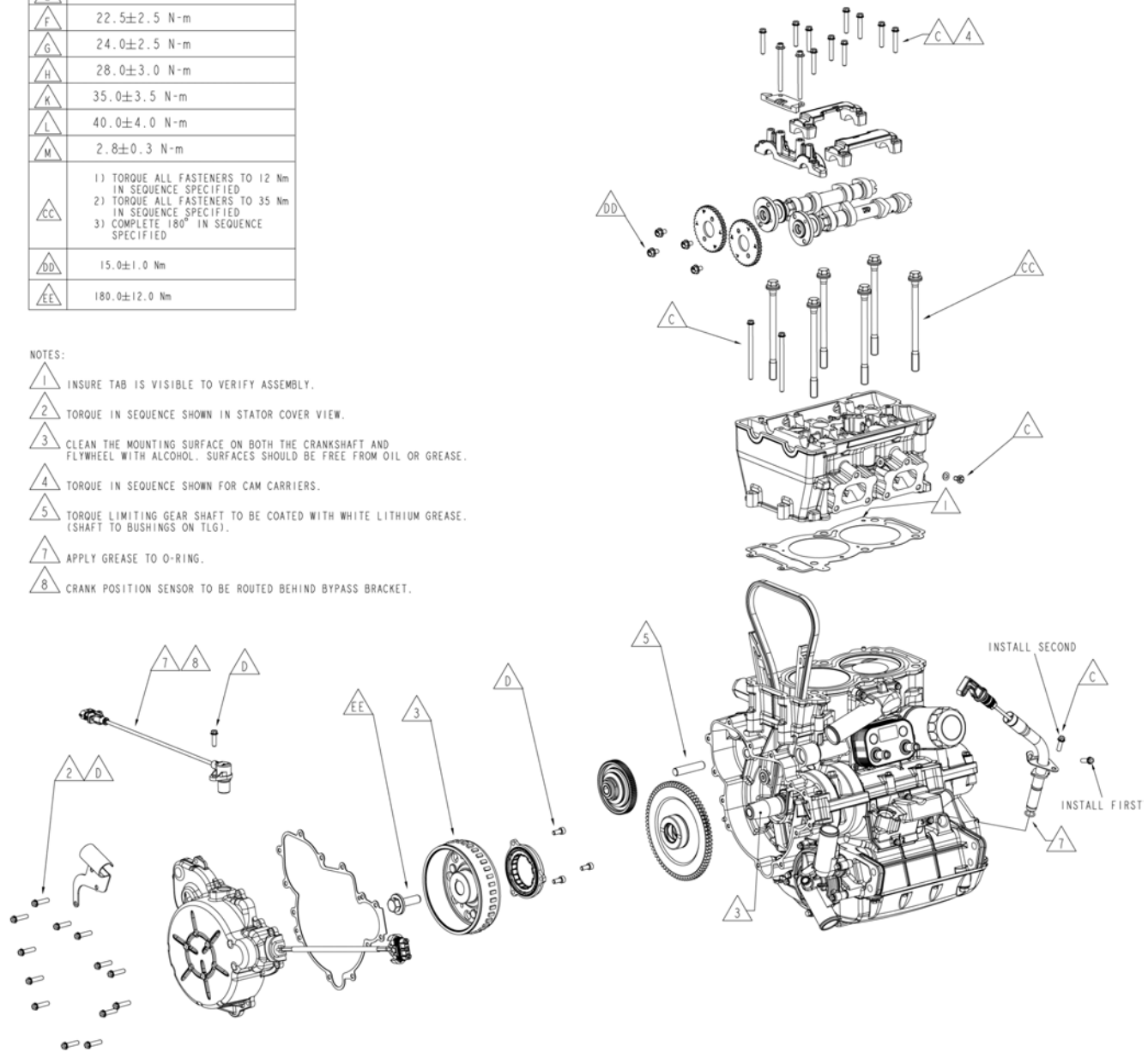
- 1 LUBRICATE SEAL WITH ENGINE OIL PRIOR TO FILTER INSTALLATION.
- 2 ENSURE TAB IS VISIBLE TO VERIFY ASSEMBLY
- 3 TORQUE IN SEQUENCE SHOWN IN OIL SUMP COVER VIEW.
- 4 ENSURE O-RING SEALS ARE SEATED IN C'BORES BEFORE ASSEMBLY.
- 5 APPLY ENGINE OIL TO CYLINDER BORES PRIOR TO ASSEMBLY.
- 6 CLEAN WITH NON-RESIDUE DEGREASER OR ALCOHOL, SEAL MATING SURFACES WITH SEALANT.
- 7 APPLY LUBE TO ORING PRIOR TO PUMP ASSEMBLY TO CRANKCASE.

## Camshafts / Cylinder Head / Flywheel / Idler Gears / Stator Cover

FASTENER TORQUE TABLE	
	6.5±1.0 N-m
	8.0±1.0 N-m
	10.0±1.0 N-m
	12.0±1.0 N-m
	16.0±1.5 N-m
	22.5±2.5 N-m
	24.0±2.5 N-m
	28.0±3.0 N-m
	35.0±3.5 N-m
	40.0±4.0 N-m
	2.8±0.3 N-m
	1) TORQUE ALL FASTENERS TO 12 Nm IN SEQUENCE SPECIFIED 2) TORQUE ALL FASTENERS TO 35 Nm IN SEQUENCE SPECIFIED 3) COMPLETE 180° IN SEQUENCE SPECIFIED
	15.0±1.0 Nm
	180.0±12.0 Nm

NOTES:

- INSURE TAB IS VISIBLE TO VERIFY ASSEMBLY.
- TORQUE IN SEQUENCE SHOWN IN STATOR COVER VIEW.
- CLEAN THE MOUNTING SURFACE ON BOTH THE CRANKSHAFT AND FLYWHEEL WITH ALCOHOL. SURFACES SHOULD BE FREE FROM OIL OR GREASE.
- TORQUE IN SEQUENCE SHOWN FOR CAM CARRIERS.
- TORQUE LIMITING GEAR SHAFT TO BE COATED WITH WHITE LITHIUM GREASE. (SHAFT TO BUSHINGS ON TLG).
- APPLY GREASE TO O-RING.
- CRANK POSITION SENSOR TO BE ROUTED BEHIND BYPASS BRACKET.



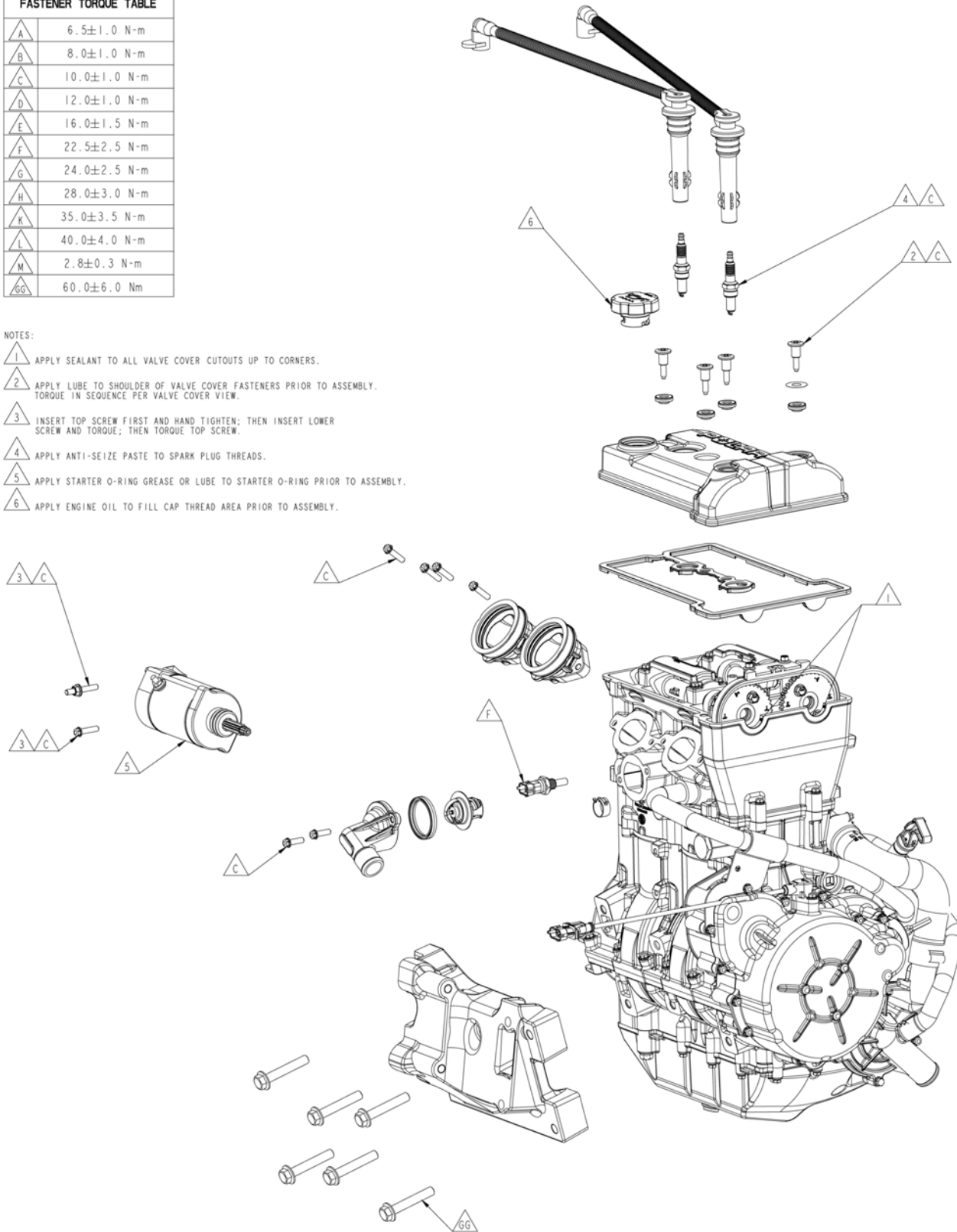
# ENGINE / COOLING SYSTEM

## Spark Plugs / Starter / Thermostat Housing / Trans Joint / Valve Cover

FASTENER TORQUE TABLE	
A	6.5±1.0 N-m
B	8.0±1.0 N-m
C	10.0±1.0 N-m
D	12.0±1.0 N-m
E	16.0±1.5 N-m
F	22.5±2.5 N-m
G	24.0±2.5 N-m
H	28.0±3.0 N-m
K	35.0±3.5 N-m
L	40.0±4.0 N-m
M	2.8±0.3 N-m
GG	60.0±6.0 Nm

NOTES:

- 1 APPLY SEALANT TO ALL VALVE COVER CUTOUTS UP TO CORNERS.
- 2 APPLY LUBE TO SHOULDER OF VALVE COVER FASTENERS PRIOR TO ASSEMBLY. TORQUE IN SEQUENCE PER VALVE COVER VIEW.
- 3 INSERT TOP SCREW FIRST AND HAND TIGHTEN; THEN INSERT LOWER SCREW AND TORQUE; THEN TORQUE TOP SCREW.
- 4 APPLY ANTI-SEIZE PASTE TO SPARK PLUG THREADS.
- 5 APPLY STARTER O-RING GREASE OR LUBE TO STARTER O-RING PRIOR TO ASSEMBLY.
- 6 APPLY ENGINE OIL TO FILL CAP THREAD AREA PRIOR TO ASSEMBLY.



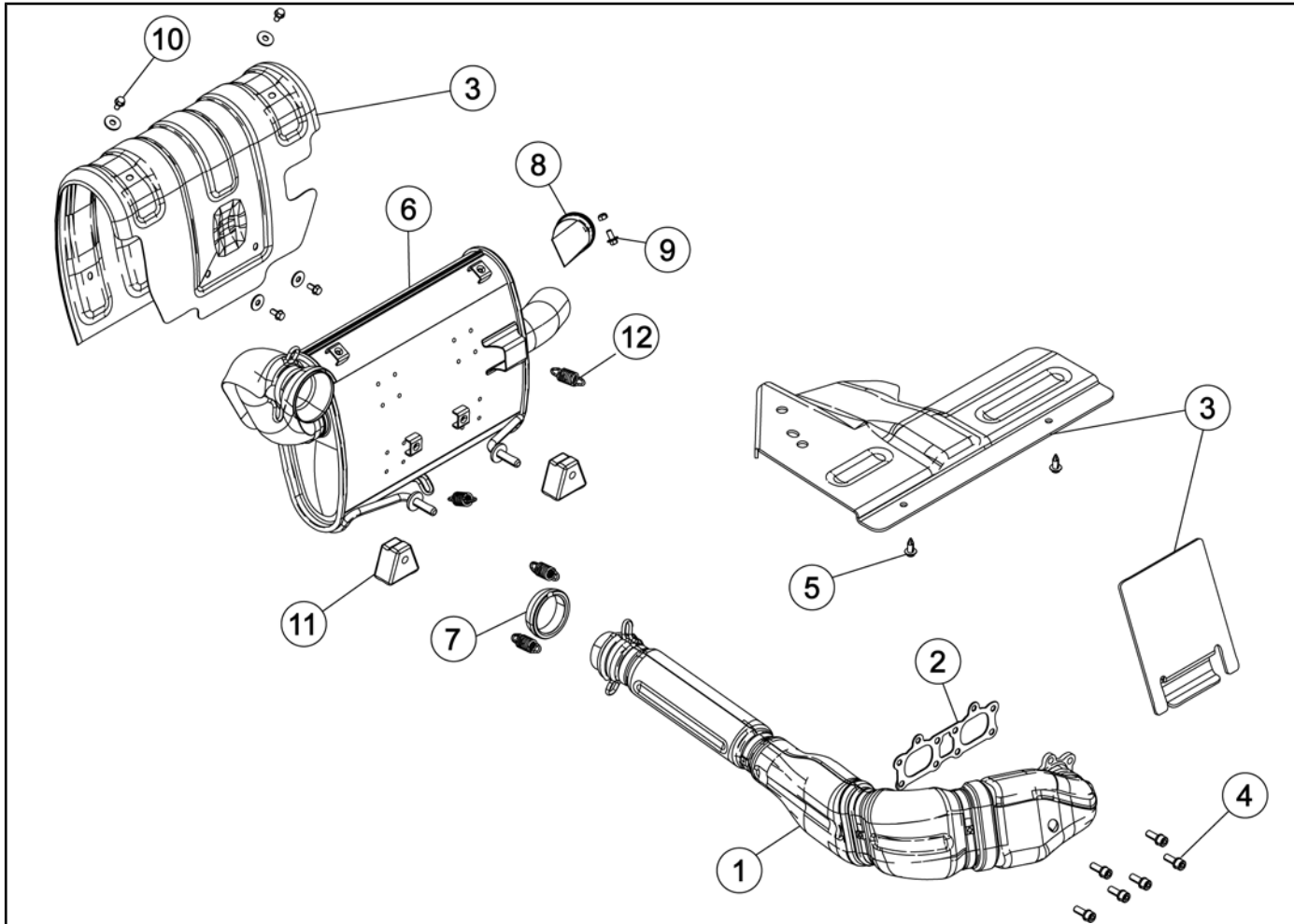




# ENGINE / COOLING SYSTEM

## EXHAUST SYSTEM

### Exhaust Assembly View / Torque Values

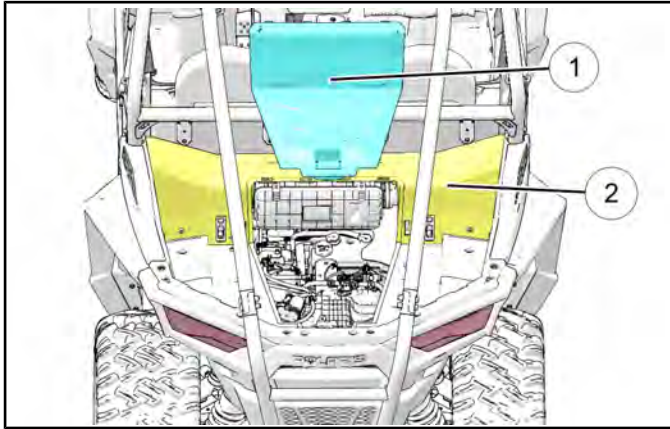


ITEM / TORQUE	ITEM / TORQUE
① Exhaust Head Pipe	⑦ Exhaust Gasket
② Head Pipe Gasket	⑧ Spark Arrestor
③ Heat Shields	⑨ Spark Arrestor Fastener / <b>8 ft-lb (11 Nm)</b>
④ Head Pipe Bolts / <b>18 ft-lb (24 Nm)</b>	⑩ Muffler Shield Fasteners / <b>10 ft-lb (14 Nm)</b>
⑤ Push Rivet	⑪ Muffler Rubber Mounts
⑥ Muffler	⑫ Exhaust Spring

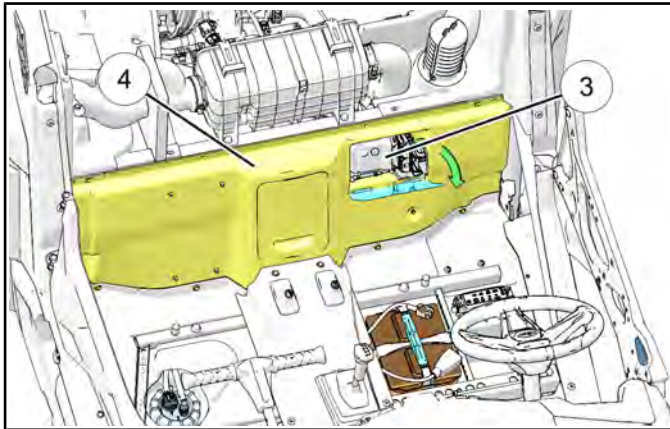
## ENGINE / COOLING SYSTEM

### Exhaust Removal / Installation

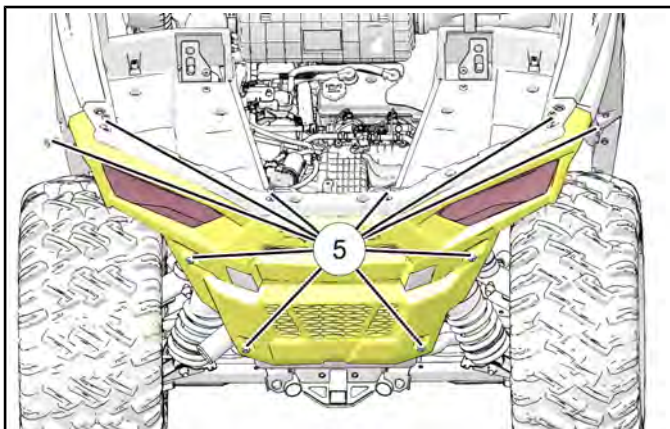
1. Remove the engine access panel ① and the air intake housing cover ②.



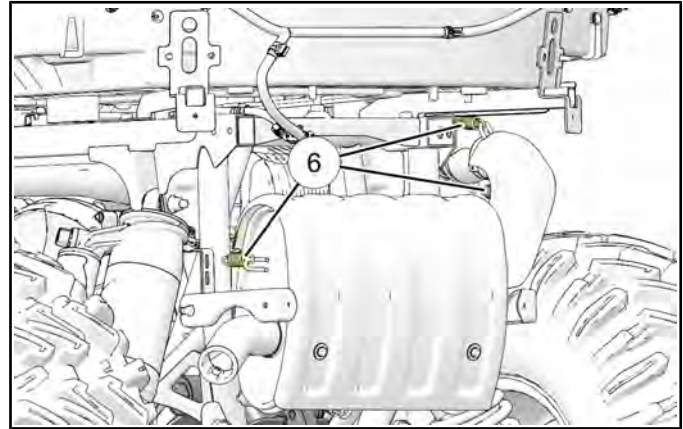
2. Remove the seats.
3. Disconnect and remove the ECU ③.



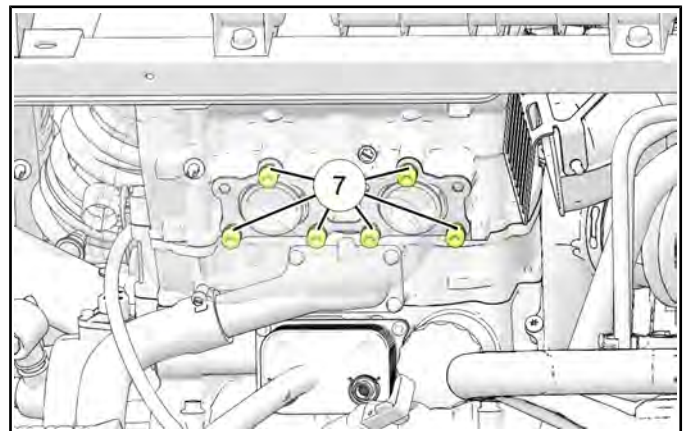
4. Remove the four plastic rivets retaining the bottom of the engine / cab divider panel ④.
5. Disconnect both taillights and remove ten Torx fasteners ⑤ retaining the rear fascia.



6. Remove the three springs ⑥, two retaining the muffler to the head pipe and one spring retaining the muffler to the chassis.



7. Remove the six exhaust head pipe fasteners ⑦.



8. Remove the exhaust from the vehicle.
9. To install, reverse procedure. Torque fasteners to specification.



Exhaust Head Pipe Fasteners:  
**18 ft-lb (24 Nm)**

Body Screws:  
**8 ft-lb (11 Nm)**

Air Box Mounting Fasteners:  
**8 ft-lb (11 Nm)**

3

# ENGINE / COOLING SYSTEM

## ENGINE COOLING SYSTEM

### Cooling System Specifications

CONDITION	COOLANT TEMP
Thermostat Starts to Open	180° F (82° C)
Fan Shuts Off	192° F (89° C)
Fan Turns On	198° F (92° C)
Thermostat Fully Open	203° F (95° C)
Engine Temperature Overheat Indicator	232° F (111° C)
Engine Protection Level 1 – Power Limit	232° F (111° C)
Engine Protection – Ignition Misfire	237° F (114° C)
Engine Protection Level 2 – Power Limit	244° F (118° C)
Engine Shutdown Protection	252° F (122° C)

ITEM	SPECIFICATION
Cooling System Capacity	4.9 qts (4.6 L)
Pressure Cap Relief	13 PSI

**PolarisAntifreeze**  
**2880514 – Quart**  
**2880513 – Gallon**

### Cooling System Pressure Test

1. Remove the hood from the front cab.

#### **WARNING**

Escaping steam can cause burns. Never remove the pressure cap while the engine is warm or hot. Always allow the engine to cool before removing the pressure cap.

2. Remove the pressure cap from the radiator and pressure test the cooling system using a commercially available tester.
3. The system must maintain 10 PSI for five minutes or longer. If pressure loss is evident within five minutes, check the radiator, all cooling system hoses, clamps and water pump seal for signs of leaking.

### Radiator Cap Pressure Test

1. Open the front hood.

#### **WARNING**

Escaping steam can cause burns. Never remove the pressure cap while the engine is warm or hot. Always allow the engine to cool before removing the pressure cap.

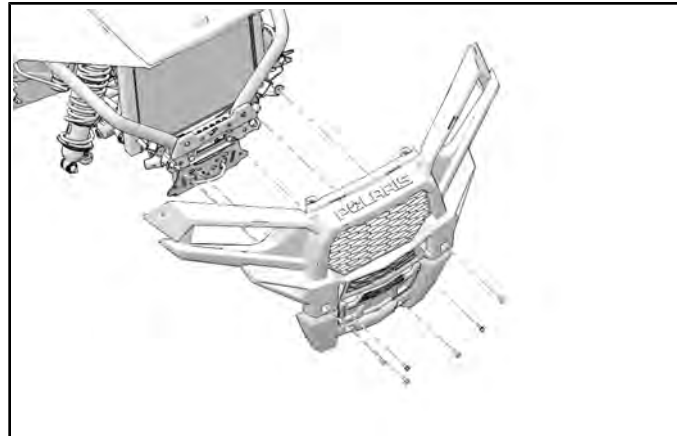
2. Remove radiator pressure cap and test using a commercially available pressure cap tester.
3. Replace cap if it does not meet the specification.

**Radiator Cap Pressure Relief**  
**13 PSI**

### Radiator Removal / Installation

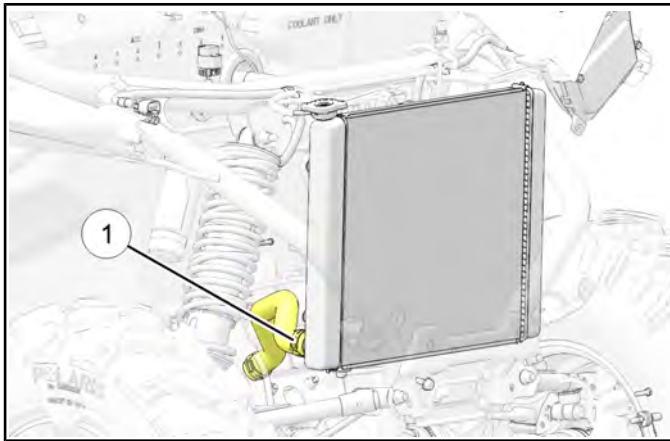
**NOTE:** This procedure should also be followed for radiator fan replacement.

1. Remove the hood and front bumper. (see Chapter 10 – Front Bumper Removal, page 10.12)
2. Remove the four fasteners retaining the front bumper support to the main frame.



## ENGINE / COOLING SYSTEM

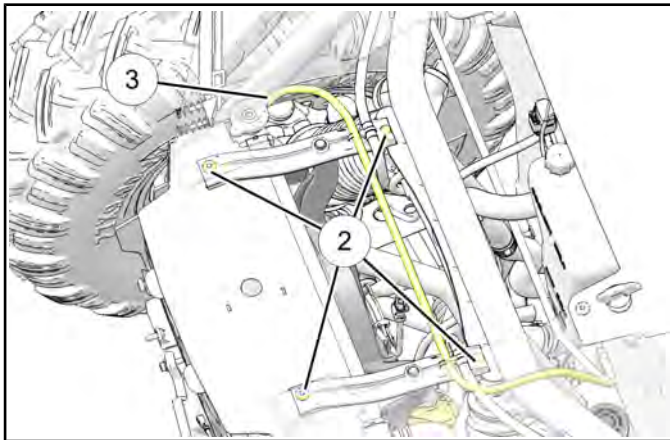
3. Drain radiator by removing the lower radiator hose ①. Be sure to catch and dispose of coolant properly.



### WARNING

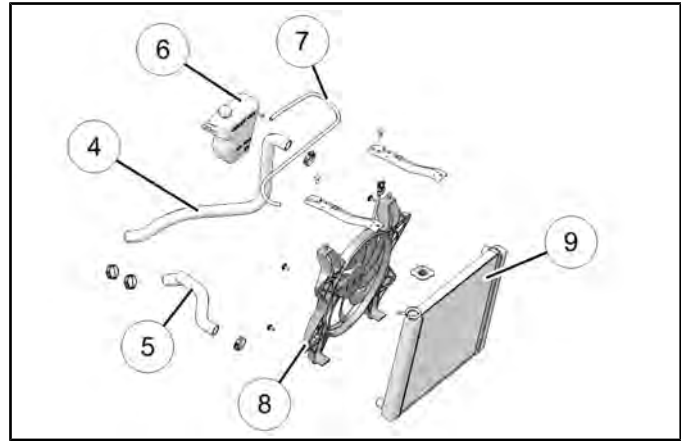
The cooling system is under pressure. Allow engine to cool before servicing or serious burns may result.

4. Disconnect the cooling fan electrical connector.
5. Remove the upper radiator hose from the radiator.
6. Remove the four upper radiator support fasteners ② and disconnect the coolant reservoir hose ③.



7. Lift radiator up to disengage it from its lower mounting points. Tilt top of radiator outward and remove the radiator from the vehicle.
8. Separate the fan motor assembly from the radiator. Inspect fan blades for damage.

9. Reverse this procedure for installation. Be sure to properly fill and bleed cooling system. (see Chapter 3 – Cooling System Bleeding Procedure, page



④ Upper Radiator Hose

⑤ Lower Radiator Hose

⑥ Coolant Reservoir

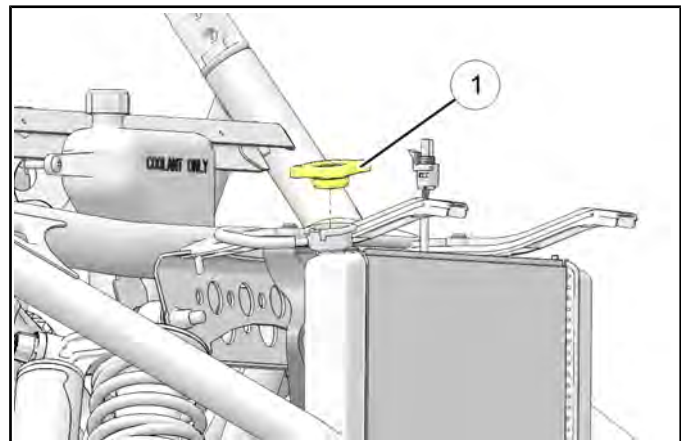
⑦ Reservoir Hose (to radiator)

⑧ Fan Motor Control

⑨ Radiator

### Thermostat Replacement

1. Remove the hood.
2. Remove the pressure cap ① to relieve any system pressure.



3

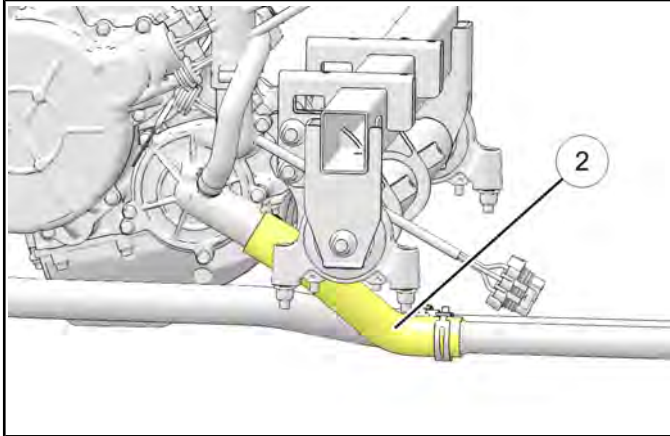


## ENGINE / COOLING SYSTEM

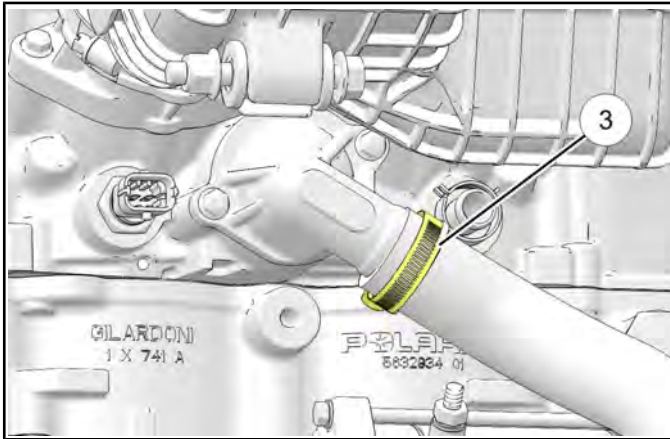
### WARNING

Escaping steam can cause burns. Never remove the pressure cap while the engine is warm or hot. Always allow the engine to cool before removing the pressure cap.

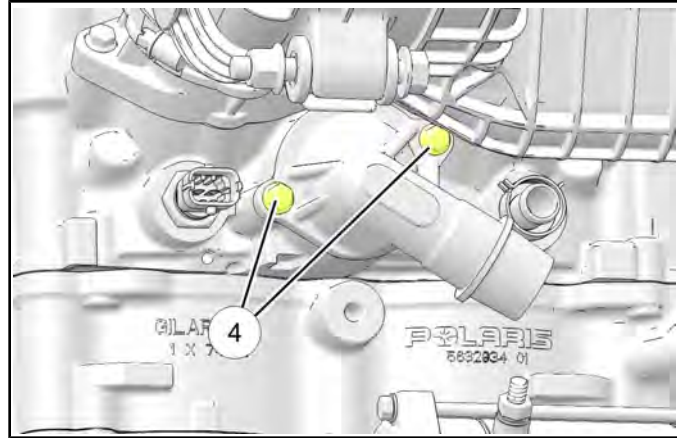
3. Remove the lower radiator hose ② and drain coolant to a level below the thermostat housing.



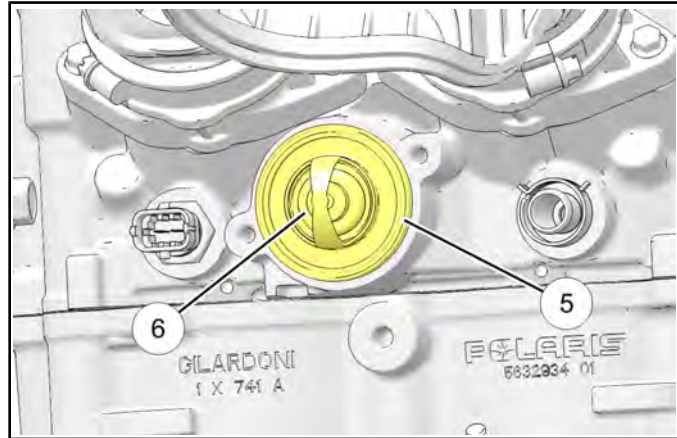
4. Loosen the hose clamp ③ and remove the coolant hose from the thermostat cover.



5. Remove the two bolts ④ that retain the thermostat cover to the engine.



6. Remove the thermostat cover, seal ⑤ and thermostat ⑥ from the engine.



**NOTE:** Thermostat has a pop-off relief to allow the bypass system to operate until the thermostat opens.

7. Clean the thermostat mating surfaces on the engine and thermostat cover.
8. Install a new thermostat and seal into the cover and install the cover onto the engine.
9. Install the thermostat cover bolts. Torque bolts to specification.



Thermostat Cover Bolts:  
7 ft-lb (10 Nm)

10. Install coolant hose back on the thermostat cover and securely tighten the hose clamp.

## ENGINE / COOLING SYSTEM

11. Fill cooling system and proceed to bleed the cooling system (see Chapter 3 – Cooling System Bleeding Procedure, page ).

### Cooling System Bleeding

#### WARNING

Always wear safety glasses and proper shop clothing when performing the procedures in this manual. Failing to do so may lead to injury or death.

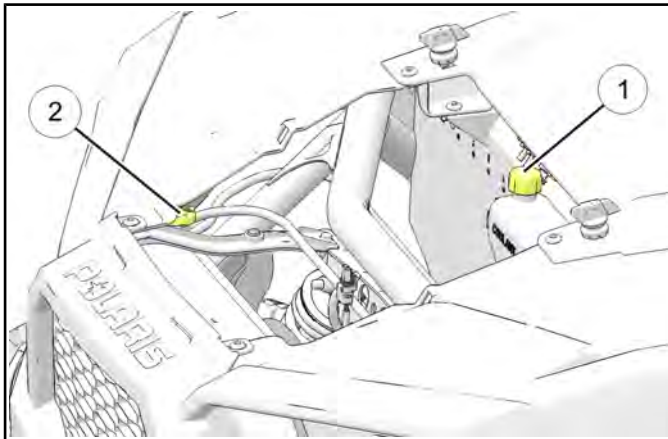
**NOTE:** If the coolant level is **LOW** in the radiator or if there are leaks in the system, the cooling system will not draw coolant from the reservoir tank.

1. Allow engine and cooling system to cool down.

#### CAUTION

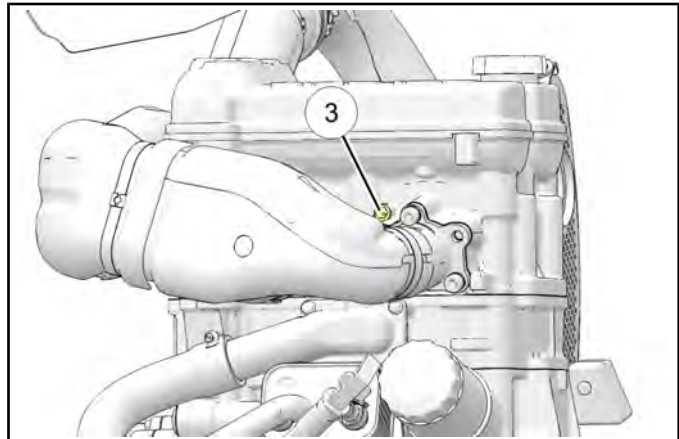
Escaping steam can cause burns. Never remove the pressure cap while the engine is warm or hot. Always allow the engine to cool before removing the pressure cap.

2. Remove the hood.
3. Remove the cap from the Coolant Reservoir ① and fill the reservoir to the MAX line.



4. Remove the radiator pressure cap ② and add the necessary amount of Polaris Premium Antifreeze to the radiator.
5. Remove the cargo box engine access panel.

6. Open the bleed screw ③ to allow any trapped air to escape.



7. Tighten the bleed screw to specification, top off coolant and properly install the pressure cap.



Coolant Bleed Screw:  
**89 in-lb (10 Nm)**

8. Start the engine and allow it to idle until the cooling fan has cycled two times.
9. Allow engine and coolant system to completely cool down.
10. Remove the radiator pressure cap. Add the necessary amount of Polaris Premium Antifreeze to the radiator.
11. Open the bleed screw to allow any trapped air to escape. Close the bleed screw once a steady stream of coolant begins to drain out.
12. Tighten the bleed screw to specification, top off coolant and properly install the pressure cap.



Coolant Bleed Screw:  
**89 in-lb (10 Nm)**

13. Fill the recovery bottle to the MAX line.
14. Reinstall the cargo box engine access panel and the hood.

3



# ENGINE / COOLING SYSTEM

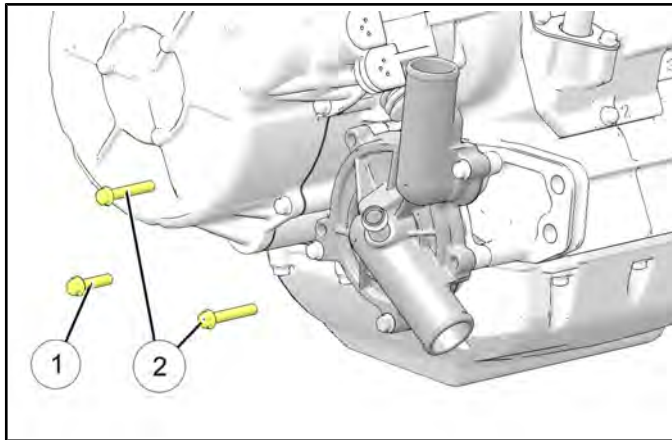
## Water Pump Removal

1. Allow engine and cooling system to cool down.

**⚠ WARNING**

Be sure the engine has cooled and no pressure is built up in the cooling system before removing the pressure cap. The coolant may be hot and could cause severe injury / burns.

2. Disconnect the (-) negative battery cable.
3. Remove all debris and thoroughly clean the area around the water pump.
4. Remove the hood and remove the pressure cap from the radiator.
5. Place a drain pan under the water pump and drain the cooling system.
6. Disconnect the three coolant hoses that are attached to the water pump. Note the location and routing for installation.
7. Remove the three bolts <sup>①②</sup> retaining the water pump to the engine. Note the different lengths of the bolts for installation.

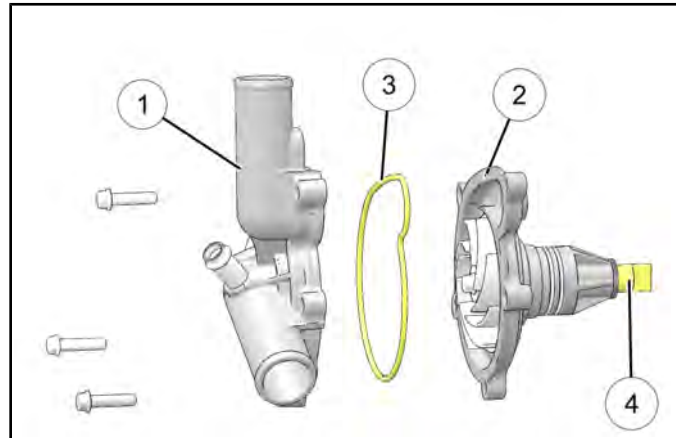


8. Remove the water pump from the engine by gently twisting and rocking the water pump housing while pulling outward.
9. Plug the water pump drive access hole in the engine block with a clean shop towel.

## Water Pump Service

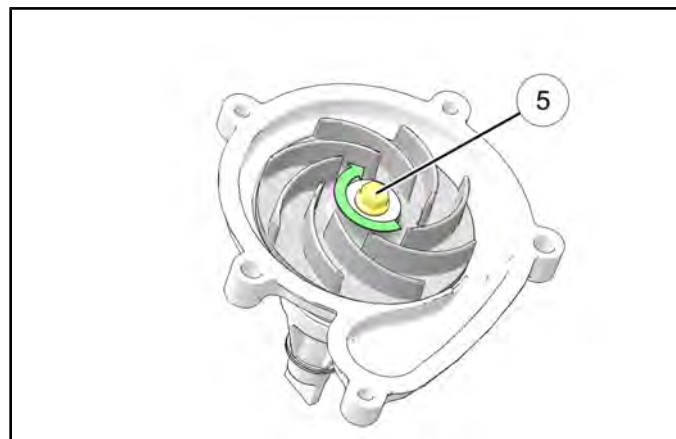
**NOTE:** The water pump cover gasket can be replaced while the water pump housing is still installed in the engine.

1. Remove water pump assembly. (see Chapter 3 – Water Pump Removal, page 3.16)
2. Remove the three bolts retaining the water pump <sup>①</sup> cover to the water pump housing <sup>②</sup>. Discard the gasket <sup>③</sup>.



3. Place the water pump drive tab <sup>④</sup> vertically into a soft jaw vice.
4. Remove the bolt and washer retaining the water pump impeller to the shaft. Inspect the impeller vanes and water pump housing for damage.

**NOTE:** The water pump impeller bolt <sup>⑤</sup> is left hand threaded (reverse thread).

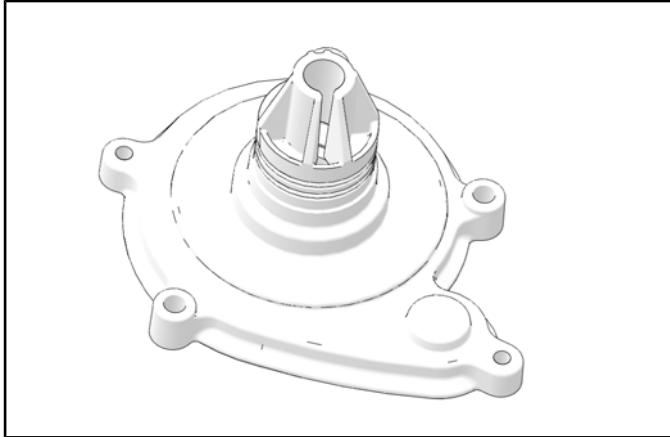


5. Remove impeller from water pump shaft.
6. Using an appropriate arbor press, properly support the water pump housing and press out the water pump shaft from the impeller side.

## ENGINE / COOLING SYSTEM

7. Extract the mechanical seal and the oil seal from the water pump housing.

**NOTE: A 5/32" (4 mm ) diameter punch will fit in the lubrication slot to aid in the removal of the oil seal. Do not damage the water pump shaft bearing surface.**



8. Inspect the water pump shaft bore for damage. Replace water pump housing if necessary.
9. Clean and inspect water pump shaft for excessive wear or damage. Replace water pump housing if necessary as shaft cannot be purchased separately.
10. Thoroughly clean mechanical seal and oil seal bores.
11. Install a NEW oil seal into the water pump housing until fully seated.
12. Fully install the water pump shaft and two washers into the housing.
13. Place water pump drive tab vertically into a soft jaw vice. Install a NEW mechanical seal into the water pump housing using special tool PU-50564. Press the new mechanical seal in until it is flush with the housing.



14. Rotate the water pump shaft after seal installation to verify free movement.
15. Place impeller onto the water pump shaft.

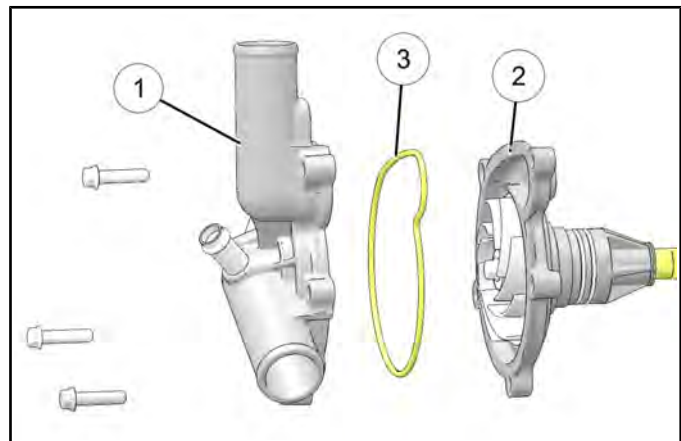
16. Apply Loctite® 204™ to the threads of the impeller bolt. Install washer and impeller bolt and torque to specification.



Water Pump Impeller Bolt:  
**7 ft-lb (10 Nm)**  
**(Apply Loctite® 204™ to bolt threads)**

17. Clean water pump cover and housing gasket surfaces.

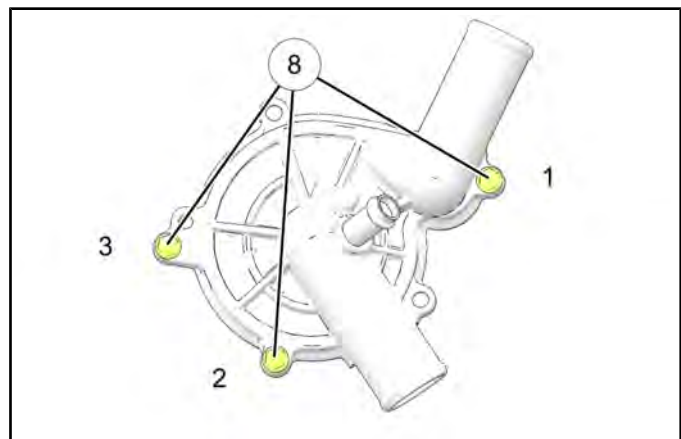
18. Install a new water pump cover gasket.



19. Install the water pump cover and three retaining bolts. Torque bolts in sequence to specification.



Water Pump Cover Bolts:  
**7 ft-lb (10 Nm)**  
**(Apply Loctite® 204™ to bolt threads)**

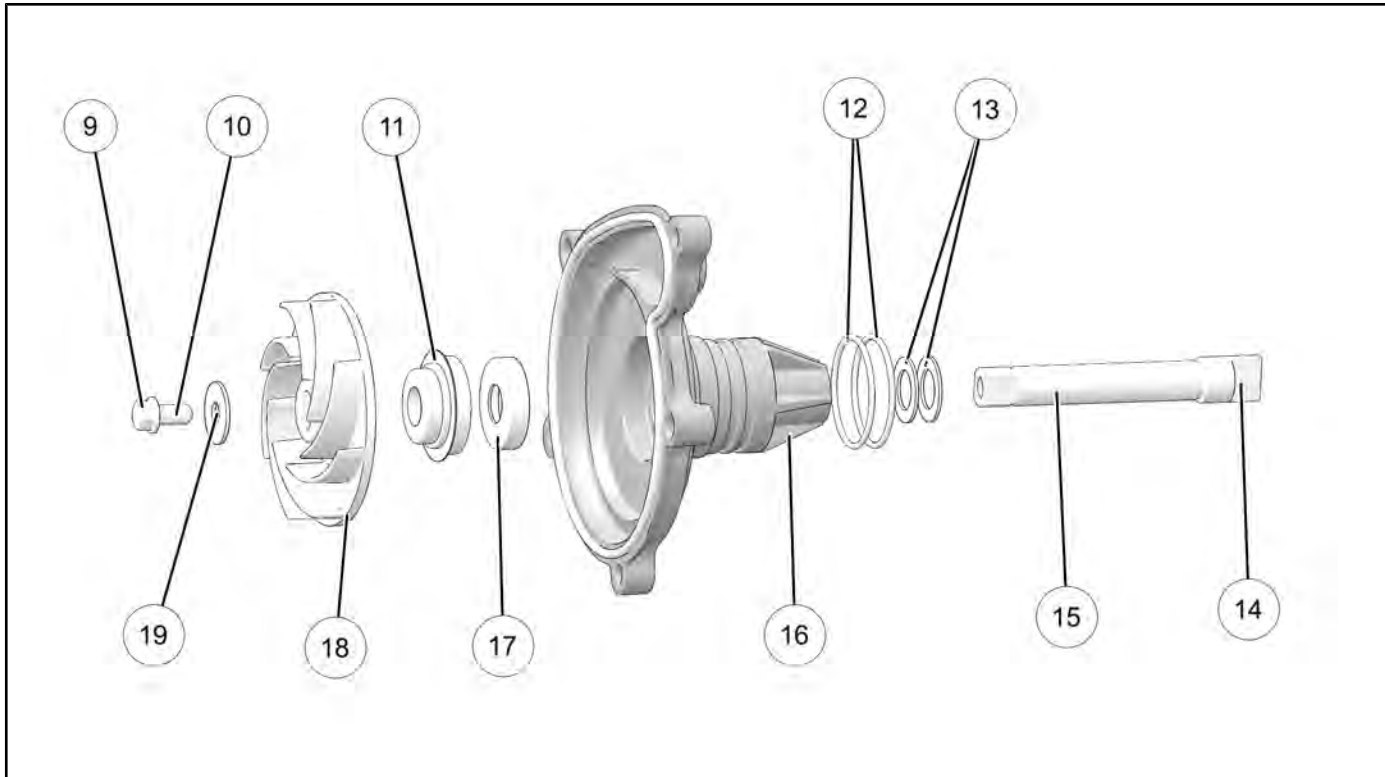


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# ENGINE / COOLING SYSTEM

20. Install two new water pump o-rings and lubricate them with clean engine oil.

21. Install water pump assembly into the engine. (see Chapter 3 – Water Pump Installation, page 3.18)



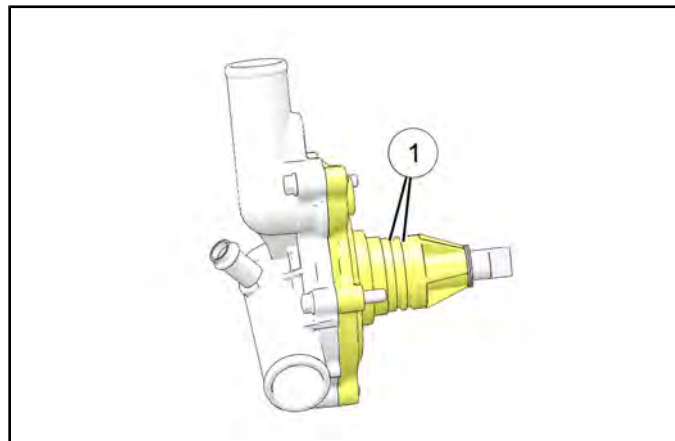
⑨ Bolt	⑬ Washers	⑰ Oil Seal
⑩ Loctite 204	⑭ Drive Tab	⑱ Washer
⑪ Mechanical Seal	⑮ Water Pump Shaft	
⑫ O-Rings	⑯ Water Pump Housing	

## Water Pump Installation

1. Replace the two sealing o-rings ① on the water pump housing.

**NOTE:** Always use **NEW** o-rings each time the water pump is removed.

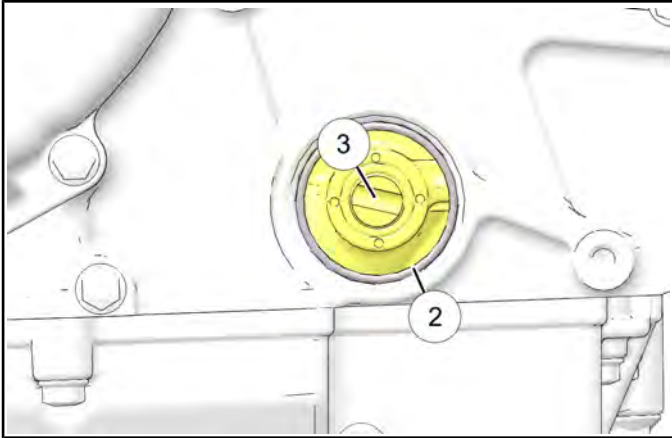
2. Lubricate new o-rings ① with clean engine oil.



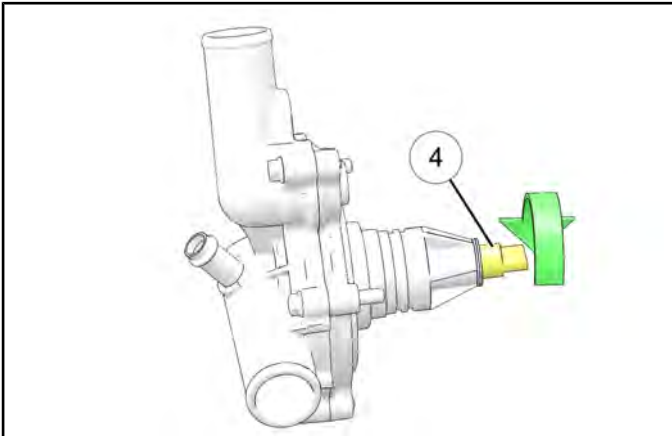
3. Remove the shop towel from the water pump drive access hole in the engine block.

## ENGINE / COOLING SYSTEM

4. Clean the o-ring sealing surface ② in the engine block using a clean shop towel.



5. Use a shop light to illuminate the water pump drive access hole in the engine crankcase. Note the orientation of the water pump drive slot ③.
6. Rotate the water pump drive tab ④ so it matches the angle of the drive slot in the engine.

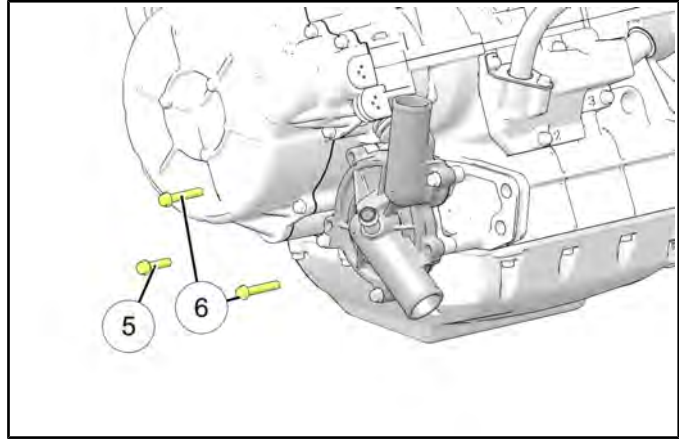


### CAUTION

The water pump drive tab and slot must be aligned properly during installation or severe engine or water pump damage will occur.

7. Slide water pump into engine crankcase. Be sure water pump is fully seated and the drive tab and slot are properly aligned.

8. Install the three water pump mounting bolts ⑤ ⑥, noting location of the shorter bolt. Torque bolts to specification.



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Water Pump Mounting Bolts:  
**7 ft-lb (10 Nm)**  
(Apply Loctite® 204™ to bolt threads)

9. Install the three coolant hoses that attach to the water pump. Be sure orientation and routing are correct.
10. Connect the (-) negative battery cable.
11. Fill and bleed the cooling system. (see Chapter 3 – Cooling System Bleeding, page 3.15)

# ENGINE / COOLING SYSTEM

## ENGINE SERVICE

### Lubrication Specifications

Oil Capacity*	≈ 2.5 Quarts (2.4 L)
Oil Filter Wrench	PU-50105 or 2.5" (64 mm)
Oil Filter	2540086
Oil Type <i>Ambient Temp Range:</i> -35° F to 100° F	PS-4 Synthetic Engine Oil 2876244 – Qt
Oil Type <i>Ambient Temp Range:</i> 0° F to 120° F	PS-4 Extreme Duty Synthetic Engine Oil 2878920 – Qt
Oil Pressure (idle)	at 70° F: 72 PSI
	at 220° F: 60 PSI

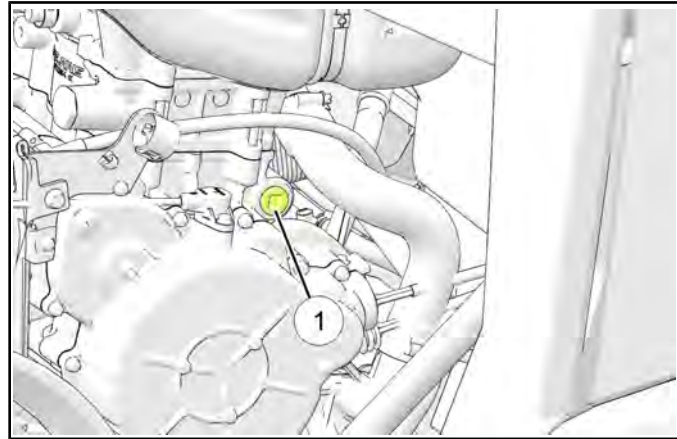
\* Additional oil may be required after complete engine disassembly. Check level after filling and add oil as needed.

### Engine Oil Pressure Test

1. Attach the Oil Pressure Gauge Adapter (PU-50565) to the Oil Pressure Gauge (PV-43531).

**Oil Pressure Gauge: PV-43531**  
**Oil Pressure Gauge Adapter: PU-50565**

2. Clean the area around the main oil gallery plug ①, located in the upper crankcase on the MAG side of the engine.



3. Remove the plug and insert the oil pressure adapter.
4. Start engine and allow it to reach operating temperature. Monitor the gauge.

**NOTE: Test results are based on the use of the recommended engine oil (Polaris PS-4 or PS-4 Extreme Duty) at operating temperature, and may vary considerably if any other oil is used or if the engine is not up to operating temperature.**

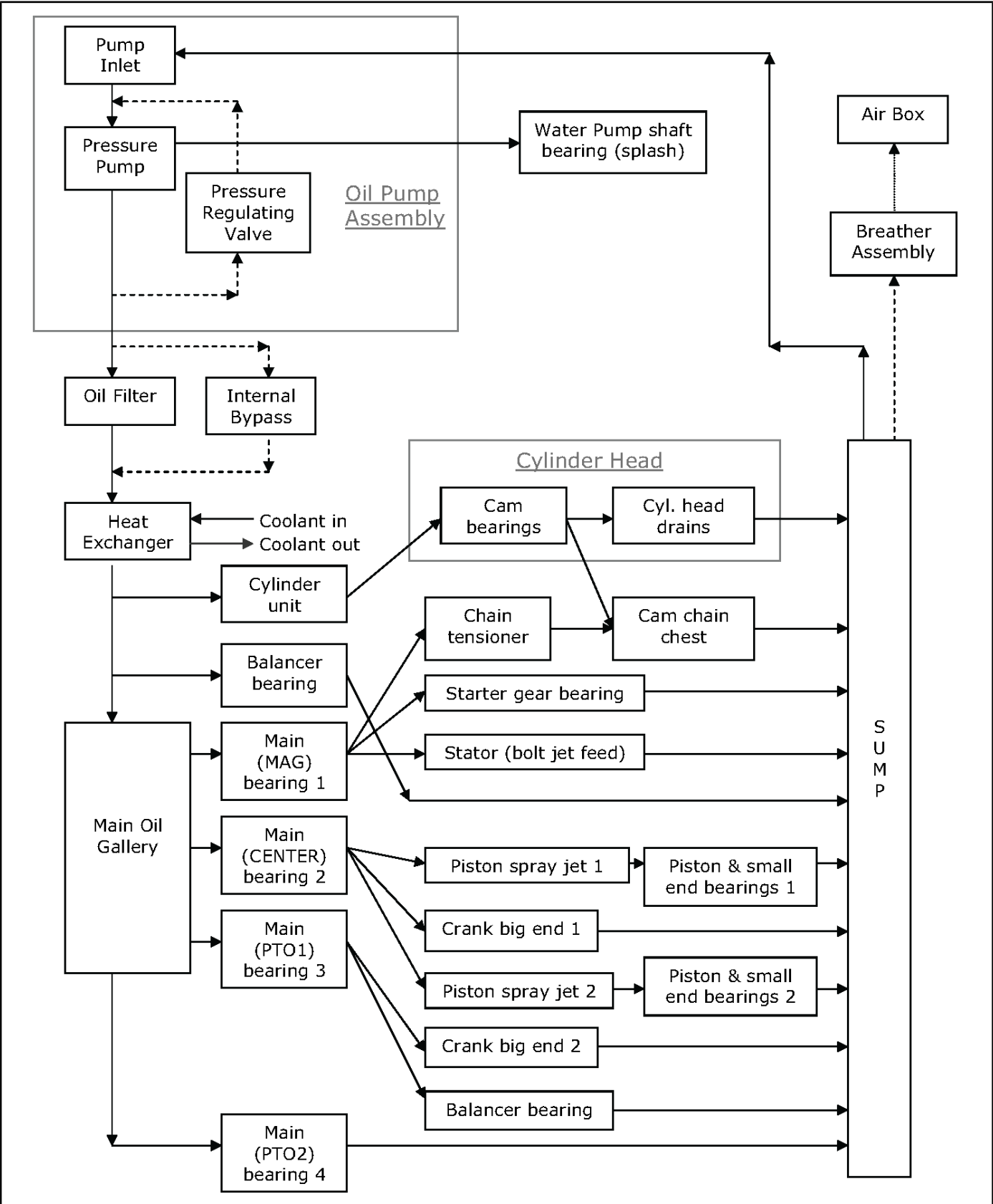
**Oil Pressure (engine at operating temp)**  
**Standard @ 1200 RPM: 60 PSI**  
**Minimum: 15 PSI**

5. Upon assembly, torque the crankcase gallery plug to specification.



Crankcase Gallery Plug:  
11 ft-lb (15 Nm)

Engine Oil Flow Chart



3



# ENGINE / COOLING SYSTEM

## Engine Specifications

CAMSHAFT / CYLINDER HEAD / CYLINDER		
Camshaft	Cam Lobe Height - Intake (Standard)	1.5256" ± 0.0015" (38.75 ± 0.04 mm)
	Cam Lobe Height - Intake (Service Limit)	1.5220" (38.66 mm)
	Cam Lobe Height - Exhaust (Standard)	1.4961" ± 0.0015" (38.00 ± 0.04 mm)
	Cam Lobe Height - Exhaust (Service Limit)	1.4925" (37.91 mm)
	Camshaft Journal O.D. - All (Standard)	0.9035" - 0.9046" (22.949 - 22.978 mm)
	Camshaft Journal O.D. - All (Service Limit)	0.9025" (22.923 mm)
	Camshaft Journal Bore I.D. - All (Standard)	0.9055" - 0.9063" (23.000 - 23.021 mm)
	Camshaft Journal Bore I.D. - All (Service Limit)	0.9072" (23.044 mm)
	Camshaft Oil Clearance (Standard)	0.0009" - 0.0028" (0.022 - 0.072 mm)
	Camshaft Oil Clearance (Service Limit)	0.0039" (0.1 mm)
	Camshaft End Play (Standard)	0.0040" - 0.0100" (0.101 - 0.254 mm)
	Camshaft End Play (Service Limit)	0.0157" (0.4 mm)
Cylinder Head	Cylinder Head - Surface Warp Limit	0.0039" (0.1 mm)
	Cylinder Head - Standard Height	4.717" ± 0.0019" (119.8 ± 0.05 mm)
Valve Seat	Valve Seat - Contacting Width - Intake (Standard)	0.0393" ± 0.0039" (1.0 ± 0.10 mm)
	Valve Seat - Contacting Width - Intake (Service Limit)	0.0551" (1.4 mm)
	Valve Seat - Contacting Width - Exhaust (Standard)	0.0590" ± 0.0039" (1.5 ± 0.10 mm)
	Valve Seat - Contacting Width - Exhaust (Service Limit)	0.0748" (1.9 mm)
	Valve Seat Angles	30.0° ± 1.5° / 45.0° ± 0.5° / 60.0° ± 1.5°
Valve Guide	Valve Guide Inner Diameter	0.2165" - 0.2171" (5.500 - 5.515 mm)
Valve	Valve Lash (Cold) - Intake	0.006" ± 0.002" (0.15 ± 0.5 mm)
	Valve Lash (Cold) - Exhaust	0.008" ± 0.002" (0.20 ± 0.5 mm)
	Valve Stem Diameter - Intake	0.2155" - 0.2161" (5.475 - 5.490 mm)
	Valve Stem Diameter - Exhaust	0.2147" - 0.2153" (5.455 - 5.470 mm)
	Valve Stem Oil Clearance - Intake	0.0003" - 0.0015" (0.010 - 0.040 mm)
	Valve Stem Oil Clearance - Exhaust	0.0011" - 0.0023" (0.030 - 0.060 mm)
	Valve Overall Length - Intake	3.7704" (95.77 mm)
	Valve Overall Length - Exhaust	3.8023" (96.58 mm)
Valve Spring	Valve Spring Free Length (Standard)	1.7213" (43.72 mm)
	Valve Spring Free Length (Service Limit)	1.6830" (42.75 mm)
Cylinder	Cylinder - Surface Warp Limit (mating with cylinder head)	0.002" (0.05 mm)
	Cylinder Bore - Standard	3.6614" ± 0.0003" (93 mm ± 0.008 mm)
	Cylinder Out of Round Limit	0.001" (0.025 mm)
	Cylinder Taper Limit	0.001" (0.025 mm)
	Cylinder to Piston Clearance	0.0014" - 0.0026" (0.035 - 0.065 mm)



## ENGINE / COOLING SYSTEM

PISTON / RINGS / CONNECTING ROD / CRANKSHAFT / BALANCE SHAFT			
Piston	Piston - Standard O.D. - Measured 90 degrees to pin, 0.51 in. (13 mm) up from piston skirt. See text.		3.6592 ± 0.0003" (92.950 ± 0.008 mm)
	Piston Pin Bore I.D. (Standard)		0.7876" - 0.7878" (20.004 - 20.009 mm)
	Piston Pin Bore I.D. (Service Limit)		0.7893" (20.05 mm)
Piston Pin	Piston Pin O.D. (Standard)		0.7872" - 0.7874" (19.995 - 20.000 mm)
	Piston Pin O.D. (Service Limit)		0.7866" (19.98 mm)
Piston Ring	Installed Gap	Top Ring (Standard)	0.008" - 0.014" (0.20 - 0.36 mm)
		Top Ring (Service Limit)	0.020" (0.5 mm)
		Second Ring (Standard)	0.015" - 0.025" (0.37 - 0.63 mm)
		Second Ring (Service Limit)	0.028" (0.70 mm)
		Oil Control Rails (Standard)	0.010" - 0.040" (0.25 - 1.02 mm)
		Oil Control Rails (Service Limit)	0.059" (1.50 mm)
	Ring to Groove Clearance	Top Ring (Standard)	0.0012" - 0.0037" (0.030 - 0.095 mm)
		Second Ring (Standard)	0.0012" - 0.0030" (0.030 - 0.076 mm)
		Service Limit	0.0047" (0.12 mm)
Connecting Rod	Connecting Rod Small End I.D. (Standard)		0.7879" - 0.7884" (20.015 - 20.025 mm)
	Connecting Rod Small End I.D. (Service Limit)		0.7897" (20.06 mm)
	1 - Marking	Connecting Rod Big End Bore I.D.	1.7318" - 1.7321" (43.989 - 43.996 mm)
	2 - Marking	Connecting Rod Big End Bore I.D.	1.7321" - 1.7323" (43.996 - 44.003 mm)
	3 - Marking	Connecting Rod Big End Bore I.D.	1.7323" - 1.7326" (44.003 - 44.010 mm)
Crankshaft	B - Marking	Main Journal O.D. (Standard)	1.6140" - 1.6143" (40.996 - 41.004 mm)
	G - Marking	Main Journal O.D. (Standard)	1.6137" - 1.6140" (40.988 - 40.995 mm)
	Y - Marking	Main Journal O.D. (Standard)	1.6134" - 1.6137" (40.980 - 40.987 mm)
	Main Journal O.D. (Service Limit)		1.6126" (40.960 mm)
	B - Marking	Rod Journal O.D. (Standard)	1.6118" - 1.6122" (40.942 - 40.950 mm)
	G - Marking	Rod Journal O.D. (Standard)	1.6115" - 1.6118" (40.934 - 40.941 mm)
	Y - Marking	Rod Journal O.D. (Standard)	1.6112" - 1.6115" (40.926 - 40.933 mm)
	Rod Journal O.D. (Service Limit)		1.6104" (40.906 mm)
	Crankshaft Runout Limit (PTO and MAG)		Less than 0.001" (0.025 mm)
Auxiliary Sprocket Installed Depth		4.9527" ± 0.0078" (125.8 ± 0.2 mm)	
Balance Shaft	Bearing Journal O.D. (Standard)		1.4939" - 1.4946" (37.946 - 37.962 mm)
	Bearing Journal O.D. (Service Limit)		1.4921" (37.900 mm)

3

# ENGINE / COOLING SYSTEM

## Accessible Engine Components

The following components can be serviced or removed with the engine installed:

- Camshaft(s)
- Camshaft Sprocket(s)
- Cylinder Head
- Flywheel
- Oil Cooler
- Starter Motor / Idler Gear Asm
- Stator (Alternator)
- Thermostat
- Valve Cover
- Water Pump

The following components require engine removal for service:

- Camshaft Timing Chain
- Connecting Rod(s)
- Counterbalance Shaft / Bearings
- Crankcase
- Crankshaft / Main Bearings
- Crankshaft Seal (PTO)
- Cylinder
- Oil Pump / Oil Pump Sprocket or Chain
- Piston / Rings

## Top End Service

Some top-end engine components can be service while the engine is mounted in the chassis.

To service the top-end of the engine, refer to Chapter 2 – Valve Clearance Inspection, page 2.16 which provides detailed steps to remove the valve cover.

## Engine Mounts

The engine is mounted to the frame on the front only. The rear of the engine is mounted to the transmission. To replace the isolators:

1. Slightly lift and secure the engine using an engine lift.
2. Remove the engine isolator bolts securing the mount to the engine bracket.
3. Remove the fasteners retaining the isolator bracket to the frame and remove the isolator.
4. To install, reverse the procedure. Tighten fasteners to specification.



Engine Mount to Frame Fasteners:  
**22 ft-lb (30 Nm)**

Engine Isolator Fasteners:  
**40 ft-lbs (54 Nm)**

## Engine Removal

**IMPORTANT:** Do NOT rotate the engine backwards. The timing chain may jump teeth and lead to poor performance.

**NOTE:** Some engine repair procedures can be performed without removing the engine assembly from the vehicle. See Accessible Engine Components, page 3.24 for further information.

The use of an overhead or portable engine hoist is the only recommended method for removing and installing the engine.

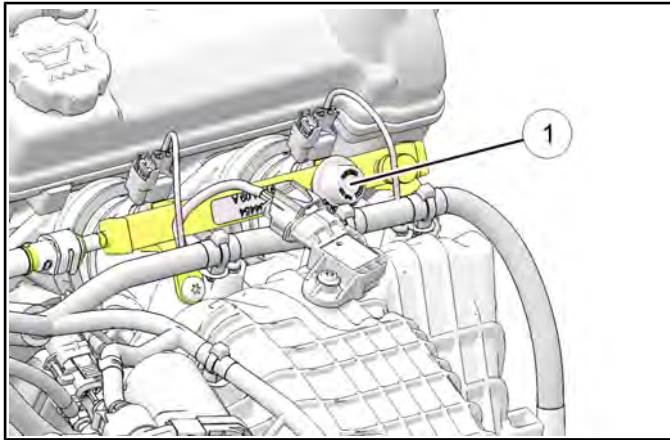
Have an assistant help guide the engine in and out of the vehicle while using an engine hoist to prevent personal injury or damage to the vehicle.

## ENGINE / COOLING SYSTEM

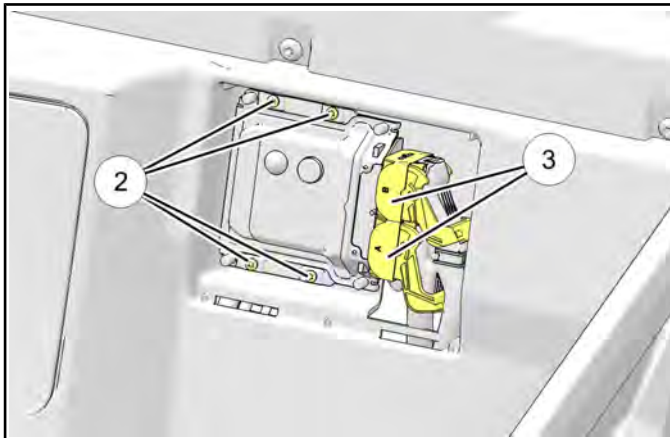
### WARNING

Always wear safety glasses and proper shop clothing when performing the procedures in this service manual. Failing to do so may lead to injury.

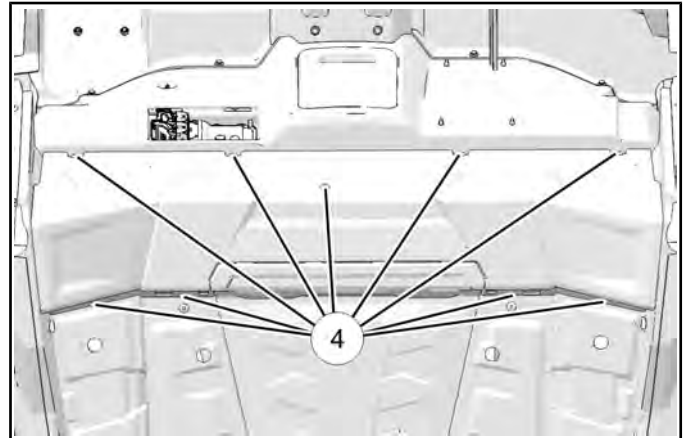
1. Disconnect the battery.
2. Drain the coolant from the engine.
3. Depressurize the fuel system at the valve ① on the fuel rail while holding a clean rag over the valve.



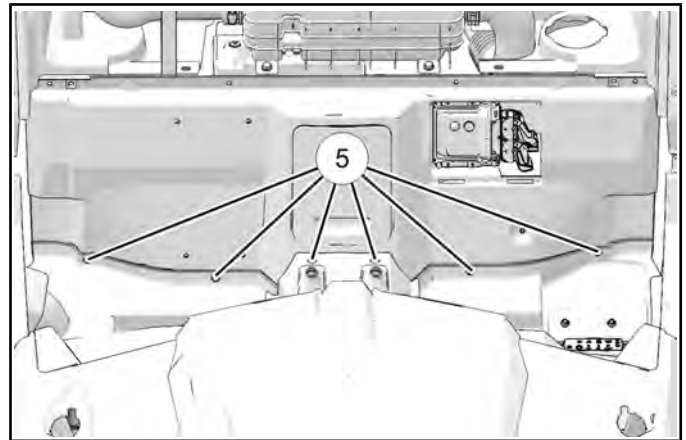
4. Remove the seat and ECU cover panel.
5. Remove the four screws mounting the ECU to the divider panel ② and disconnect the harness plugs from the ECU ③.



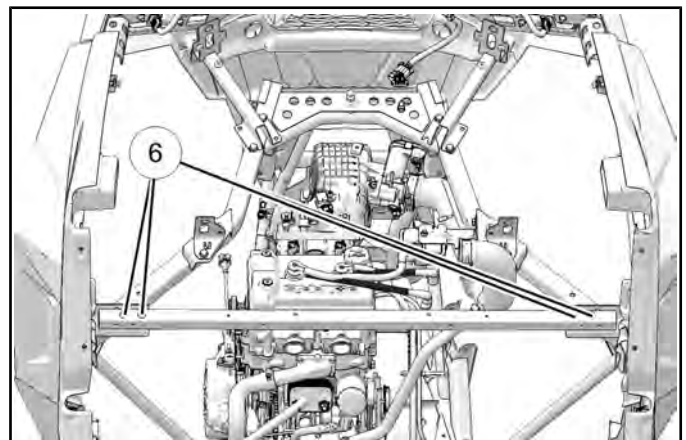
6. Remove the nine screws ④ for the air intake housing cover over the air box.



7. Remove the six plastic rivets ⑤ retaining the engine divider panel and push the clamp retaining the main harness ECU leads to the panel. Remove the panel from the vehicle.



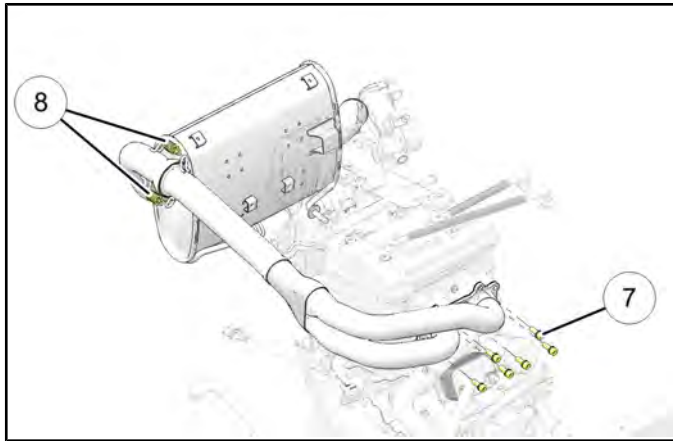
8. Remove the five bolts retaining the frame support bar above the engine ⑥.



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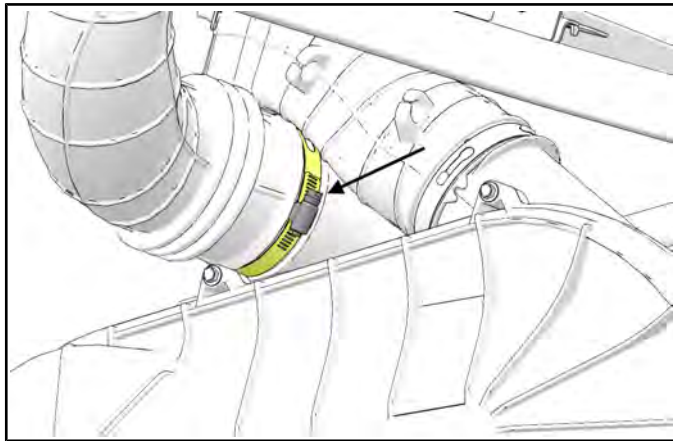
# ENGINE / COOLING SYSTEM

9. Remove the six exhaust head pipe fasteners ⑦ and the two springs ⑧ retaining the pipe to the muffler.



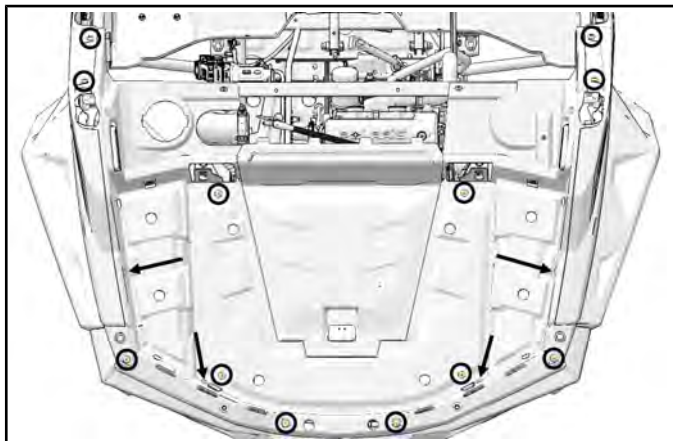
10. Remove the four screws retaining the engine and PVT intake vents.

11. Loosen the PVT intake clamp.



12. Remove the two bolts mounting the air box to the frame bracket and loosen the clamp on the air box duct. Remove the air box from vehicle.

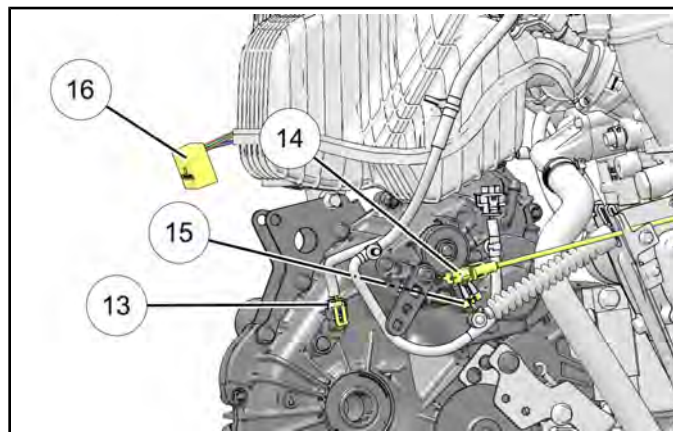
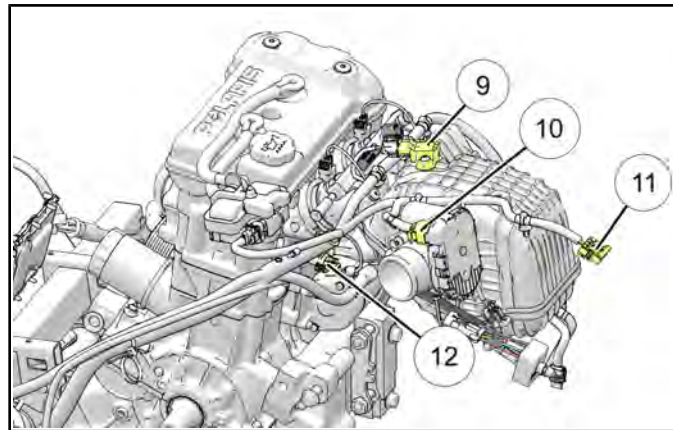
13. Remove the 22 screws retaining the cargo box panel.



14. Remove the ignition coil by disconnecting the wiring leads and removing the two mounting bolts. Remove the spark plug caps.

15. Disconnect the following electrical components:

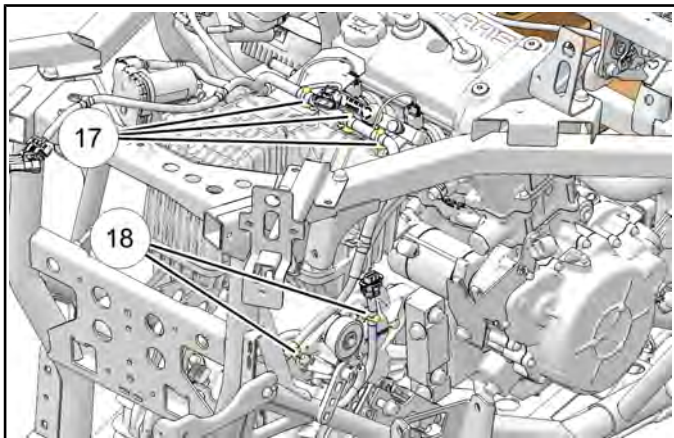
⑨ TMAP
⑩ Electronic Throttle Control
⑪ Taillight Harness
⑫ Engine Temp Sensor
⑬ Speed Sensor
⑭ CPS
⑮ Transmission Switch
⑯ Differential Relay (if equipped)



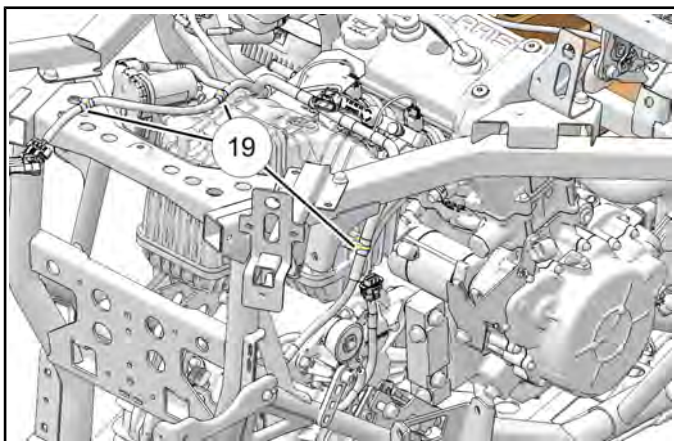


## ENGINE / COOLING SYSTEM

16. Remove the three fasteners retaining the harness to the intake manifold <sup>17</sup> and two fasteners retaining the harness by the transmission switch <sup>18</sup>.



17. Remove the three harness clamps on the intake manifold <sup>19</sup>. Move the main harness out of the way towards the driver's seat.

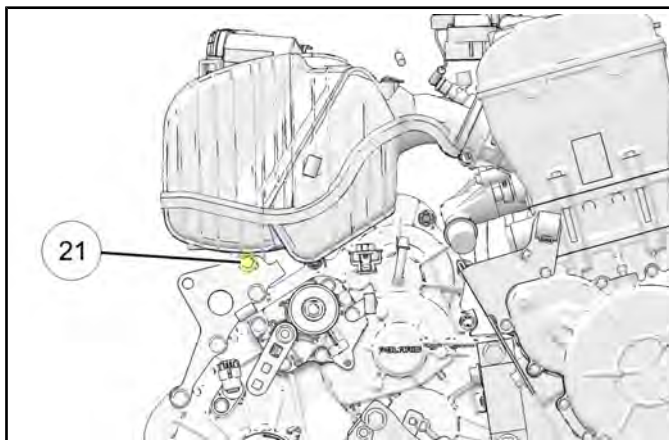
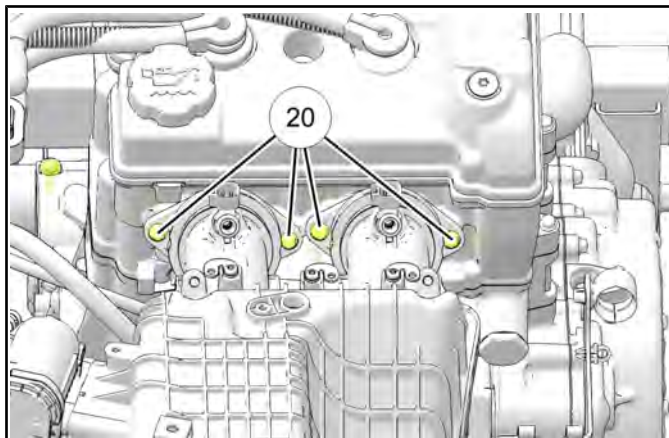


18. Disconnect the two fuel rail mounting bolts and move the fuel rail off to the driver's side.

### CAUTION

Be careful not to pinch or kink the fuel rail

19. Remove the four fasteners retaining the intake manifold to the engine <sup>20</sup> and the one retaining the bottom of the intake manifold to the transmission bracket <sup>21</sup>.



20. Remove the PVT outer cover.

21. Remove the belt and driven clutch.

22. Remove the drive clutch from the vehicle using the correct drive clutch puller (PN 2872085).

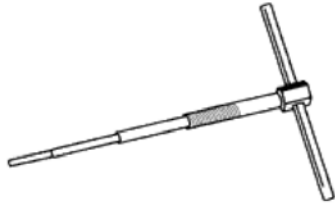
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# ENGINE / COOLING SYSTEM

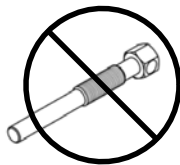
## CAUTION

**Correct Drive Clutch Puller P/N 2872085**  
Using the incorrect puller may result in a damaged crankshaft.

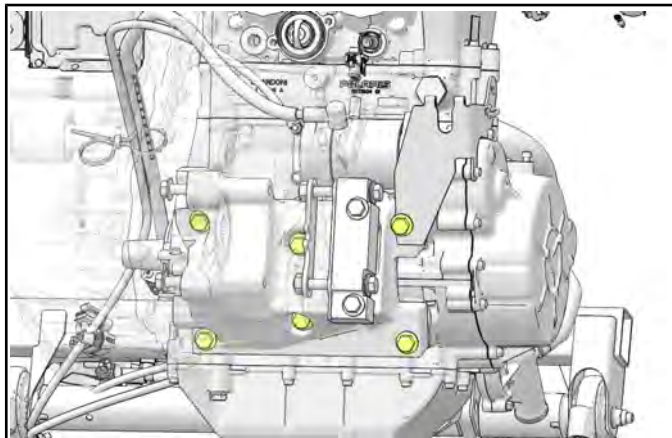
2872085 - Correct Drive Clutch Puller For RZR XP 900



PA-48595 - Incorrect Drive Clutch Puller



23. Remove seven bolts retaining the inner clutch cover.
24. Remove the positive and negative cables going to the starter.
25. Put a thin block of wood under the engine assembly to assist with engine mounting fastener removal.
26. Remove the six engine-to-transmission mounting bolts.



27. Remove the four bolts retaining the engine to the front engine mount.
28. Remove the engine from the frame.

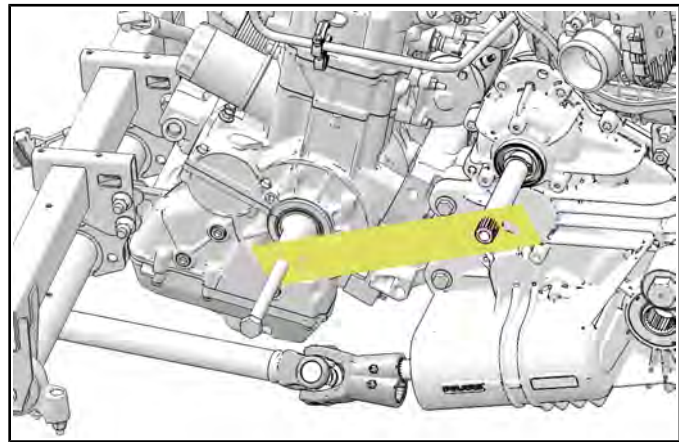
## Engine Installation

1. Carefully install the engine in the frame.
2. Install the four bolts retaining the engine to the front engine mount. Torque bolts to specification.



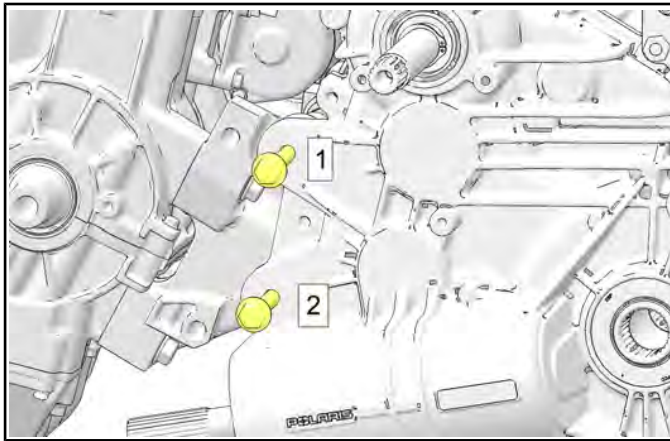
Engine Mounting Bolts (front)  
**40 ft-lbs (54 Nm)**

3. Install the Clutch Center Distance tool (PU-50658) onto the crankshaft and transmission input shaft to properly position the clutch center distance.



## ENGINE / COOLING SYSTEM

4. Install the six engine-to-transmission mounting bolts. Torque bolts in sequence to specification.



Engine-to-Transmission Mounting Bolts  
**Step 1-2: 64 ft-lb (87 Nm)**  
**Step 3: 5 ft-lb (7 Nm)**  
**Step 4-7: 44 ft-lb (60 Nm)**

5. Remove the thin block of wood under the engine assembly if you placed on there for engine removal.  
 6. Install the positive and negative cables going to the starter. Torque fasteners to specification.



Starter Cable Fasteners  
**30 in-lb (4 Nm)**

7. Install the seven bolts retaining the inner clutch cover. Torque bolts to specification.



Inner Clutch Cover Fasteners  
**10 ft-lb (14 Nm)**

8. Install the drive clutch on the vehicle. Torque mounting bolt to specification.



Drive Clutch Bolt  
**96 ft-lb (130 Nm)**

9. Install the driven clutch and the belt. Torque bolt to specification.



Driven Clutch Bolt  
**38 ft-lb (52 Nm)**

10. Install the PVT outer cover screws. Torque screws to specification.



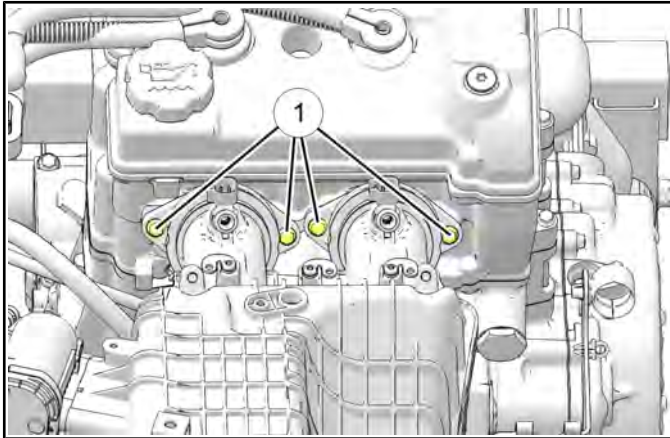
Inner Clutch Cover Fasteners  
**54 in-lb (5 Nm)**

3



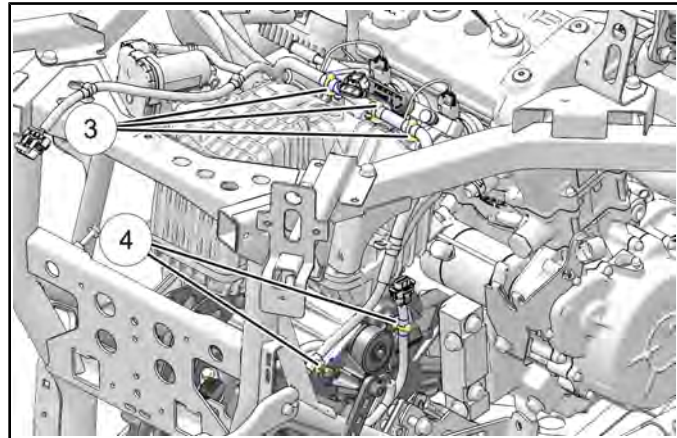
## ENGINE / COOLING SYSTEM

11. Install the four fasteners retaining the intake manifold to the engine ① and the one to retain the bottom of the intake manifold to the transmission bracket.



Intake Manifold Mounting Fasteners:  
To Engine: **17 ft-lb (23 Nm)**  
Lower: **22 ft-lb (30 Nm)**

14. Install the three fasteners retaining the harness to the intake manifold ③ and two fasteners retaining the harness by the transmission ④ switch.



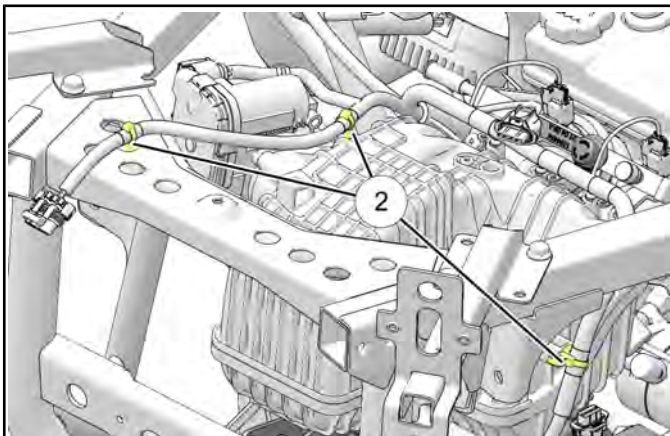
Harness Mounting Bracket Screws:  
**35 in-lb (4 Nm)**

12. Install the two fuel rail mounting fasteners. Torque fasteners to specification.



Fuel Rail Mounting Fasteners  
**7 ft-lb (10 Nm)**

13. Route the harness and install the three harness clamps on the intake manifold ②.

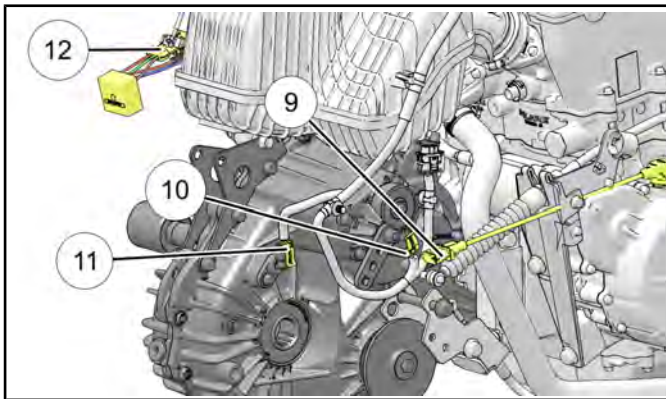
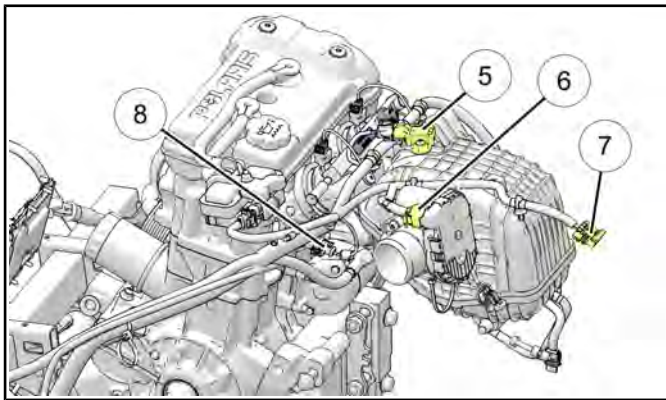





# ENGINE / COOLING SYSTEM

15. Connect the following electrical components:

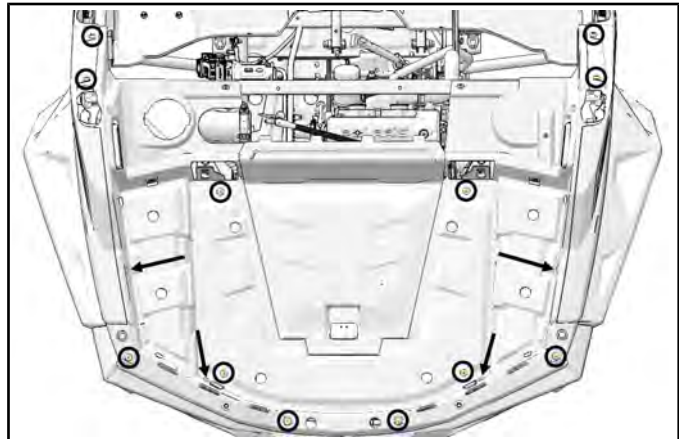
⑤ TMAP
⑥ Electronic Throttle Control
⑦ Taillight Harness
⑧ Engine Temp Sensor
⑨ CPS
⑩ Transmission Switch
⑪ Speed Sensor
⑫ Differential Relay (if equipped)




16. Install the ignition coil. Connect the wiring leads and spark plug caps. Torque mounting bolts to specification.

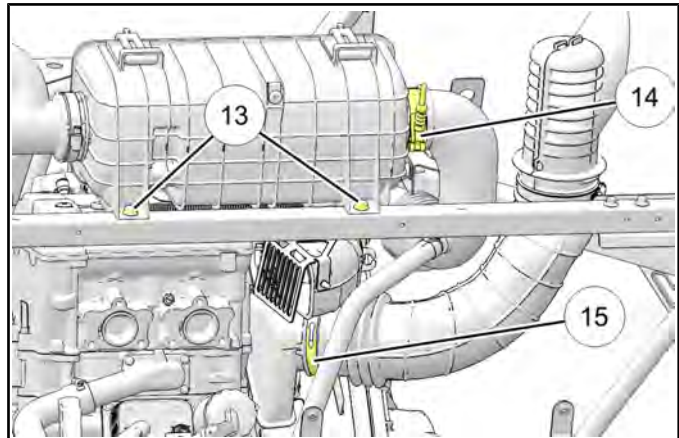
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<b>Ignition Coil Mounting Bolts: 75 in-lb (9 Nm)</b>


17. Install the 22 Torx screws retaining the cargo box panel. Torque screws to specification.



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<b>Cargo Box Screws: 8 ft-lb (11 Nm)</b>

18. Install the two bolts mounting the air box to the frame bracket ⑬ and tighten the clamp on the air box duct ⑭. Also tighten the PVT intake clamp ⑮. Torque fasteners to specification.

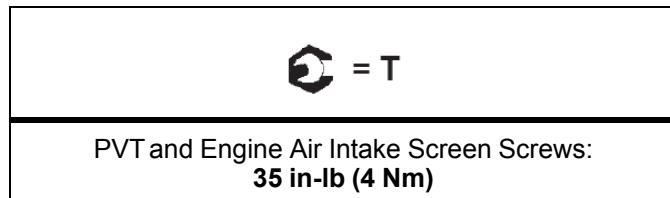


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<b>Duct Clamp: 35 in-lb (4 Nm)</b>
<b>Air Box Mounting Bolts: 8 ft-lb (11 Nm)</b>

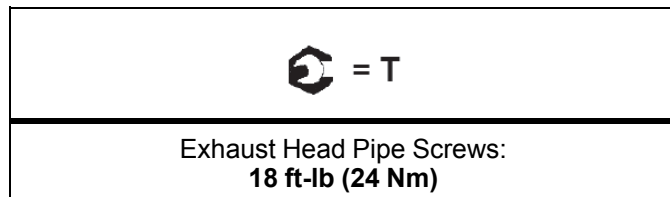
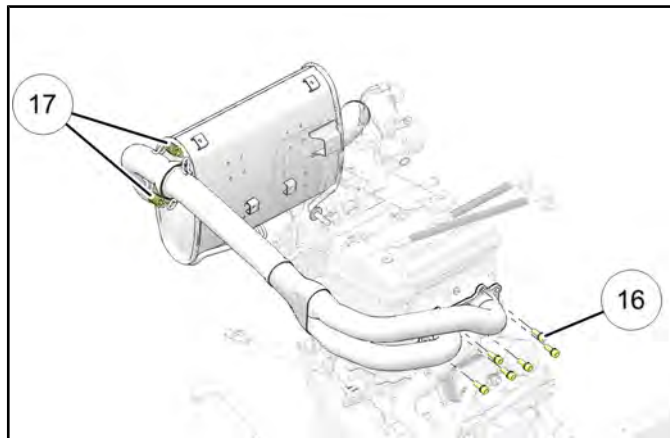
3

## ENGINE / COOLING SYSTEM

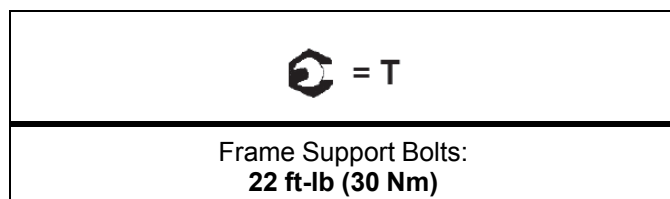
19. Install the four screws mounting the engine and PVT intake vents. Torque screws to specification.



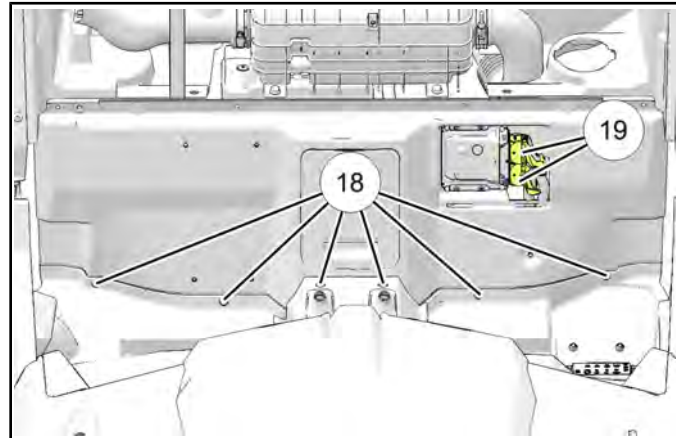
20. Install the six exhaust head pipe fasteners <sup>Ⓔ</sup> and the two springs retaining the pipe to the muffler <sup>Ⓛ</sup>. Torque screws to specification.



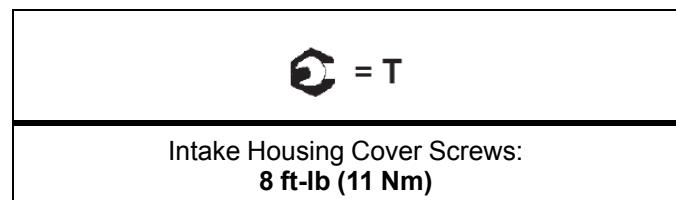
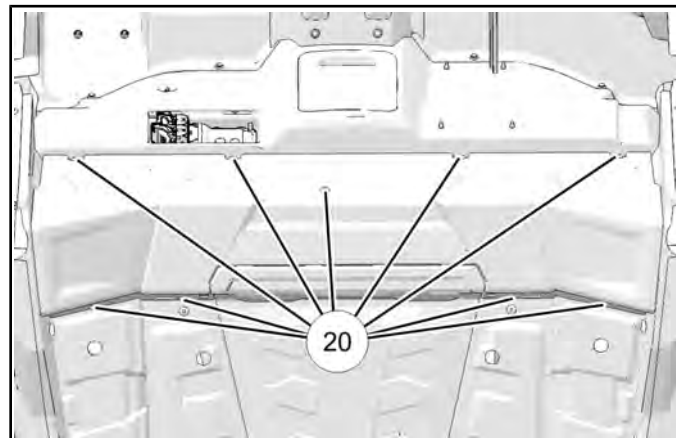
21. Install the five bolts retaining the frame support bar above the engine. Torque Bolts to Specification.



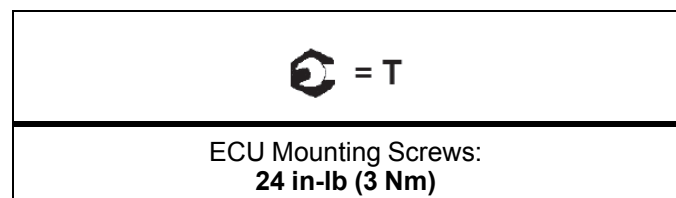
22. Install the six plastic rivets retaining the engine divider panel <sup>Ⓚ</sup> and install the clamp retaining the main harness ECU leads <sup>Ⓜ</sup> to the panel.



23. Install the nine screws for the air intake housing cover over the air box <sup>Ⓝ</sup>. Torque fasteners to specification.



24. Connect the harness plugs to the ECU and install the four screws mounting the ECU to the divider panel. Torque screws to specification.



25. Install the ECU cover panel and the seat.

## ENGINE / COOLING SYSTEM

26. Fill the cooling system with coolant and bleed the system. See Chapter 3 – Cooling System Bleeding, page 3.15

27. Connect the battery. Torque fasteners to specification.



Battery Terminal Fasteners:  
**60 in-lb (7 Nm)**

### Engine Break-In

The break-in period consists of the first 25 hours of operation, or the time it takes to use 15 gallons (57 liters) of fuel. Careful treatment of a new engine and drive components will result in more efficient performance and longer life for these components.

### CAUTION

Use only Polaris PS-4 or PS-4 Extreme Duty Synthetic 4-Cycle Engine Oil.

Never substitute or mix oil brands. Serious engine damage and voiding of warranty can result.

Do not operate at full throttle or high speeds for extended periods during the first three hours of use. Excessive heat can build up and cause damage to close fitted engine parts.

1. Fill fuel tank with unleaded fuel which has a minimum pump octane number of  $87 = (R + M)/2$ .
2. Refer to Chapter 2 – Engine Oil Level, page 2.14. Check oil level indicated on dipstick. Add oil if necessary.
3. Drive slowly at first to gradually bring engine up to operating temperature.
4. Vary throttle positions. Do not operate at sustained idle or sustained high speed.
5. Perform regular checks on fluid levels, controls and all important bolt torques.
6. Change oil and oil filter after 25 hour break-in period.

3

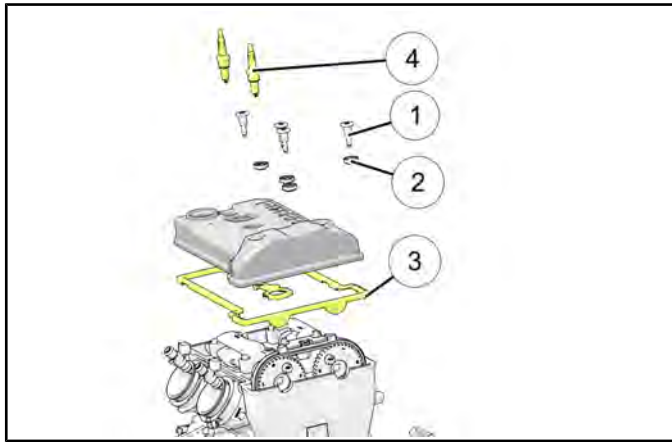
# ENGINE / COOLING SYSTEM

## ENGINE DISASSEMBLY / INSPECTION - TOP END

### Valve Cover Removal

**NOTE:** The valve cover can be removed with the engine installed in the chassis.

1. Remove the four valve cover shoulder bolts ① and isolators ② using a T40 driver.



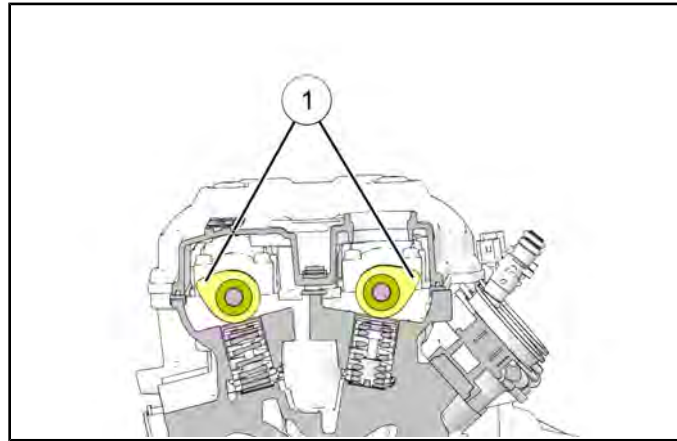
**NOTE:** Replace rubber isolators upon assembly.

2. Remove valve cover and valve cover seal. Replace isolators and valve cover seal ③ if oil leaks are evident.
3. Remove the spark plugs ④. Stuff spark plug holes with clean shop towels to prevent any debris from falling into the combustion chamber.

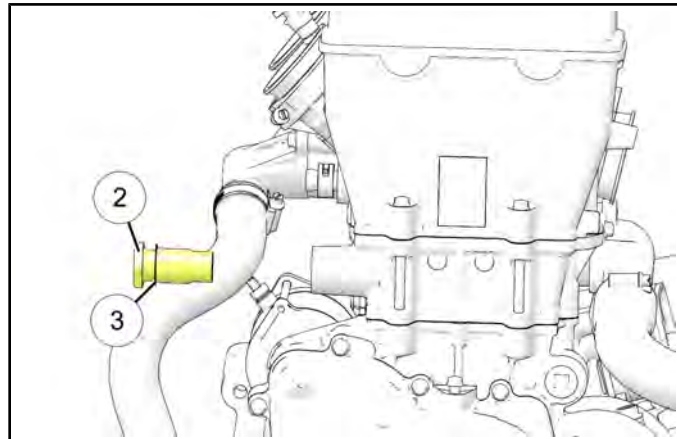
### Camshaft Removal

**NOTE:** The camshafts can be removed with the engine installed in the chassis.

1. Rotate the engine so the PTO cylinder is at Top Dead Center (TDC) to relieve most of the valve spring pressure. The camshaft lobes should face out and the slots on the end of the camshafts should line up ①.



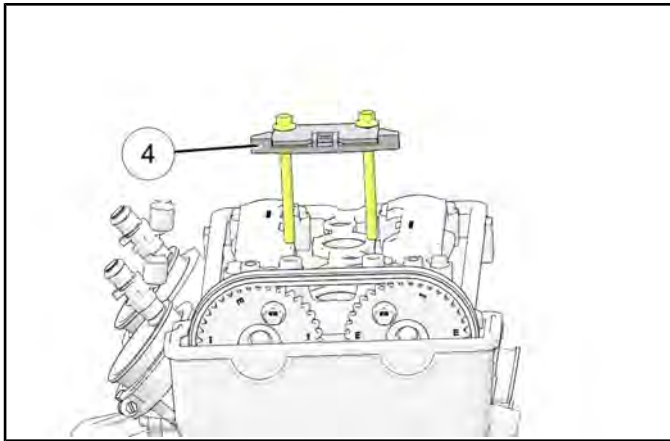
2. Remove the hydraulic cam chain tensioner ② from the cylinder. Use a *new* tensioner gasket upon assembly ③.



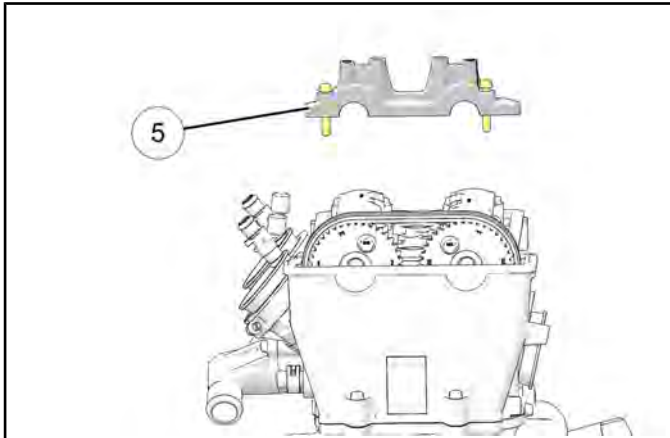


## ENGINE / COOLING SYSTEM

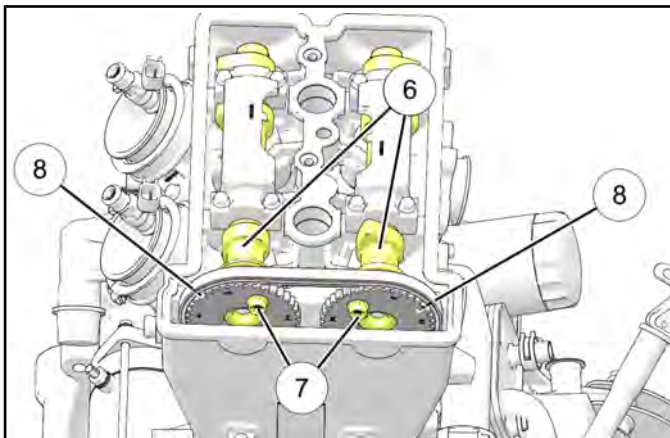
- Remove the two bolts retaining the fixed cam chain guide ④ and remove the assembly from the engine.



- Remove the remaining two bolts that retain the front camshaft carrier ⑤ and carefully lift the carrier off the camshafts.



- Hold camshafts with an open-end wrench ⑥, and remove the top bolt from the camshaft sprockets ⑦.

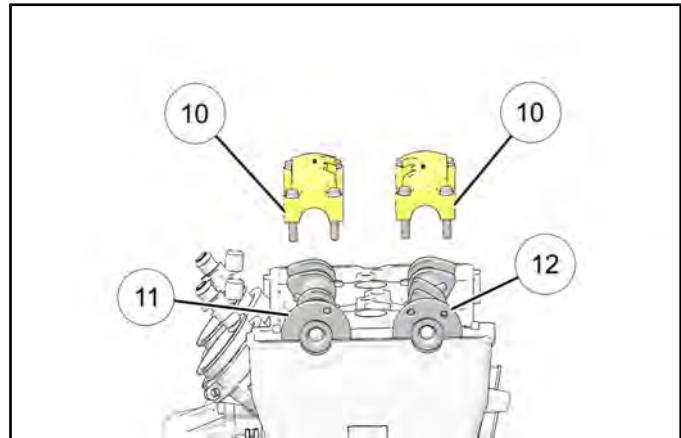


- Rotate the engine to allow access to the remaining bolt on each camshaft sprocket ⑧.

- Remove the remaining bolt from each camshaft sprocket.
- Lift the chain and sprockets off the camshafts to allow each sprocket to be removed.
- Using a paperclip or other tool, hold cam chain up.

**NOTE:** The crankcase has a built-in lower guide to prevent the chain from falling off the crankshaft.

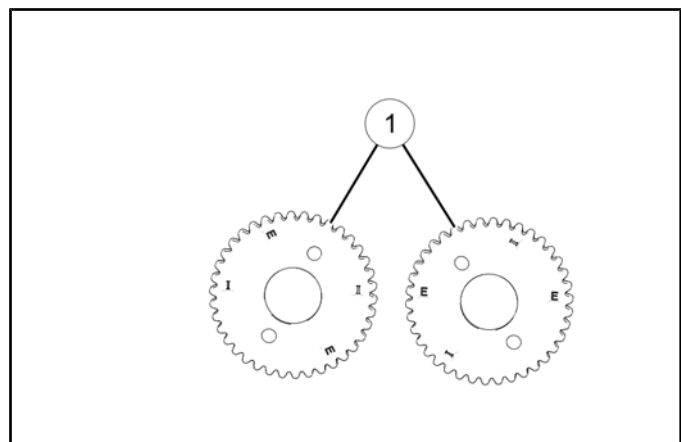
- Evenly loosen the four bolts retaining each rear camshaft carrier ⑩ and carefully lift the carriers off the camshafts.



- Mark the intake ⑪ and exhaust ⑫ camshafts to ensure proper assembly.
- Carefully remove camshafts from the cylinder head.

### Camshaft Sprocket Inspection

Inspect cam sprocket teeth for wear or damage ①. Replace timing chain and sprockets if worn or damaged.



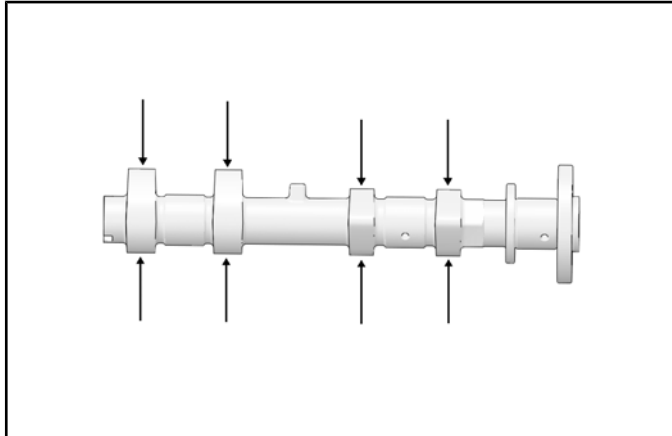
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# ENGINE / COOLING SYSTEM

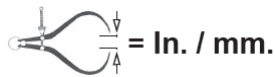
## Camshaft / Camshaft Bore Inspection

Inspect all main journals and cam lobes as described below and compare to specifications. Replace camshaft (s) or cylinder head if worn beyond service limit or if any surface is pitted or damaged.

1. Visually inspect each cam lobe for wear or damage.
2. Measure the height of each cam lobe from the base circle to highest point on the lobe using a micrometer. Compare to specification.



**NOTE: Replace camshafts if damaged or if any part is worn past the service limit.**



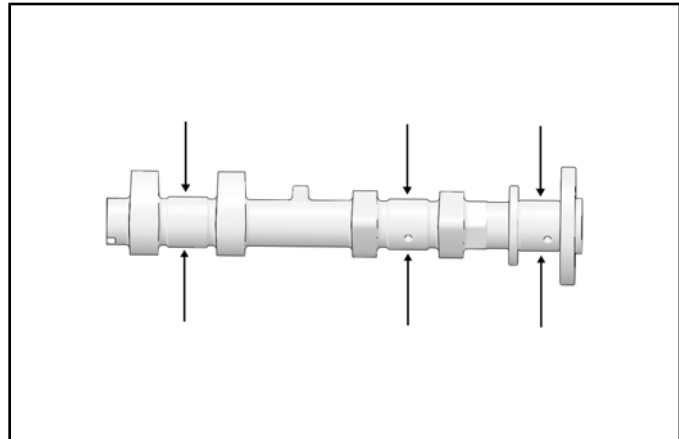
Camshaft Lobe Height:

Intake: 1.5256 ± .0015" (38.75 ± .040 mm)  
Service Limit: 1.5220" (38.66 mm)

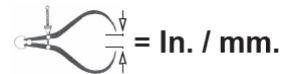
Exhaust: 1.4961" ± .0015" (38.00 ± .040 mm)  
Service Limit: 1.4925" (37.91 mm)

3. Visually inspect each camshaft journal for scoring, wear or damage.

4. Measure the diameter of the camshaft journals using a micrometer. Compare to specification.



**NOTE: Replace camshafts if damaged or if any part is worn past the service limit.**

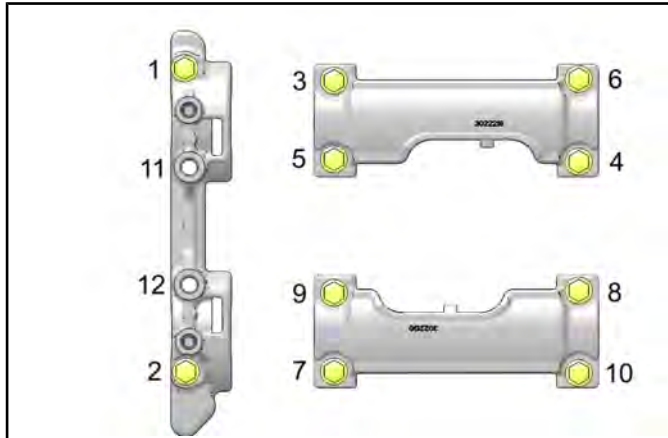


Camshaft Journal O.D.:  
0.9035 - 0.9046" (22.949 - 22.978 mm)

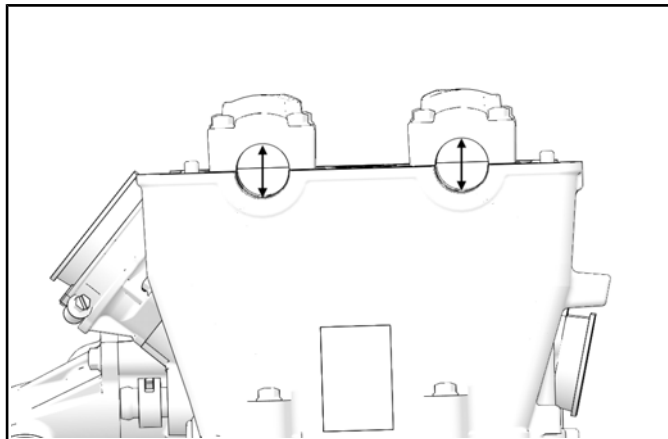
Service Limit: 0.9025" (22.923 mm)

## ENGINE / COOLING SYSTEM

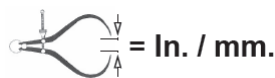
5. Temporarily install the camshaft carriers to measure the camshaft bore. Torque bolts in sequence to specification. Replace cylinder head if worn.



Camshaft Carrier Bolts:  
89 in-lbs. (10 Nm)



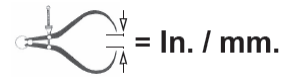
**NOTE: Replace cylinder head if camshaft journal bores are damaged or if worn past the service limit.**



Camshaft Carrier Bore I.D.:  
0.9055" - 0.9063" (23.000 - 23.021 mm)

Service Limit: 0.9072" (23.044 mm)

6. Calculate oil clearance by subtracting camshaft journal O. D. s from camshaft carrier bore I. D. s. Compare to specification.



Calculated Camshaft Oil Clearance:  
0.0009" - 0.0028" (.022 - .072 mm)

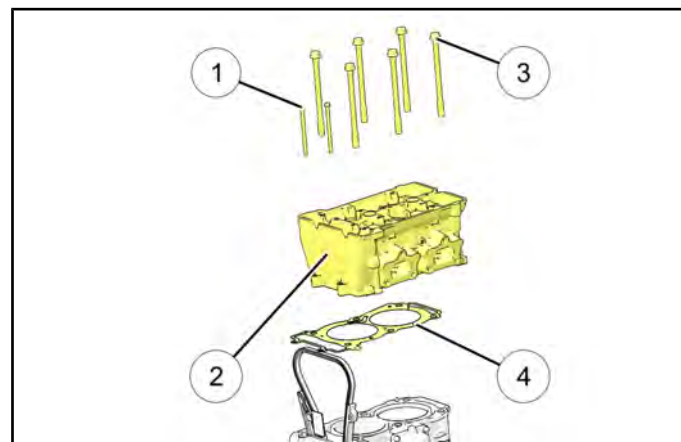
Service Limit: .0039" (.10 mm)

3

### Cylinder Head Removal

**NOTE: The cylinder head can be serviced with the engine installed in the chassis.**

1. Disconnect coolant hose from thermostat housing if connected.
2. Remove the two outer M6 bolts ① that retain the cylinder head ② to the cylinder.



3. Loosen the six cylinder head bolts ③ evenly 1/8 turn at a time until all are loose.
4. Remove and discard the cylinder head bolts.
5. Tap cylinder head lightly with a soft faced hammer until loose.

**NOTE: Tap only in reinforced areas or on thick parts of the cylinder head casting.**

6. Remove the cylinder head and head gasket ④.

**NOTE: Once the cylinder head is removed, nothing retains the cylinder to the engine. DO NOT rotate the engine without using the Cylinder Holding & Camshaft Timing Plate (PU-50563). xrefRefer to "Cylinder / Piston Removal".**

# ENGINE / COOLING SYSTEM

## Cylinder Head Inspection

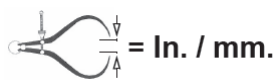
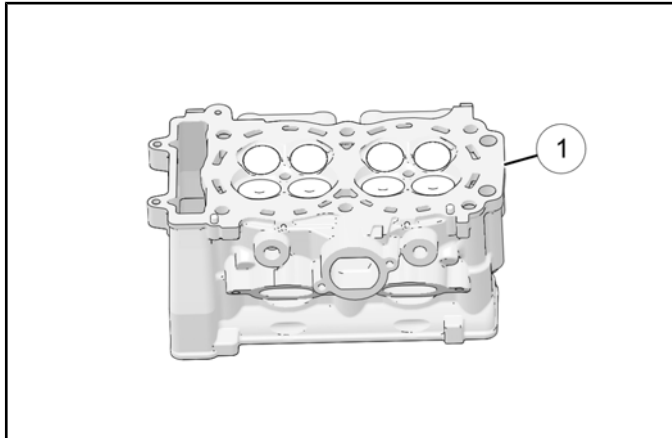
Thoroughly clean cylinder head surface to remove all traces of gasket material and carbon.

### CAUTION

Use care not to damage gasket sealing surface. All gasket surfaces must be clean, dry and free of any oil or grease upon assembly. Clean sealing surfaces with rubbing alcohol or electrical contact cleaner. Do not touch sealing surfaces of the new head gasket.

## Cylinder Head Warp Inspection

1. Lay a straight edge across the surface of the cylinder head ① at several different points and measure warp by inserting a feeler gauge between the straight edge and the cylinder head surface. If warp exceeds the service limit, replace the cylinder head.



Cylinder Head Warp Limit:  
.0039" (0.10 mm)

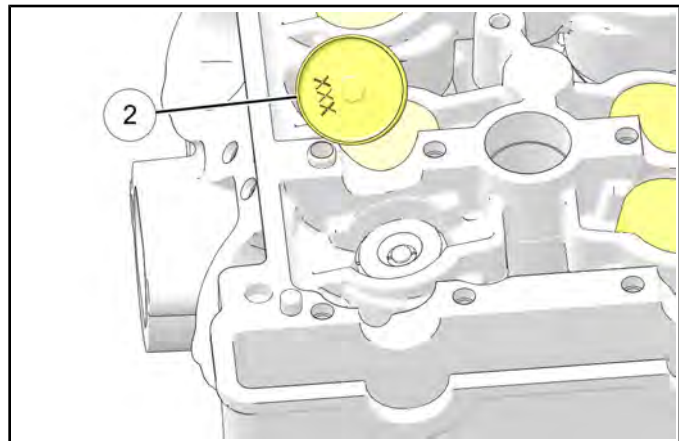
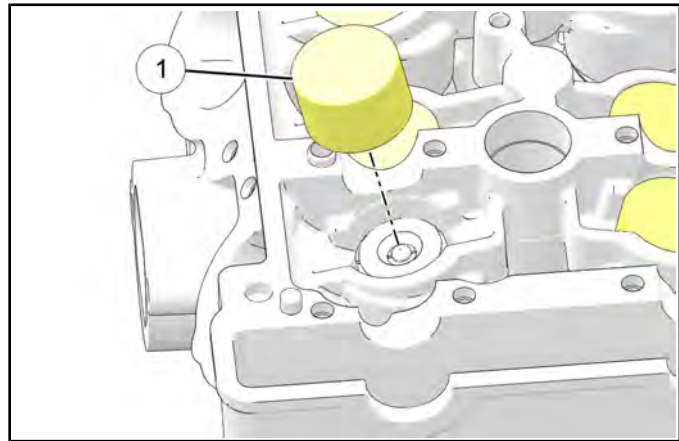
## Cylinder Head Disassembly

### WARNING

Wear eye protection during cylinder head disassembly and reassembly or when working with the valve springs.

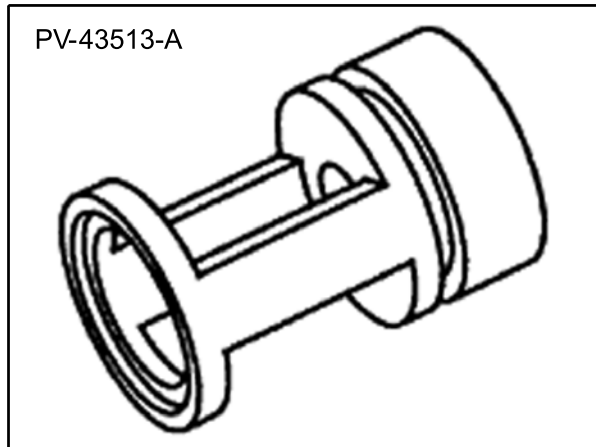
**NOTE:** Keep mated parts together and in order with respect to their location in the cylinder head for assembly purposes. It is important to install cylinder head components back in the same location. Mark each component or place them in an organized rack as you remove them.

1. Remove the valve tappet ① and note the number on the bottom side of the tappet ②.

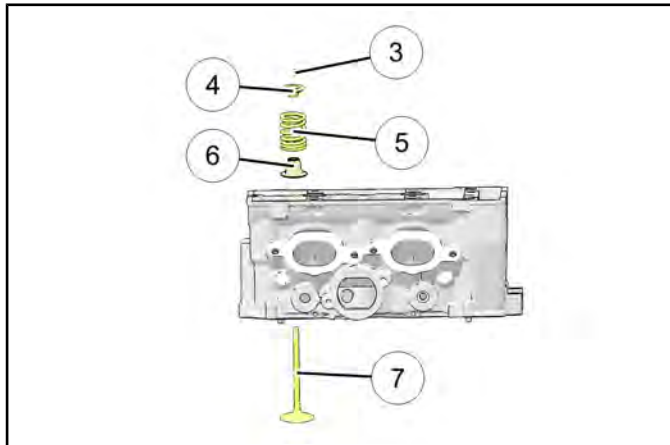




- Compress the valve spring by hand using valve spring compressor adapter (PV-43513-A).



- Push down on spring and remove split keepers ③.



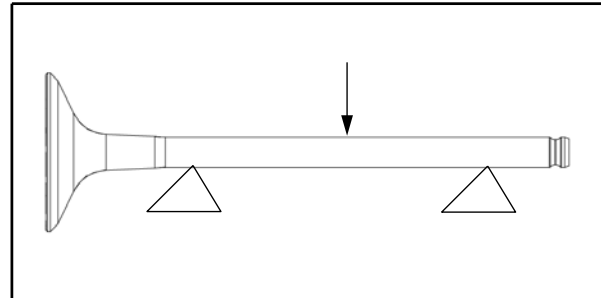
- Slowly release valve spring pressure and remove the compressor adapter.
- Remove the valve retainer ④, valve spring ⑤ and the valve stem seal / seat ⑥. Discard the valve seal.

**NOTE: Replace valve seals whenever cylinder head is disassembled. Hardened, cracked or worn seals will cause excessive oil consumption.**

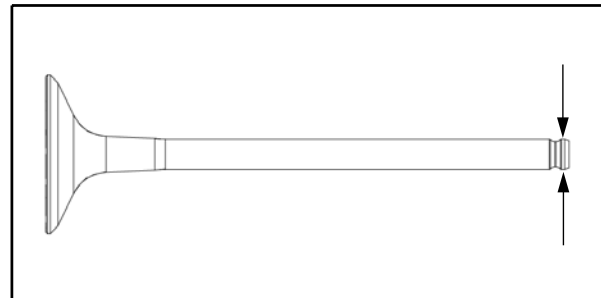
- Lift up the cylinder head and push the valve ⑦ out, keeping it in order for reassembly in the same valve guide.
- Repeat the previous steps to remove the remaining valves.
- Clean the combustion chamber and head gasket surface.

### Valve Inspection

- Remove all carbon from valves with a soft wire wheel or brush.
- Check valve face for runout, pitting, and burnt spots. To check for bent valve stems, mount valve in a drill or use "V" blocks and a dial indicator.



- Check the end of the valve stem for flaring, pitting, wear or damage.



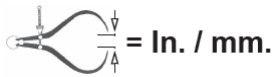
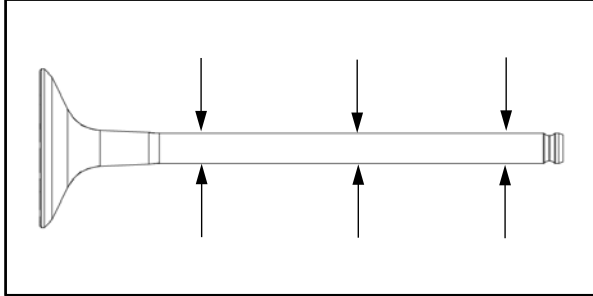
- Inspect split keeper groove for wear or flaring in the keeper seat area.

**NOTE: The valves can be re-faced or end ground, if necessary. They must be replaced if extensively worn, burnt, bent or damaged.**

3

## ENGINE / COOLING SYSTEM

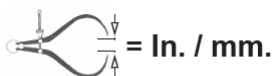
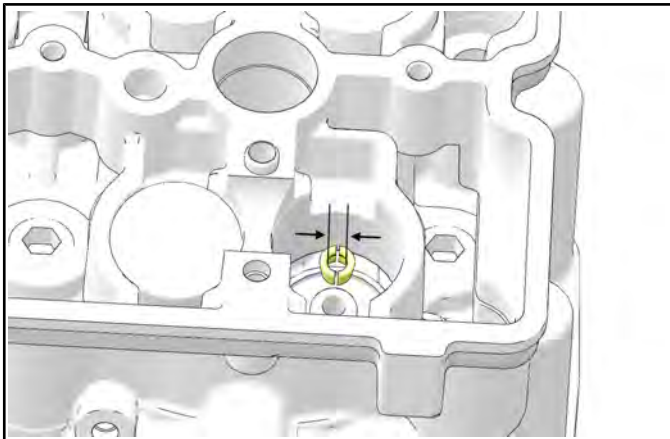
5. Measure diameter of valve stem with a micrometer in three places, then rotate 90° and measure again (take six measurements total). Compare to specifications.



Valve Stem Diameter:

Intake: 0.2155" - 0.2161" (5.475 - 5.490 mm)  
Exhaust: 0.2147" - 0.2153" (5.455 - 5.470 mm)

6. Measure valve guide inside diameter at the top, middle and end of the guide using a small hole gauge and a micrometer. Measure in two directions.



Valve Guide I.D.:

0.2165 - 0.2171" (5.500 - 5.515 mm)

7. Be sure to measure each guide and valve combination individually.

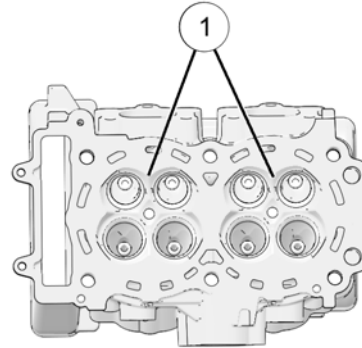
**NOTE: The valve guides cannot be replaced.**

## Combustion Chamber Cleaning

### WARNING

Wear eye protection during combustion chamber cleaning.

1. Clean all accumulated carbon deposits from combustion chambers and valve seat area ①.



**NOTE: Carbon Clean Fuel Treatment (2871326) can be used to help remove carbon deposits.**

**Do not use a metal scraper, a coarse wire brush or abrasive cleaners to clean the cylinder head. Damage may result.**

2. Visually inspect cylinder head gasket surface and combustion chamber for cracks or damage. Pay close attention to areas around spark plug and valve seats.

### Valve Seat Reconditioning

Valve seat reconditioning should be performed by a technician proficient in cylinder head reconditioning techniques. Reconditioning techniques vary, so follow the instructions provided by the valve reconditioning equipment manufacturer. Do not grind seats more than necessary to provide proper seat surface, width, and contact point on valve face.



#### WARNING

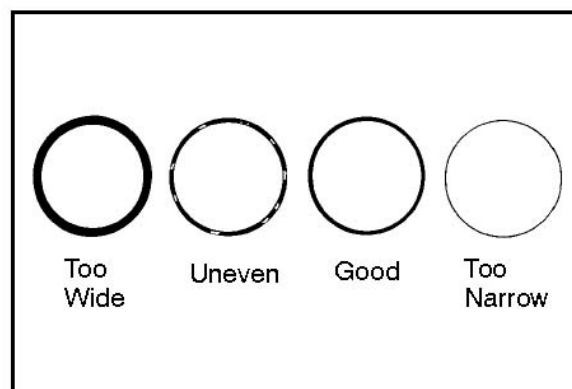
Wear eye protection or a face shield during cylinder head disassembly and reassembly.

### Valve Seat Inspection

Inspect valve seat in cylinder head for pitting, burnt spots, roughness, and uneven surface. If any of the above conditions exist, the valve seat must be reconditioned. *If the valve seat is cracked the cylinder head must be replaced.*

Valve seat width and point of contact on the valve face is very important for proper sealing. The valve must contact the valve seat over the entire circumference of the seat, and the seat must be the proper width all the way around. If seat is uneven, compression leakage will result. If seat is too wide, seat pressure is reduced, causing carbon accumulation and possible compression loss. If seat is too narrow, heat transfer from valve to seat is reduced. The valve may overheat and warp, resulting in burnt valves.

3



### Renewing Valve Seats

1. Install pilot into valve guide.
2. Apply cutting oil to valve seat and cutter.
3. Place 46° cutter on the pilot and make a light cut.
4. Inspect the cut area of the seat:

\* If the contact area is less than 75% of the circumference of the seat, rotate the pilot 180° and make another light cut.

\* If the cutter now contacts the uncut portion of the seat, check the pilot. Look for burrs, nicks, or runout. If the pilot is bent it must be replaced.

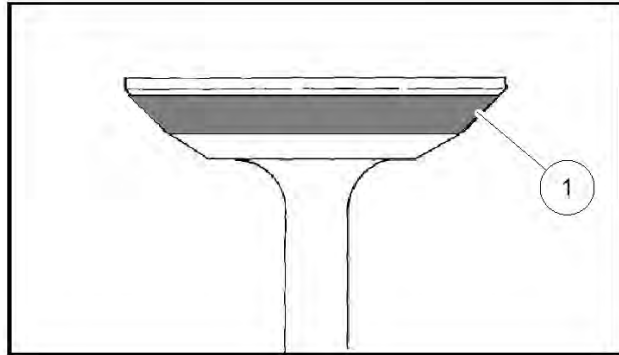
\* If the contact area of the cutter is in the same place, the valve guide is distorted from improper installation.

\* If the contact area of the initial cut is greater than 75%, continue to cut the seat until all pits are removed and a new seat surface is evident.

**NOTE: Remove only the amount of material necessary to repair the seat surface.**

## ENGINE / COOLING SYSTEM

5. To check contact area of the seat on the valve face, apply a thin coating of Prussian Blue paste to the valve seat. If using an interference angle (46°) apply black permanent marker to the entire valve face ①.



6. Insert valve into guide and tap valve lightly into place a few times.

7. Remove valve and check where the Prussian Blue indicates seat contact on the valve face. The valve seat should contact the middle of the valve face or slightly above, and must be the proper width.

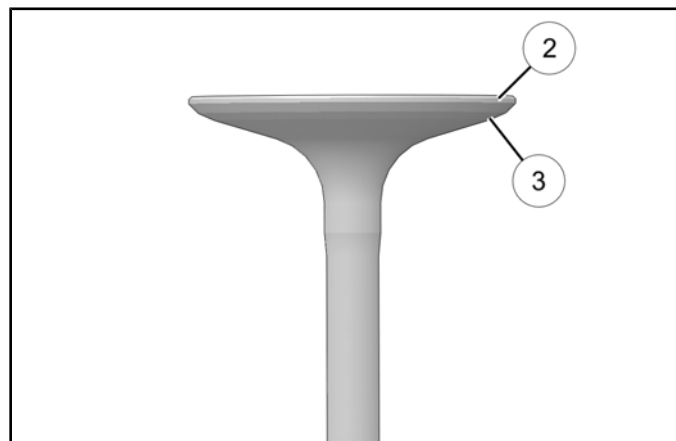
\* If the indicated seat contact is at the top edge of the valve face and contacts the margin area ③ it is too high on the valve face. Use the 30° cutter to lower the valve seat.

\* If too low, use the 60° cutter to raise the seat. When contact area is centered on the valve face, measure seat width.

\* If the seat is too wide or uneven, use both top and bottom cutters to narrow the seat.

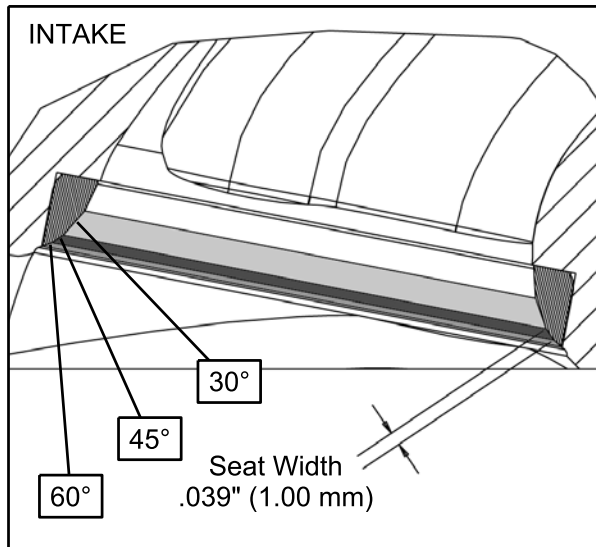
\* If the seat is too narrow, widen using the 45° cutter and re-check contact point on the valve face and seat width after each cut.

**NOTE: When using an interference angle, the seat contact point on the valve will be very narrow, and is a normal condition. Look for an even and continuous contact point all the way around the valve face ②.**

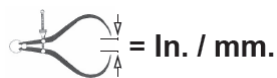
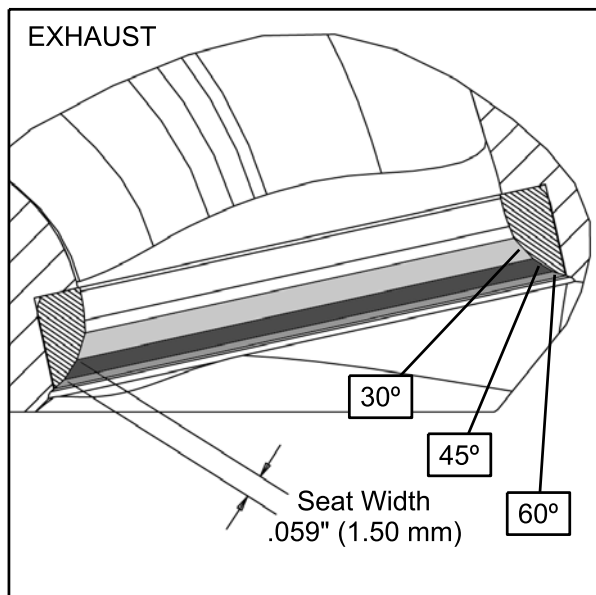


## ENGINE / COOLING SYSTEM

### Intake Seat Cutter Diameter: 1.457" (37.00 mm)



### Exhaust Seat Cutter Diameter: 1.260" (32.00 mm)



#### Valve Seat Width:

Intake: 0.039" (1.00 mm)

Service Limit: 0.055" (1.4 mm)

Exhaust: 0.059" (1.50 mm)

Service Limit: 0.075" (1.9 mm)

8. Clean all filings from the area with hot soapy water. Rinse and dry with compressed air.
9. Lubricate valve guides with clean engine oil and apply oil or water based lapping compound to the face of the valve.

**NOTE: Lapping is not required if an interference angle reconditioning method is used.**

10. Insert the valve into its respective guide and lap using a lapping tool or a section of fuel line connected to the valve stem.
11. Rotate the valve rapidly back and forth until the cut sounds smooth. Lift the valve slightly off of the seat, rotate 1/4 turn, and repeat the lapping process. Do this four to five times until the valve is fully seated, and repeat process for the other valve(s).
12. Thoroughly clean cylinder head and valves.

3

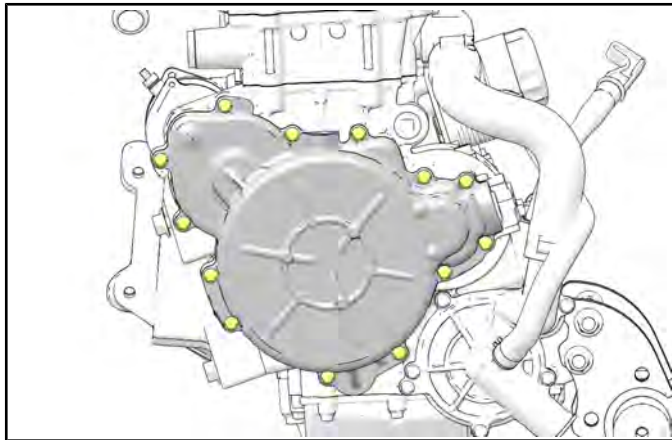
# ENGINE / COOLING SYSTEM

## ENGINE DISASSEMBLY / INSPECTION - LOWER END

### Stator Cover Removal / Inspection

**NOTE:** The stator cover can be removed with the engine installed in the chassis.

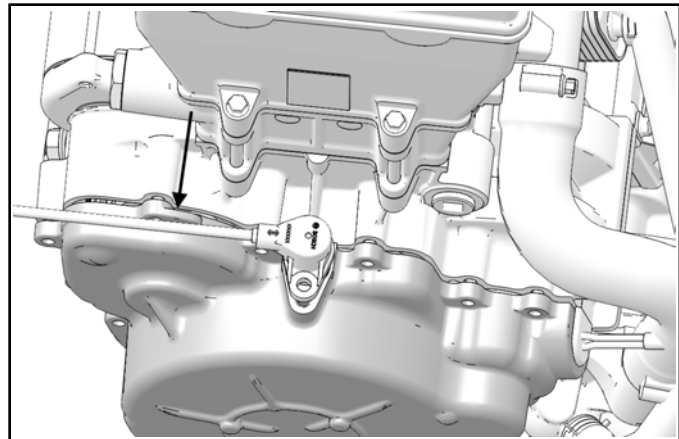
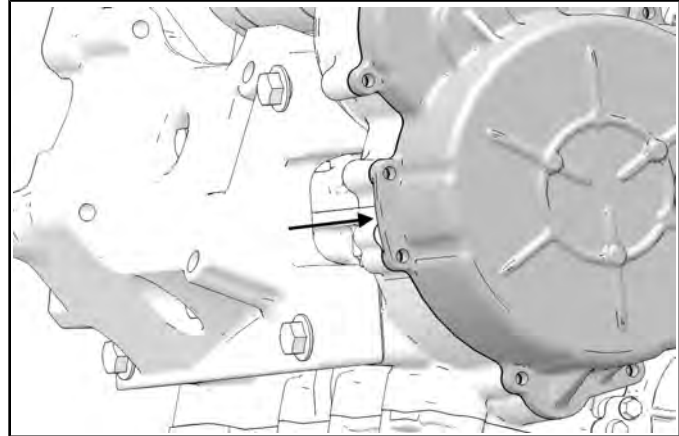
1. Remove the thirteen screws retaining the stator cover.



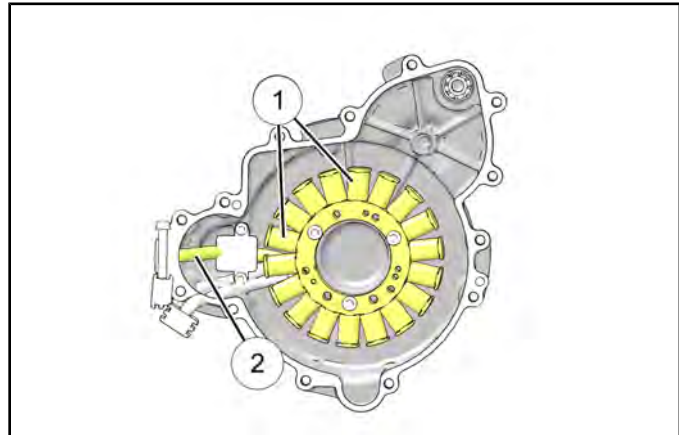
**⚠ CAUTION**

The flywheel contains powerful magnets. Use caution when removing and installing the stator cover. DO NOT place fingers between cover and crankcase at any time during the removal / installation process or injury could result.

2. Carefully pry the stator cover off the engine using the two pry areas as shown below.



3. Inspect the condition of the stator windings ① and output wires ②. If replacement is required, refer to Chapter 10.



4. Inspect the ball bearing that supports the starter motor shaft.



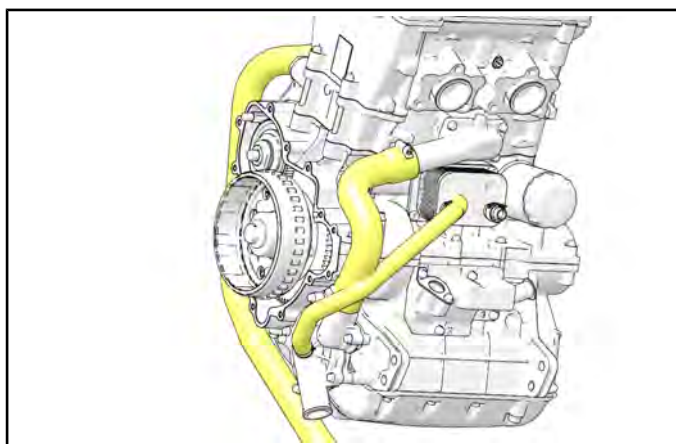
## ENGINE / COOLING SYSTEM

5. If bearing replacement is required, remove the retaining ring and heat the stator cover around the bearing evenly with a heat gun. Tap cover on a soft work surface to remove the bearing from the housing. A blind bearing puller can also be used. Replace bearing if removed.

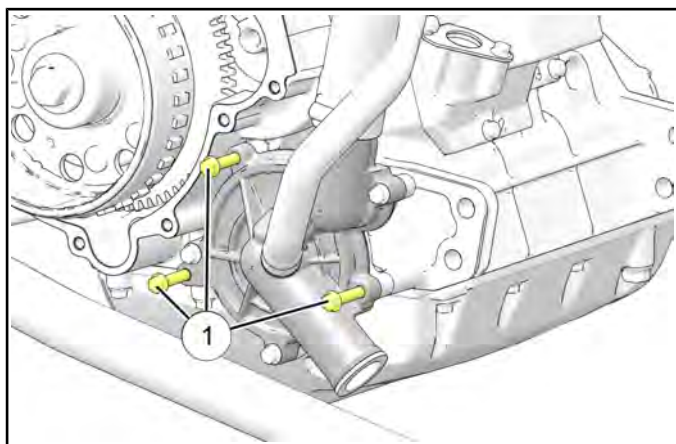
### Water Pump Housing Removal

**NOTE:** The water pump housing can be serviced with the engine installed in the chassis (see Chapter 3 – Water Pump Removal, page 3.16).

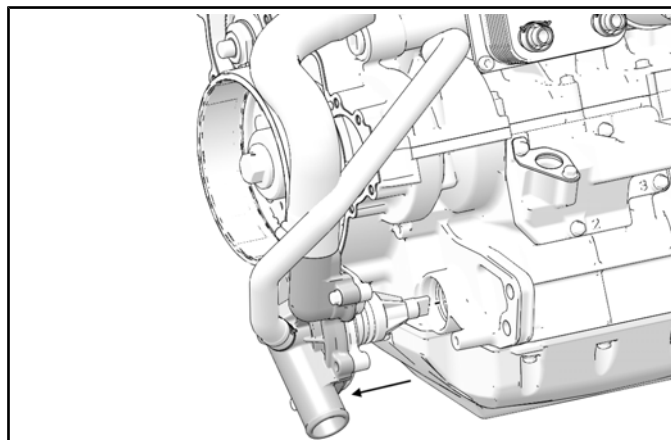
1. Remove the coolant lines from the thermostat housing, cylinder inlet and oil cooler. Leave them all attached to the water pump housing.



2. Remove the three gold colored bolts ① retaining the water pump housing to the engine. Note the location of the shorter bolt.



3. Remove the water pump assembly from the engine by using a twisting motion as you pull out on the housing.

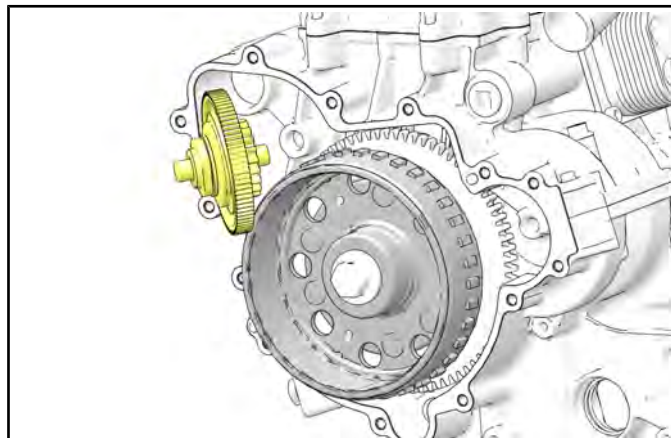


4. If water pump service is required (impeller or mechanical seal), refer to “ENGINE COOLING SYSTEM”.

### Flywheel Removal

**NOTE:** The flywheel can be serviced with the engine installed in the chassis.

1. Remove the stator cover assembly.
2. Remove the starter torque limit gear as an assembly.

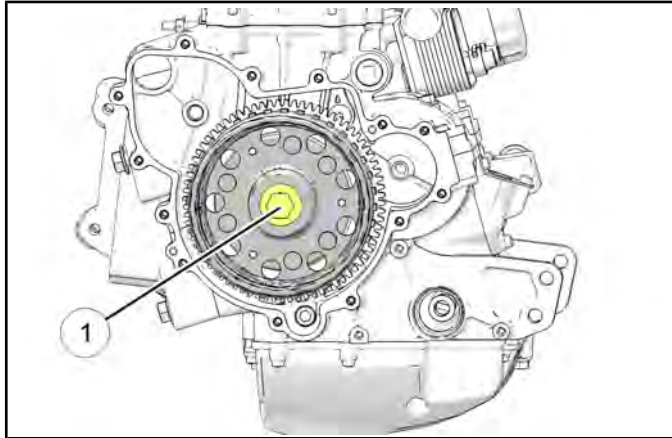


3. Inspect gear teeth for damage. Inspect fit of shaft inside gear and replace gear assembly if clearance is excessive. Inspect the shaft and bearing surfaces in the crankcase and stator cover for excessive wear.

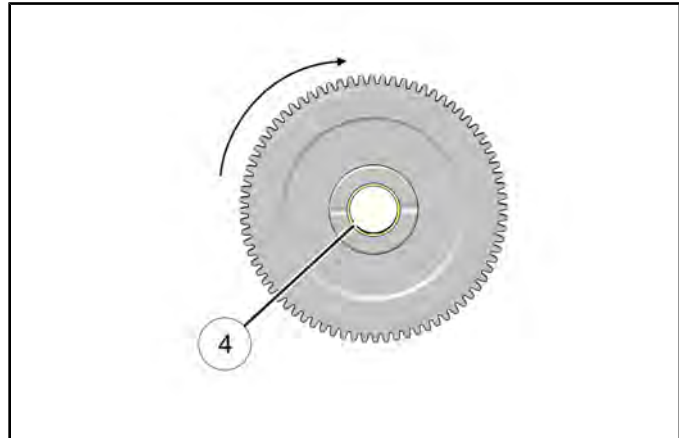


## ENGINE / COOLING SYSTEM

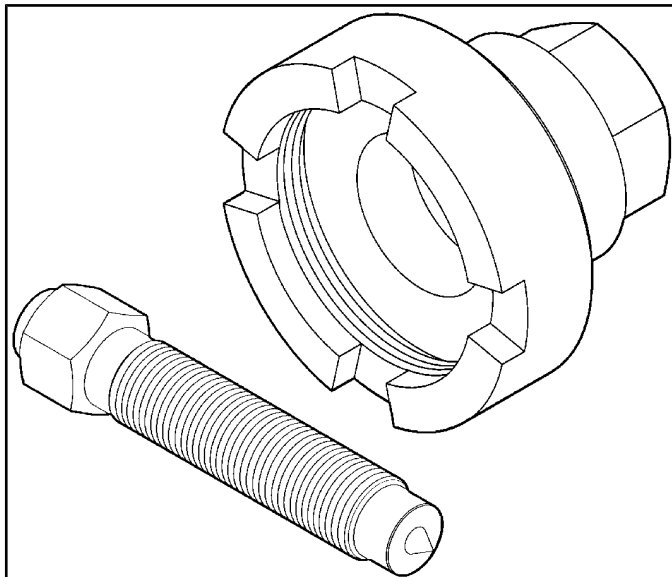
- Using a commercially available strap wrench, hold the flywheel and remove the flywheel retaining bolt ①.



- Inspect the one-way gear bushing ④ for wear or galling. If service is required, refer to "Starter One-Way Clutch Disassembly".



- Fully install Flywheel Puller (PA-49316) on the threads of the flywheel (left hand thread - turn flywheel puller counterclockwise to install).



- Hold puller body and tighten the center bolt ② to remove the flywheel.

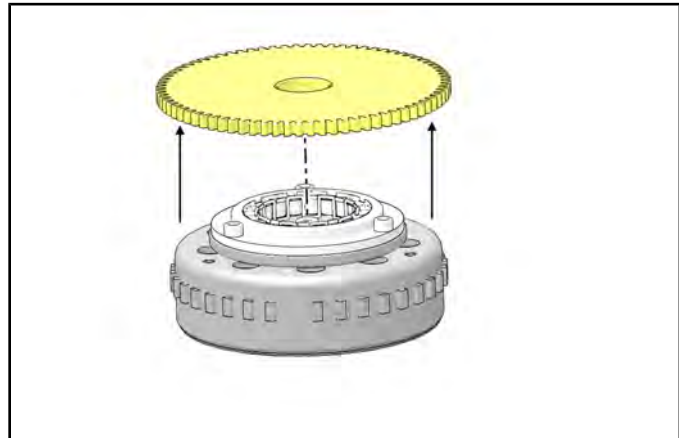
### Starter One-Way Clutch Inspection

**NOTE: The starter one-way clutch can be serviced with the engine installed in the chassis.**

- Remove the stator cover and flywheel (see Chapter 3 – Flywheel Removal, page 3.45).
- Place flywheel on a work bench with the one-way clutch facing up. Grasp clutch gear and rotate clockwise. It should turn smoothly without binding.
- Rotate one-way gear counterclockwise. The gear should immediately lock in position and not slip.

### Starter One-Way Clutch Disassembly

- Lift up to remove starter one-way gear.

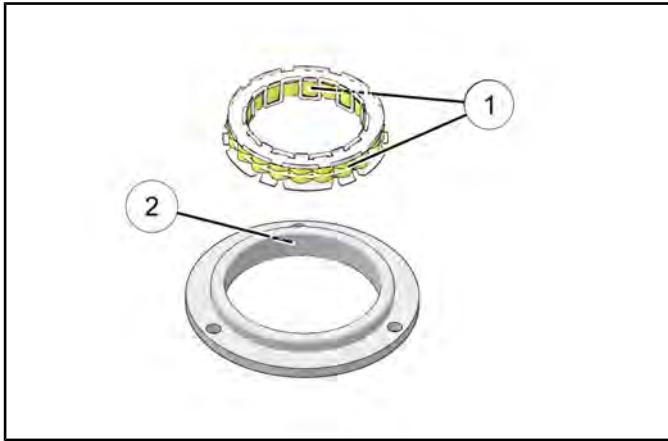


- Remove the three one-way clutch retaining screws.

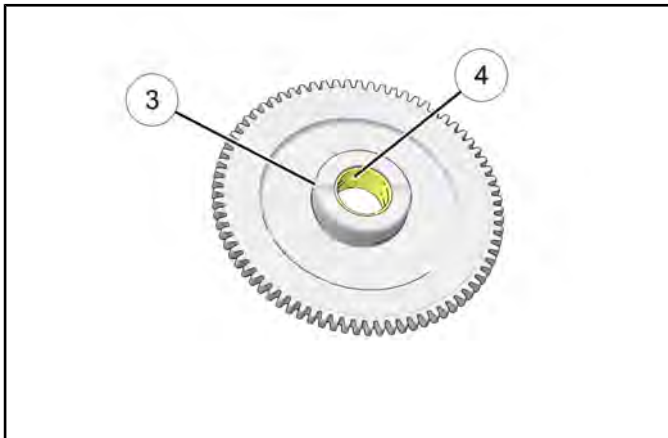


## ENGINE / COOLING SYSTEM

- Remove the one-way clutch and inspect both sides of drive rollers ①. Inspect the roller contact surface ② inside the hub for wear, damage or uneven surface.

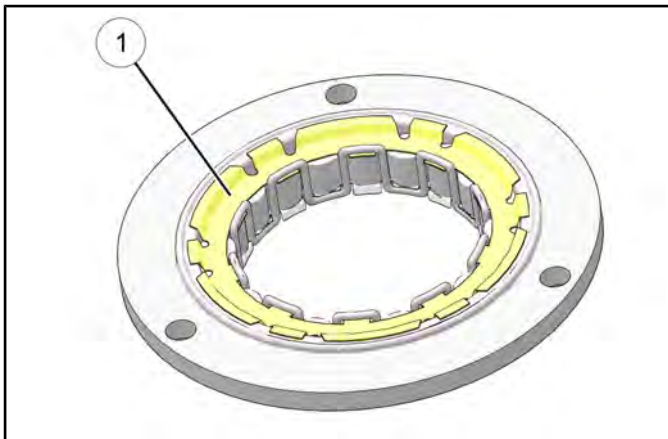


- Inspect drive surface of starter gear ③ and bushing ④ for wear, damage or uneven surface. If any starter one-way clutch component is worn or damaged, replace the clutch and starter gear as an assembly.



### Starter One-Way Clutch Assembly

- Install one-way clutch in clutch hub with flange of clutch ① engaged in recess.



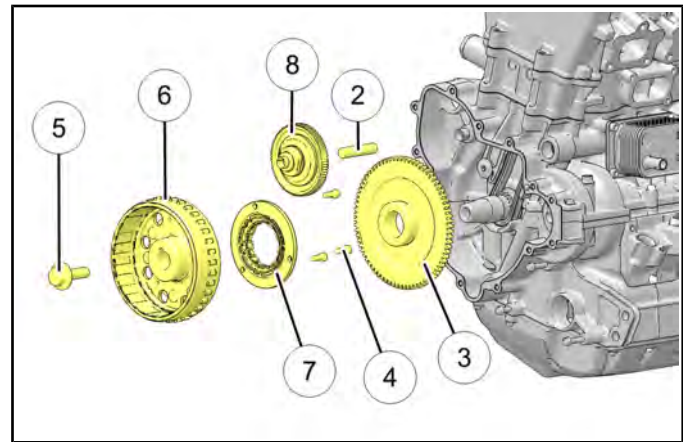
- Clean screw threads in flywheel to remove all oil or grease.
- Place one-way clutch on flywheel and install the three screws. Torque screws to specification.



One-Way Clutch Retaining Screws:  
**106 in-lbs (12 Nm)**

**3**

- Reassemble starter one-way clutch and gear using the following illustration.

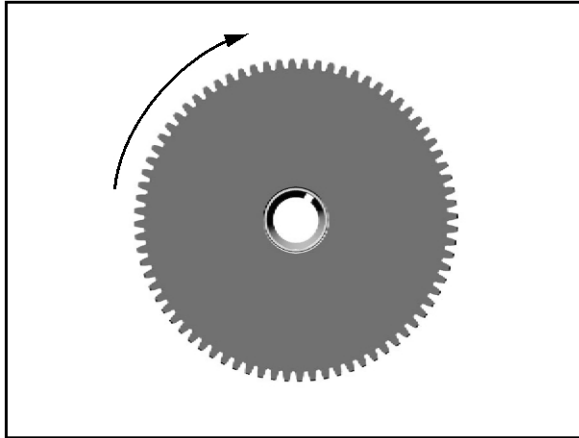


② Torque Limit Gear Pin	⑥ Flywheel
③ Starter Gear	⑦ One-Way Clutch Asm
④ Screws	⑧ Torque Limit Gear Asm
⑤ Bolt	

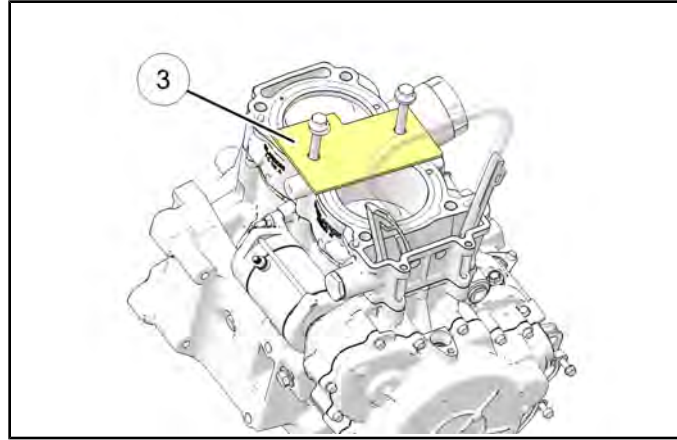
- If starter gear was replaced, inspect the torque limit gear.

## ENGINE / COOLING SYSTEM

6. After assembly, be sure the starter gear rotates in the clockwise direction only.

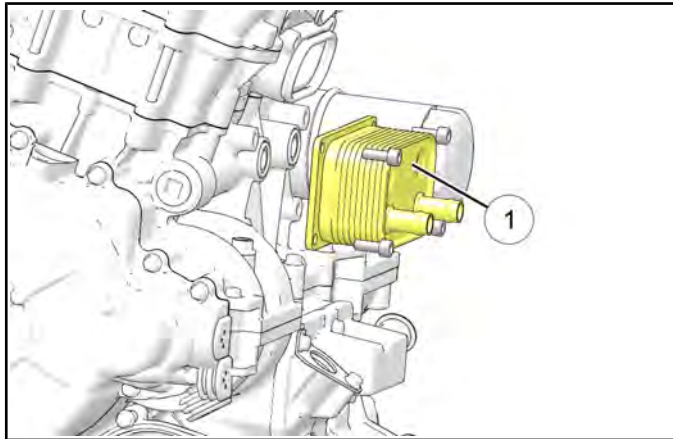


3. Remove the oil filter.
4. Install the Cylinder Holding & Camshaft Timing Plate (3) (PU-50563) onto the cylinder. The cylinder holding tool retains the cylinder and pistons when the engine is rotated.

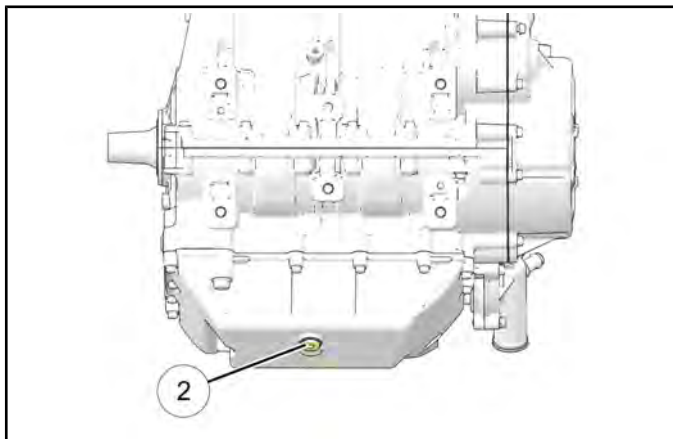


### Crankcase Disassembly / Inspection

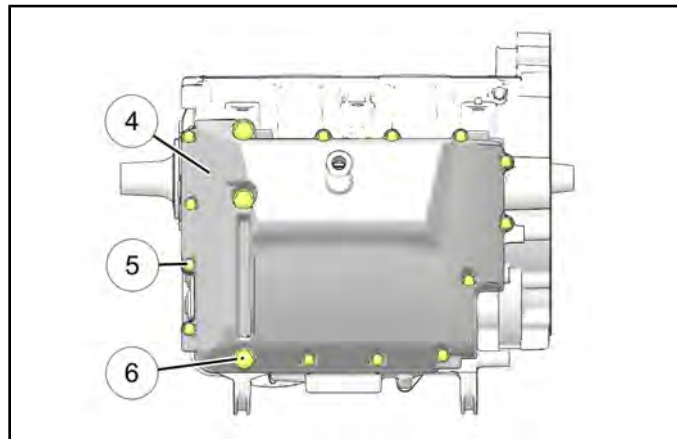
1. Remove the oil cooler (1) from the crankcase.



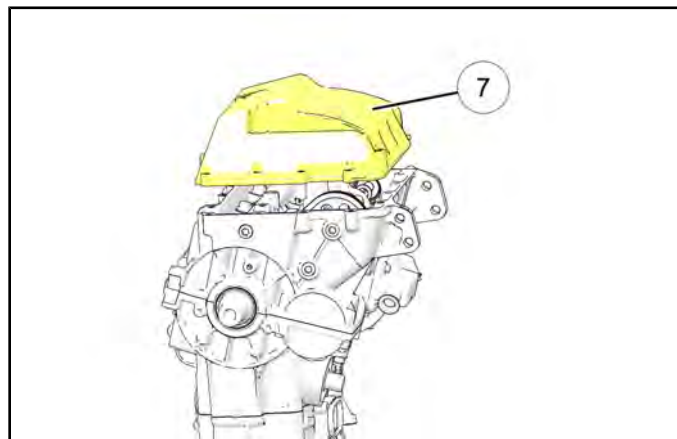
2. Remove the crankcase drain plug (2) to drain any oil remaining in the engine.



5. Rotate engine to access the crankcase sump cover.
6. Remove the thirteen M6 (5) and three M8 (6) bolts retaining the sump cover (4) to the crankcase.

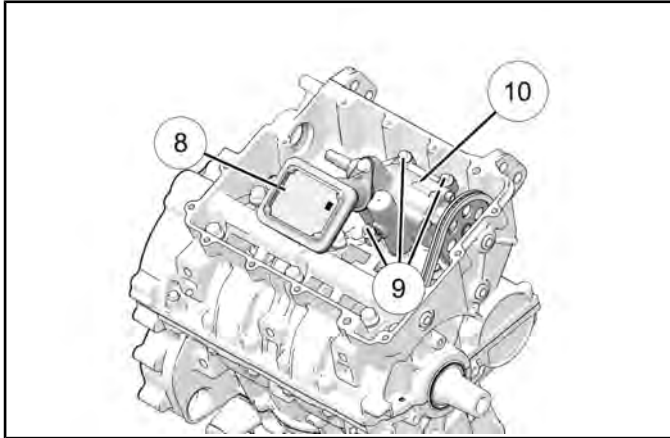


7. Remove the sump cover (7) from the crankcase.

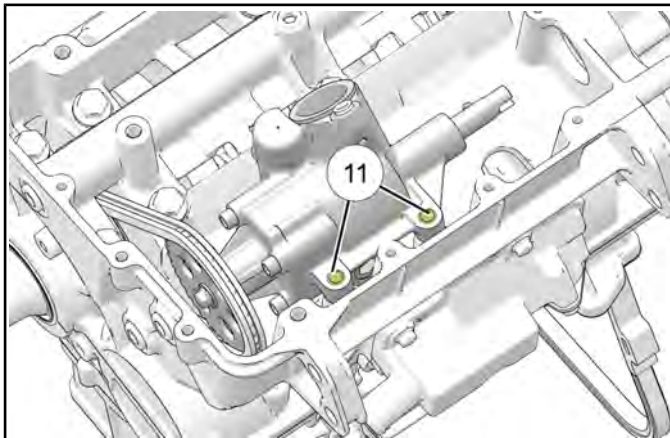


## ENGINE / COOLING SYSTEM

8. Remove and clean oil pump pick-up ⑧.

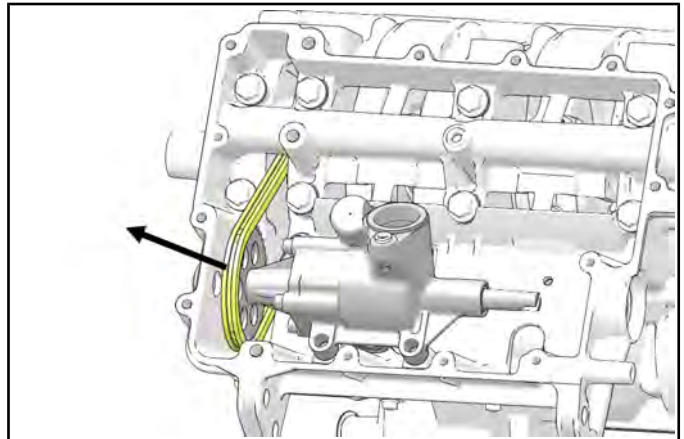


9. Remove the three bolts ⑨ that retain the oil pump ⑩ to the crankcase.
10. Use one of the oil pump retaining bolts or a pen magnet to extract the dowel pins ⑪ from the oil pump. Doing so allows for oil pump removal without having to remove the pump drive sprocket.

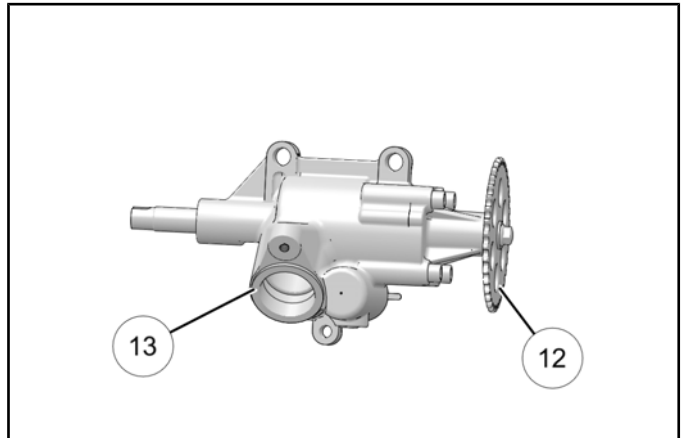


**NOTE:** If unable to extract the dowel pins from the oil pump, the oil pump sprocket must be removed. Access the sprocket bolt by removing the case plug.

11. Lift the oil pump drive chain and remove the oil pump.



12. Visually inspect the oil pump and drive sprocket ⑫ for wear or damage. Replace oil pump drive chain and sprocket if worn or damaged. If any part of the oil pump is damaged, the entire assembly must be replaced. Replace the oil pump seal ⑬ during crankcase assembly.



**NOTE:** Oil pump assembly is non-serviceable

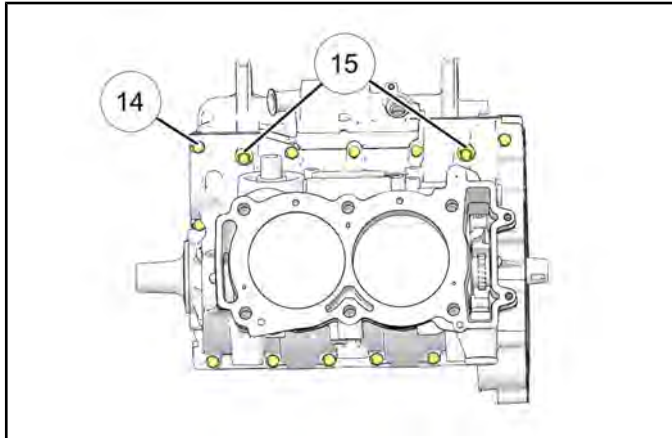
13. Rotate the engine so the cylinder is facing up.

3

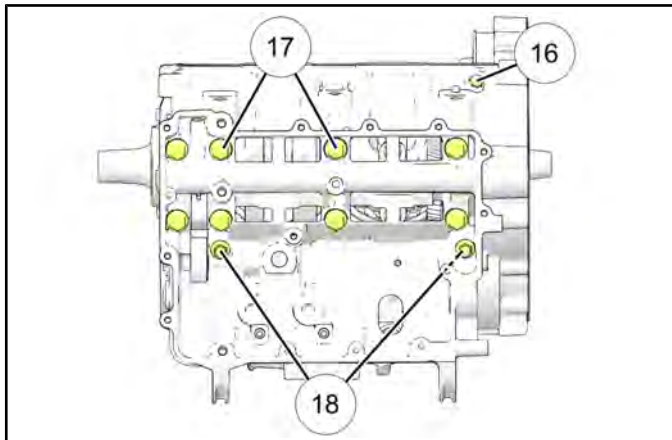


## ENGINE / COOLING SYSTEM

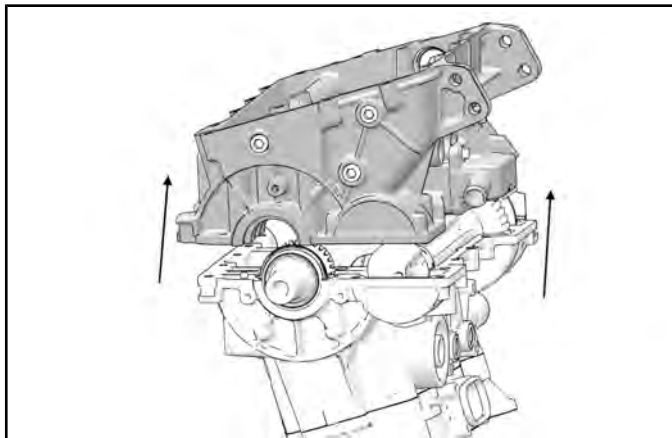
14. Remove the eleven) M6 (14) and two M8 (15) upper crankcase bolts.



15. Rotate the engine so the cylinder is facing down.  
16. Remove the one M6 (16), eight M10 (17) and two M8 (18) lower crankcase bolts. Discard the eight M10 bolts.

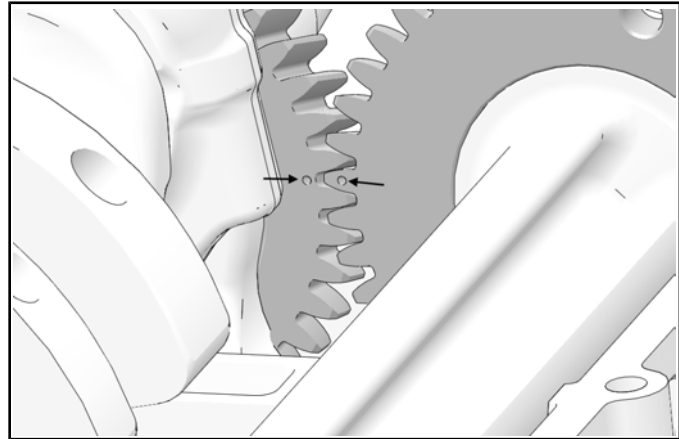


17. Tap on the lower crankcase in reinforced areas with a soft faced hammer to loosen. Carefully lift up and remove the lower crankcase half.

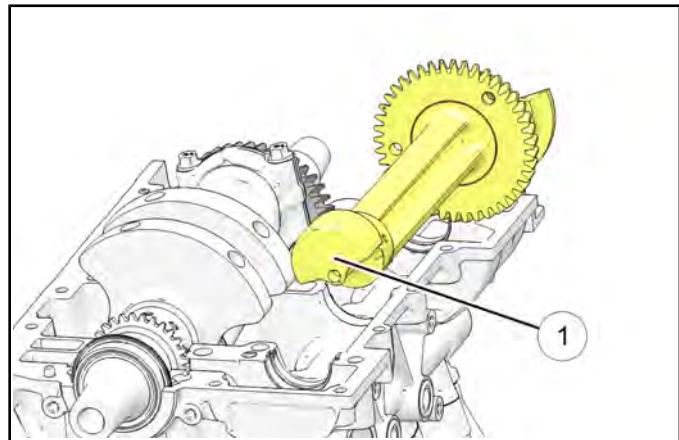


### Balance Shaft Removal / Inspection

1. Perform "Crankcase Disassembly / Inspection" procedure.
2. Note timing marks on balance shaft and crankshaft drive gears. Shafts must be properly timed upon assembly.

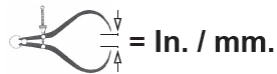
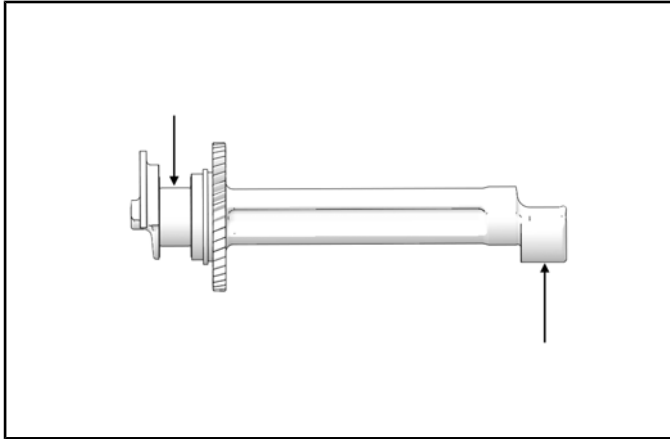


3. Carefully rotate the balance shaft (1) and remove it from the crankcase.



4. Inspect the balance shaft gear teeth for damage.

5. Measure each bearing journal in two locations, 90 degrees apart. Replace balance shaft if either journal is worn below the service limit specification. If worn past the service limit, replace the balance shaft assembly.

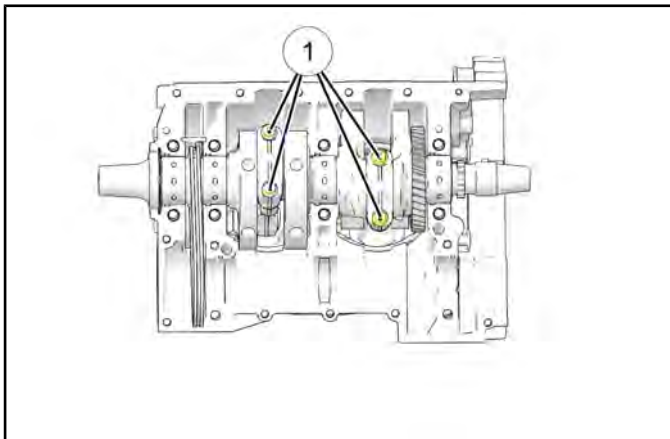


Balance Shaft Diameter (MAG & PTO):  
1.4939 - 1.4946" (37.946 - 37.962 mm)

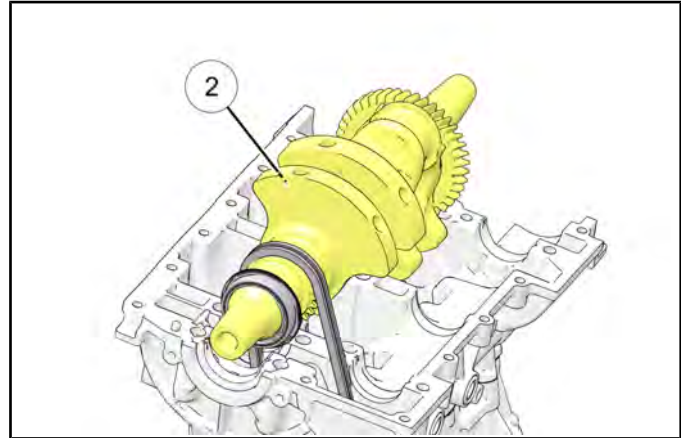
Service Limit: 1.4921" (37.900 mm)

## Crankshaft Removal / Inspection

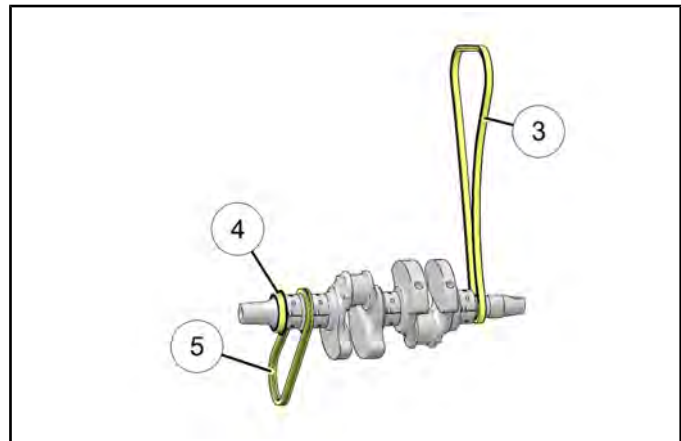
1. Perform "Crankcase Disassembly / Inspection" procedure.
2. Perform "Balance Shaft Removal / Inspection" procedure.
3. For ease of assembly, mark each connecting rod and end cap.
4. Loosen, remove and discard the four connecting rod bolts ①. Remove the end caps from the crankshaft.



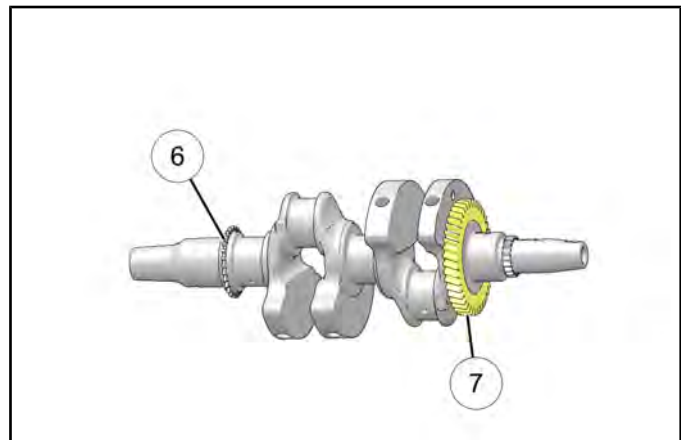
5. Carefully lift the crankshaft ② out of the crankcase.



6. Remove the cam chain ③, PTO main seal ④ and oil pump drive chain ⑤ from the crankshaft.



7. Inspect the auxiliary sprocket ⑥ and crankshaft gear ⑦ for broken or worn teeth.



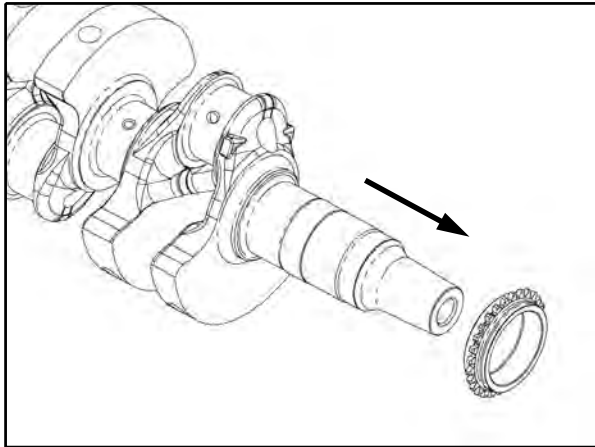
8. If the crankshaft gear is damaged, the crankshaft assembly must be replaced.

3

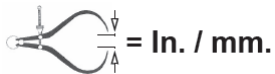
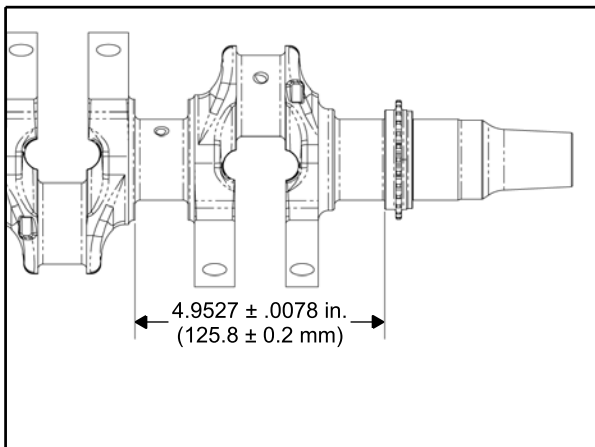


# ENGINE / COOLING SYSTEM

9. If the auxiliary sprocket is damaged, remove the sprocket with a 3-jaw puller.

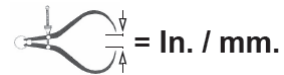
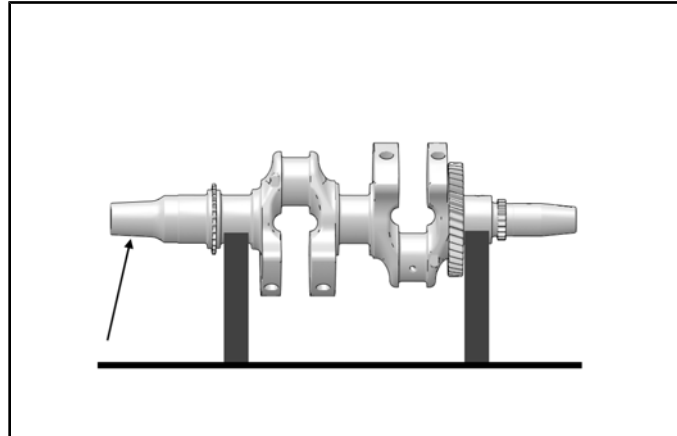


10. Using an arbor press, install new sprocket in any orientation to the depth shown in the following illustration.



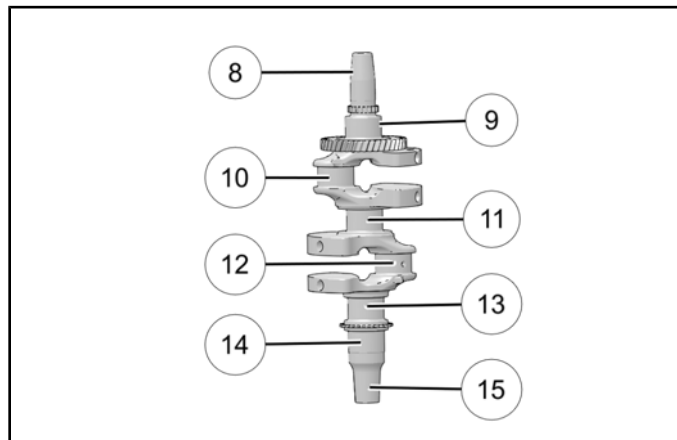
Auxiliary Sprocket Installed Depth:  
4.9527 ± .0078" (125.8 ± 0.2 mm)

11. Support crankshaft on V-blocks or on-centers in a crankshaft stand or lathe. Measure crankshaft runout where indicated and replace if runout exceeds maximum listed below.



Crankshaft Maximum Runout:  
.001" (0.025 mm)

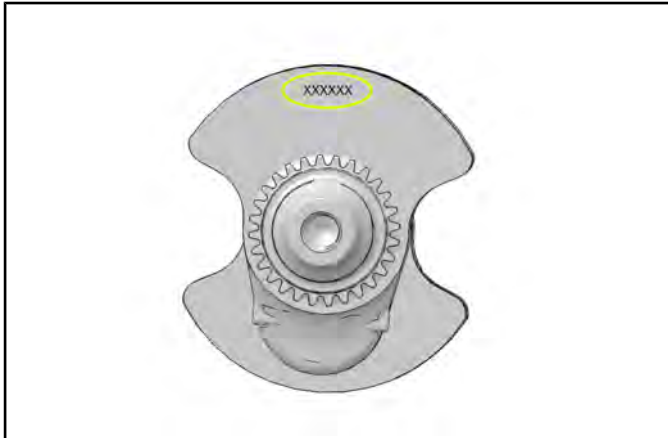
12. Visually inspect surface of crankshaft main and connecting rod journals. Replace crankshaft if any journal is scratched or pitted.
13. Measure each main journal and connecting rod journal in two locations, 90 degrees apart. Replace crankshaft if any journal is worn below the service limit specification.



⑧ MAG End	⑫ PTO Rod Journal
⑨ Main Journal 1	⑬ Main Journal 3
⑩ MAG Rod Journal	⑭ Main Journal 4
⑪ Main Journal 2	⑮ PTO End

## ENGINE / COOLING SYSTEM

14. Refer to the six letters stamped onto the PTO end of the crankshaft.



15. Use the table below to see if the crankshaft bearing journals are within specification. If worn past the service limit, replace the crankshaft assembly.

### Crankshaft Bearing Journal Diameters

B		
Main Bearing	Standard	1.6140 - 1.6143" (40.996 - 41.004 mm)
	Service Limit	1.6126" (40.960 mm)
Connecting Rod Bearing	Standard	1.6118 - 1.6122" (40.942 - 40.950 mm)
	Service Limit	1.6104" (40.906 mm)
G		
Main Bearing	Standard	1.6137 - 1.6140" (40.988 - 40.995 mm)
	Service Limit	1.6126" (40.960 mm)
Connecting Rod Bearing	Standard	1.6115 - 1.6118" (40.934 - 40.941 mm)
	Service Limit	1.6104" (40.906 mm)
Y		
Main Bearing	Standard	1.6134 - 1.6137" (40.980 - 40.987 mm)
	Service Limit	1.6126" (40.960 mm)
Connecting Rod Bearing	Standard	1.6112 - 1.6115" (40.926 - 40.933 mm)
	Service Limit	1.6104" (40.906 mm)

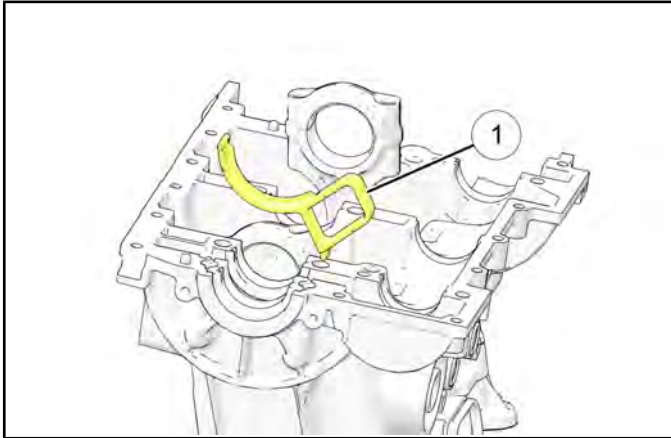
16. Whether installing a new crankshaft or re-installing the original, refer to the bearing selection chart provided in the "Crankshaft Main Bearing Selection" and "Connecting Rod Bearing Selection" procedures.

3

## ENGINE / COOLING SYSTEM

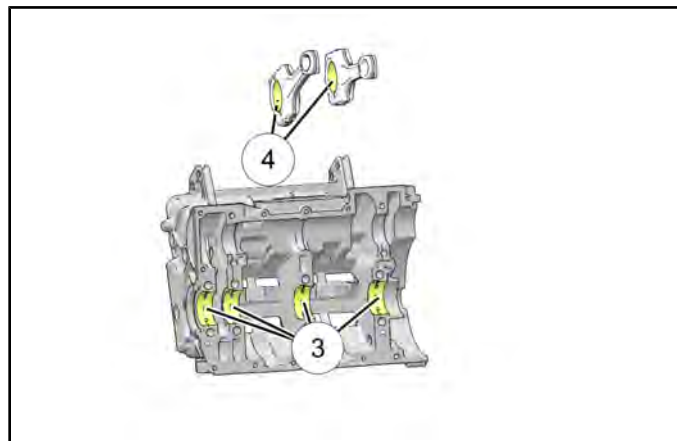
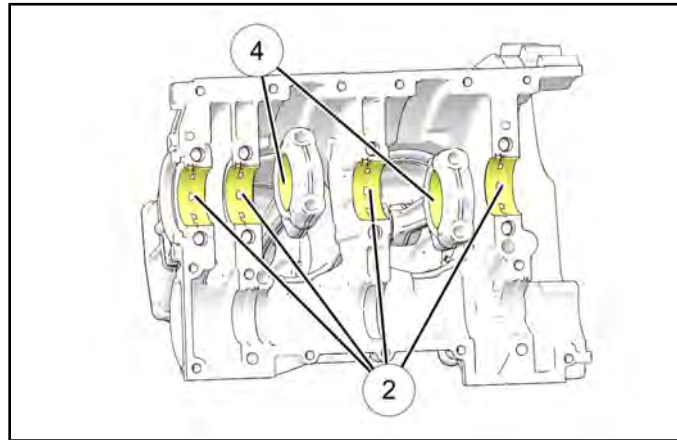
### Crankcase Inspection

1. Remove the oil drain diverter ① from the upper crankcase.



2. Remove all traces of crankcase sealer from the crankcase mating surfaces. Inspect the surfaces closely for nicks, burrs or damage.
3. Be sure alignment pins are in place where used.
4. Be sure oil passages are clean and free of any cleaning solvent (see Chapter 3 – Engine Oil Flow Chart, page 3.21).

5. Remove and discard the plain bearings located in the upper crankcase ②, lower crankcase ③ and connecting rods ④. Replace the crankcase assembly if a bearing bore is galled or if bearing inserts have rotated in the case. Refer to bearing selection procedures upon assembly.



**NOTE:** Always replace plain bearings when the crankcase or connecting rods have been disassembled. Refer to “Bearing Selection Chart”.

## ENGINE / COOLING SYSTEM

### Cylinder / Piston Removal

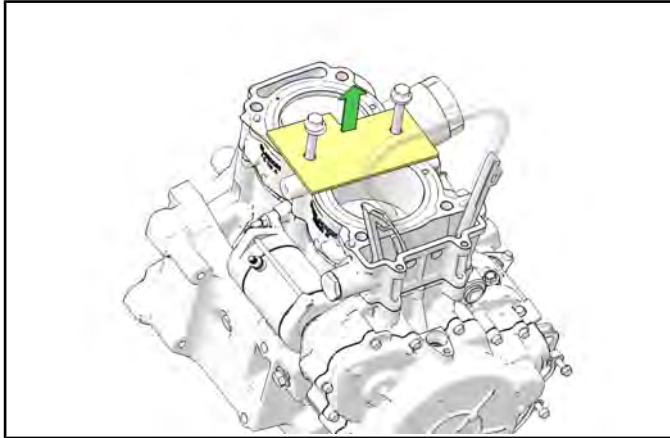


#### CAUTION

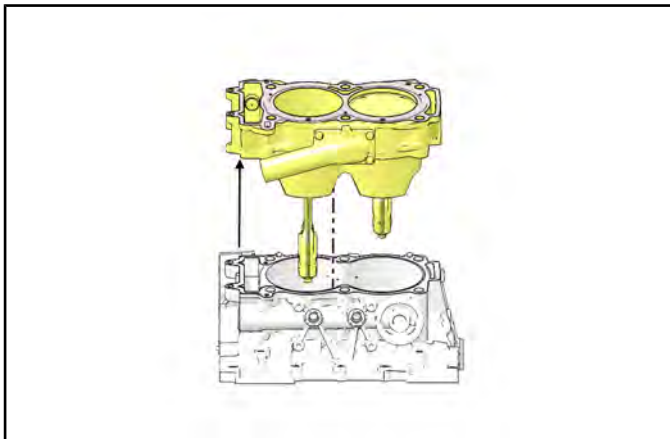
Pistons must be removed from the cylinders with the connecting rods attached.

DO NOT attempt to service the cylinder or pistons without disassembling the crankcase. Although you can remove the cylinder and pistons without disassembly, you will not be able to reassemble the engine because of the unique cylinder skirt and crankcase design.

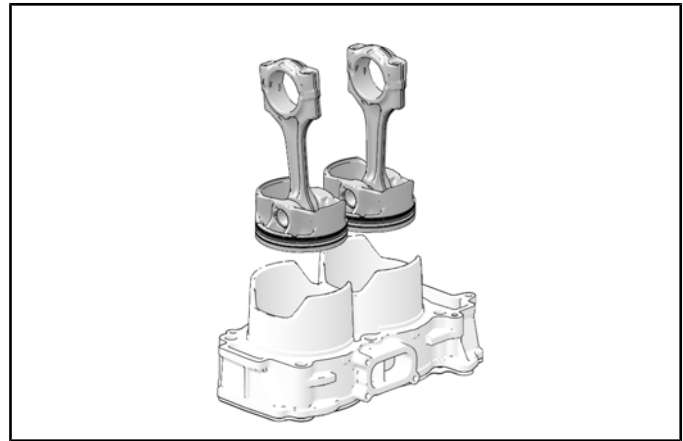
1. Perform "ENGINE DISASSEMBLY / INSPECTION - TOP END" and the "ENGINE DISASSEMBLY / INSPECTION - LOWER END" procedures.
2. Rotate the engine so the cylinder is facing up.
3. Remove the Cylinder Holding & Camshaft Timing Plate (PU-50563) from the cylinder.



4. Carefully lift the cylinder and pistons from the upper crankcase.



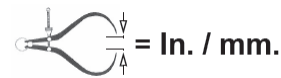
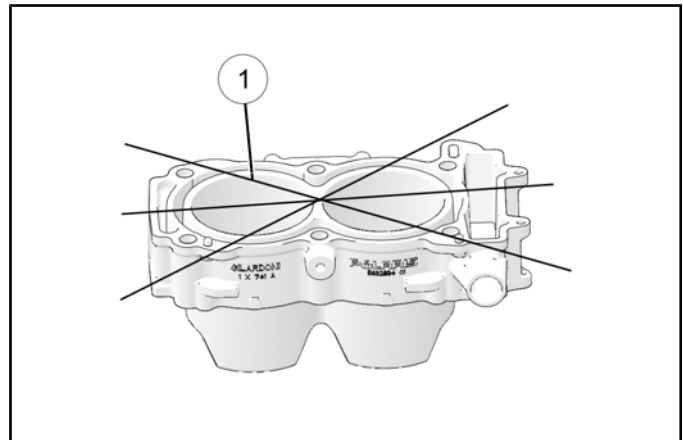
5. Remove the piston / connecting rod assemblies from the cylinder.



**NOTE:** If the pistons are to be reused, mark the pistons so they are reassembled in the same cylinder bore and direction from which they were removed (MAG / PTO).

### Cylinder Inspection

1. Lay a straight edge across the top surface of the cylinder at several different points ① and measure warp by inserting a feeler gauge between the straight edge and the cylinder surface. If warp exceeds the service limit, replace the cylinder.



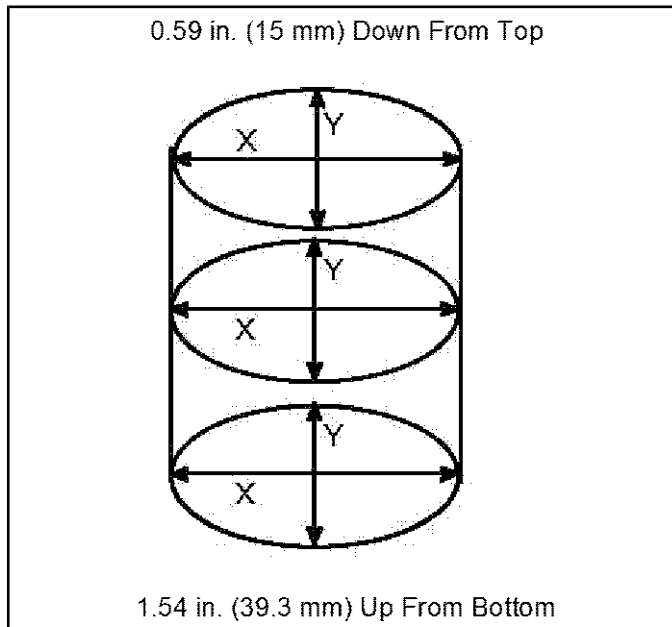
Cylinder Warp Limit:  
.002" (0.05 mm)


2. Inspect cylinder for wear, scratches, or damage.

**NOTE:** DO NOT hone the cylinders or attempt to repair a damaged cylinder by honing.

# ENGINE / COOLING SYSTEM


3. Inspect taper and out of round with a dial bore gauge.
4. Inspect cylinder for taper and out of round with a dial bore gauge. Measure in two different directions (front to back and side to side), on three levels (0.59 in. down from top, the middle, and 1.54 in. up from bottom). Record measurements. If cylinder is tapered or out of round beyond the service limit, the cylinder must be replaced.



 = In. / mm.

Cylinder Taper:  
Service Limit: 0.001" (.025 mm)


Cylinder Out of Round:  
Service Limit: 0.001" (.025 mm)

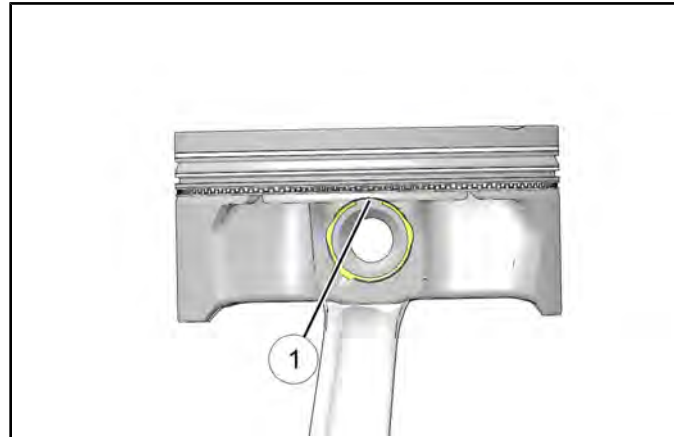
 = In. / mm.

Standard Bore Size:  
3.6614 ± .0003" (93 mm ± .008 mm)

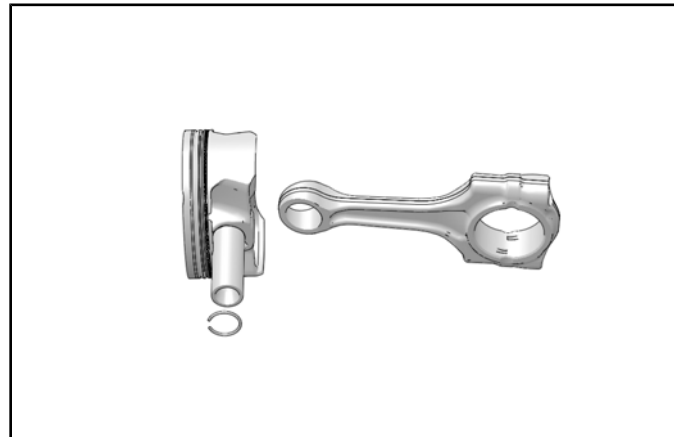
## Piston Disassembly / Inspection


**NOTE: New pistons are directional (intake vs. exhaust), but can be placed in either cylinder.**

1. Note location of the piston circlip gap  at the top (12:00 position) or bottom (6:00 position).



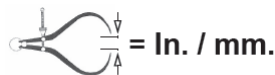
2. Remove piston circlip and push piston pin out of piston. If necessary, heat the crown of the piston slightly with a heat gun if pin cannot be removed by hand. Discard circlips.



 **CAUTION**

DO NOT apply heat to piston rings or a loss of radial tension could result.

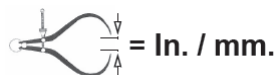
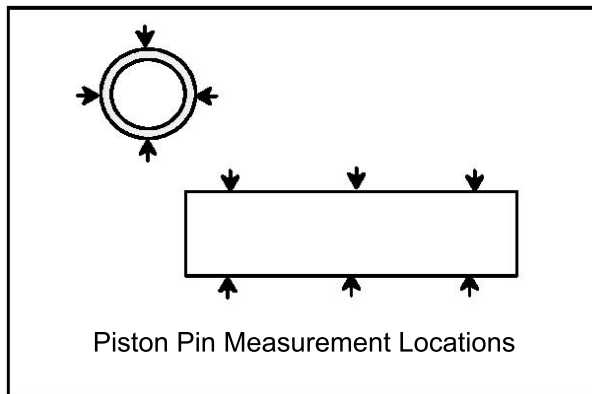
3. Measure piston pin bore I.D. in two directions (90° apart). Replace piston and piston pin if out of specification.



Piston Pin Bore I.D.:

0.7876" - 0.7878" (20.004 - 20.009 mm)  
Service Limit: 0.7893" (20.05 mm)

4. Measure piston pin O.D. in two directions (90° apart) at three locations on the length. Replace piston and piston pin if out of specification.



Piston Pin O.D.:

0.7872" - 0.7874" (19.995 - 20.000 mm)  
Service Limit: 0.7866" (19.98 mm)

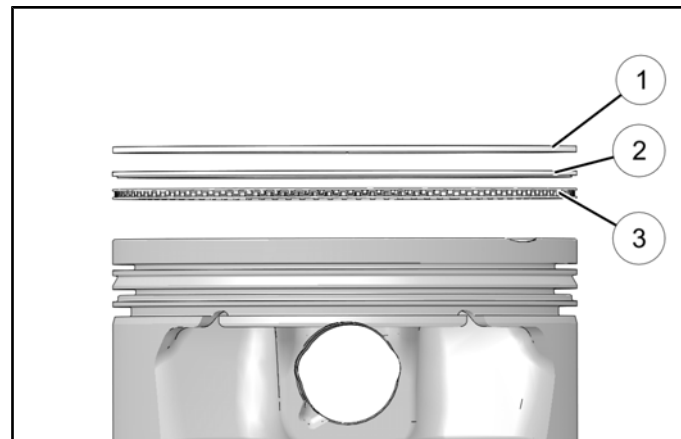
## Piston Ring Removal

1. Carefully remove top compression ring ① by hand or using a ring removal pliers.

### CAUTION

DO NOT expand the ring more than necessary to remove it from the piston or the ring may break or lose radial tension.

- **Piston ring pliers:** Carefully expand ring and lift it off the piston.
- **By hand:** Placing both thumbs on the ring ends, spread the ring open and push up on opposite side. Do not scratch ring lands.



2. Repeat procedure for second compression ring ②.
3. The oil control ring ③ is a three piece design consisting of a top and bottom steel rail and a center expander section. Remove top rail first, then bottom rail, then the expander.

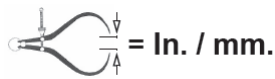
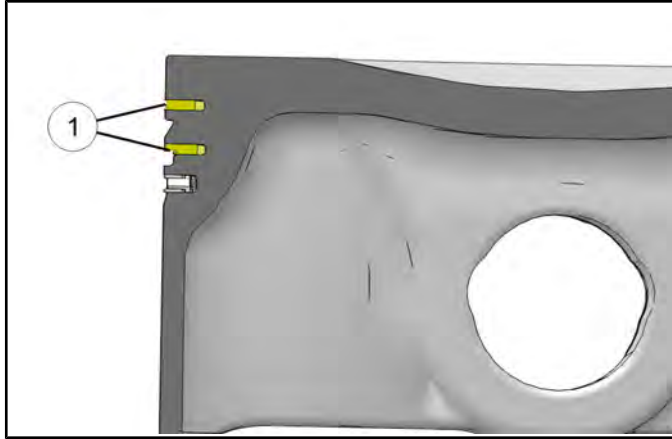
3



# ENGINE / COOLING SYSTEM

## Piston Ring to Groove Clearance Inspection

1. Measure piston ring to groove clearance ① by placing the ring in the ring land and measuring with a thickness (feeler) gauge. Replace piston and rings if ring-to-groove clearance exceeds service limits.



Piston Ring to Groove Clearance:

Top Ring: 0.0012 - 0.0037" (.030 - .095 mm)

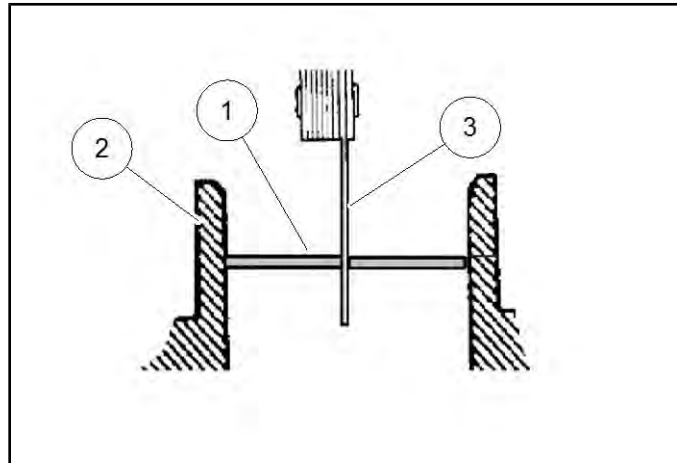
Second Ring: 0.0012 - 0.0030" (.030 - .076 mm)

Service Limit: .0047" (.12 mm)

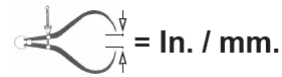
## Piston Ring Installed Gap

1. Place each piston ring ① inside the cylinder ②. Use the piston to push the ring squarely into cylinder, as shown below.
2. Measure installed gap with a feeler gauge ③ at both the top and bottom of the cylinder.

**NOTE:** A difference between top and bottom end gap measurements is a general indication of cylinder taper (wear). The cylinder should be measured for taper and out of round.



3. If the installed gap measurement exceeds the service limit, replace the rings.



Piston Ring Installed Gap:

Top Ring: .008 - .014" (.20 - .36 mm)  
Service Limit: .020" (.50 mm)

Second Ring: .015 - .025" (.37 - .63 mm)  
Service Limit: .028" (.70 mm)

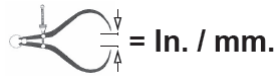
Oil Control Rails: .010 - .040" (.25 - 1.02 mm)  
Service Limit: .059" (1.50 mm)

**NOTE:** Always check piston ring installed gap when installing new rings and/or a new cylinder.

## Piston-to-Cylinder Clearance

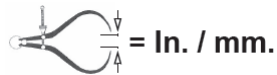
Measure piston outside diameter at a point 13 mm up from the bottom of the piston, at a right angle to piston pin bore.

Subtract measurement from maximum measurement obtained in Step 4 of "Cylinder Inspection" procedure.



Piston O.D. (Standard):

3.6592 ± .0003" (92.950 ± .008 mm)

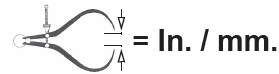
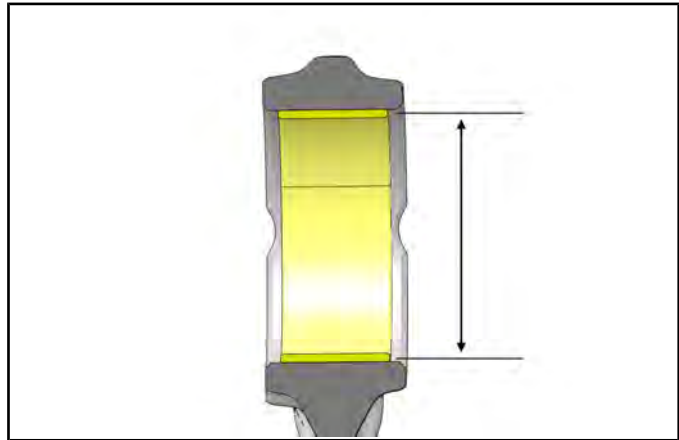


Piston to Cylinder Clearance:

.0014 - .0026" (.035 - .065 mm)

## Connecting Rod Inspection

1. Inspect the small end and big end of connecting rod (and matching rod cap) for damage, galling of surface or pitting.
2. Measure small end I.D. in two directions as shown. Record measurements and compare to specifications. Replace connecting rod if worn past the service limit specification.



Connecting Rod Small End I.D.:  
0.7879" - 0.7884" (20.015 - 20.025 mm)  
Service Limit: 0.7897" (20.06 mm)

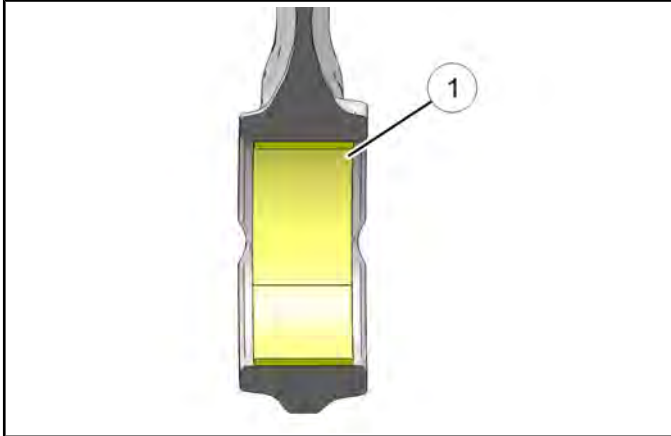
3. Install matching rod cap on connecting rod (**without bearings**) and install the bolts.
4. Tighten bolts by hand, then torque to **Step 1: 9 ft-lb (12 Nm)**  
**Step 2: 22 ft-lb (30 Nm)**  
**Step 3: Tighten add'n 90°** prior to taking any measurements.

3

## ENGINE / COOLING SYSTEM

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5. Using a dial bore gauge, measure big end I.D. in two directions shown. Remove bearings when taking measurements ①. Record measurements and compare to specifications.



6. Refer to the number printed onto the side of the connecting rod, closest to the small bore end. This number represents the bore diameter.



7. The table below lists the big end bore diameter specifications.

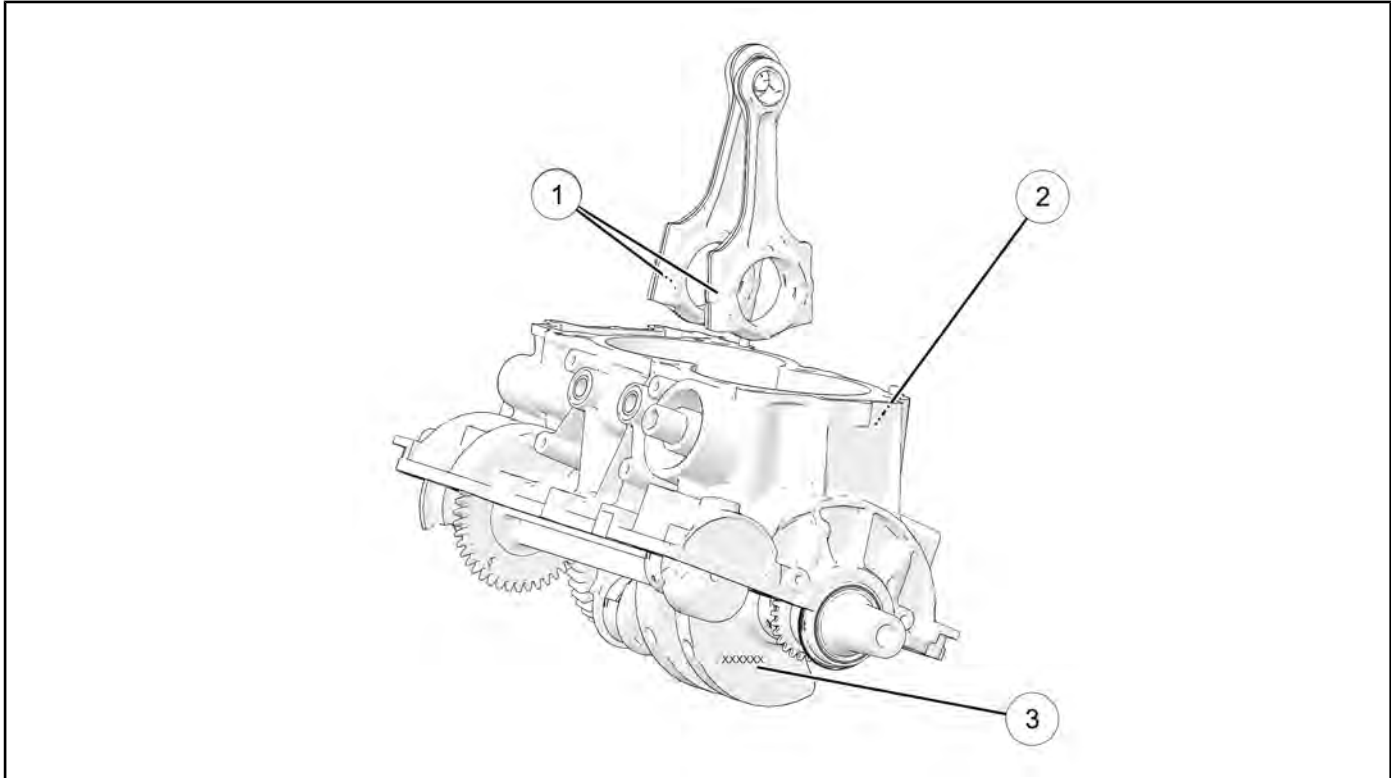
### Connecting Rod Big End Bore Diameters

1	2	3
1.7318- 1.7321" (43.989- 43.996 mm)	1.7321- 1.7323" (43.996- 44.003 mm)	1.7323- 1.7326" (44.003- 44.010 mm)

8. Whether using new connecting rods or re-installing the original ones, refer to the bearing selection chart provided in the "Connecting Rod Bearing Selection" procedure in this chapter.

## ENGINE ASSEMBLY - LOWER END

### Bearing Selection Identification Letters and Numbers



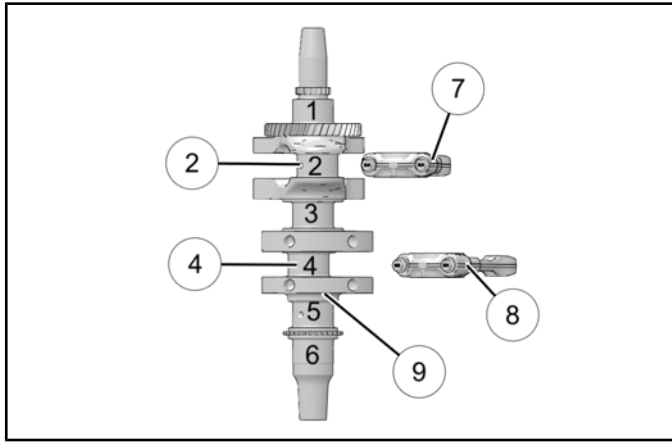
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① Connecting Rod Bearing Identification Number (1 digit)
② Crankcase Bearing Identification Number (6 digits)
③ Crankshaft Bearing Identification Letters (6 letters)

# ENGINE / COOLING SYSTEM

## Connecting Rod Bearing Selection

In order to select the proper bearing for the connecting rods, you must reference the number on each connecting rod ⑦&⑧ and match that up with the rod journal letters on the crankshaft ⑨.



In this example, you would use the number 2 as the connecting rod code. You would use letters G and G as the crankshaft codes (crank journals 2 and 4).

Based off the bearing selection chart, you would use:

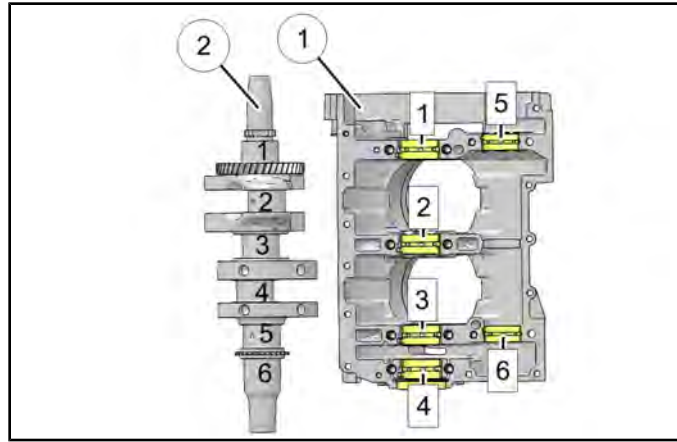
Green bearing for each connecting rod

### Bearing Selection Chart – Rod Bearings

Rod	CRANKSHAFT			
	Code	B	G	Y
1	Blue	Blue	Green	Yellow
2	Blue	Green	Yellow	Yellow
3	Green	Yellow	Yellow	Yellow

## Crankshaft Main Bearing Selection

In order to select the proper main bearings for the crankshaft, you must reference the six numbers on the crankcase ① and match that up with the main journal letters on the crankshaft ②.



In this example, you would use the number 2 as the crankcase codes (case journals 1, 2, 3, 4). You would use letters G, Y, G, Y as the crankshaft codes (crank journals 1, 3, 5 and 6).

Based off the bearing selection chart, you would use:

Green bearing for Main #1

Yellow bearing for Main #2

Green bearing for Main #3

Yellow bearing for Main #4

## Bearing Selection Chart - Main Bearings

Case	CRANKSHAFT			
	Code	B	G	Y
1	Blue	Blue	Green	Green
2	Blue	Green	Yellow	Yellow
3	Green	Yellow	Yellow	Yellow

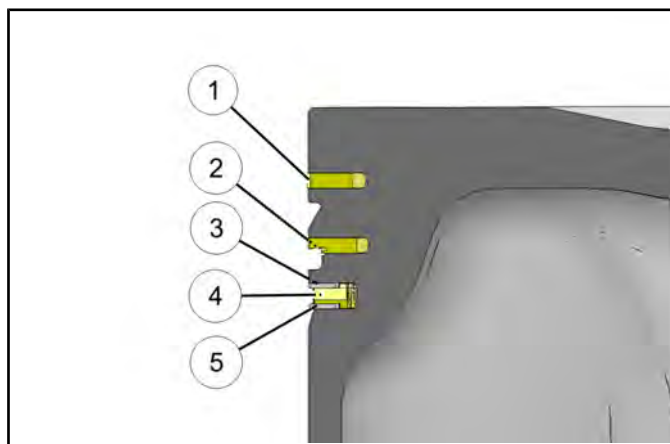
## Upper Crankcase Preparation

**NOTE:** Always replace plain bearings when the crankcase or connecting rods have been disassembled. Refer to bearing selection procedures.

1. Remove all traces of crankcase sealer from the crankcase mating surfaces. Inspect the surfaces closely for nicks, burrs or damage.
2. Clean bolt hole threads to remove any oil or crankcase sealant.
3. Inspect crankcase bearing bores. Replace the crankcase assembly if a bearing bore is galled or if bearing inserts have rotated in the case.
4. Be sure alignment pins are in place where used.
5. Refer to "Oil Flow Chart" at the beginning of this chapter and trace the oil paths through the crankcase and cylinder.
6. Flush all oil passages with solvent and then warm soapy water. Rinse with clear, warm water and dry with compressed air.
7. Be sure passages are clean and dry before assembling the upper crankcase.

## Piston Ring Installation

**NOTE:** Apply clean engine oil to all ring surfaces and ring lands upon installation. Always check piston ring installed gap before rings are installed on piston (see Chapter 3 – Piston Ring Installed Gap, page 3.58). Clean accumulated carbon from piston ring grooves and oil ring lube holes if piston has been in service.

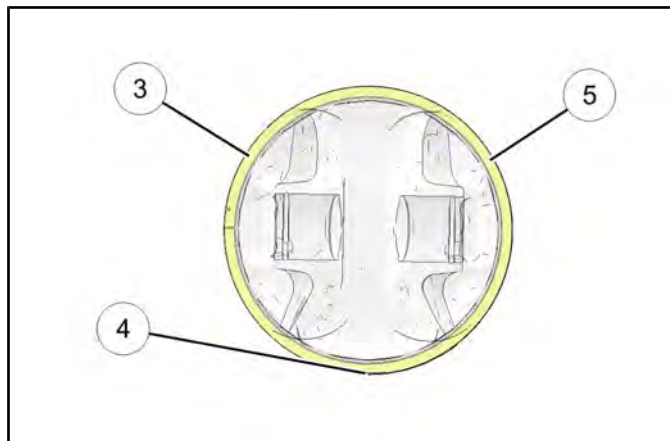


① Top Ring	④ Spring Expander
② Second Ring	⑤ Lower Rail
③ Upper Rail	

1. Place oil control ring expander in oil ring groove. Rotate expander in groove until butt ends are on PTO side of piston ④.

**NOTE:** Ends must butt squarely together and must not overlap.

2. Install lower rail with end gap positioned on the intake side of piston ⑤.
3. Install upper rail with end gap positioned on the exhaust side of piston ③.

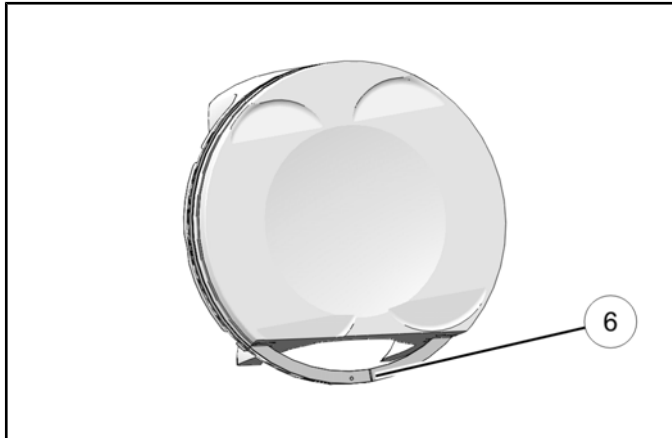


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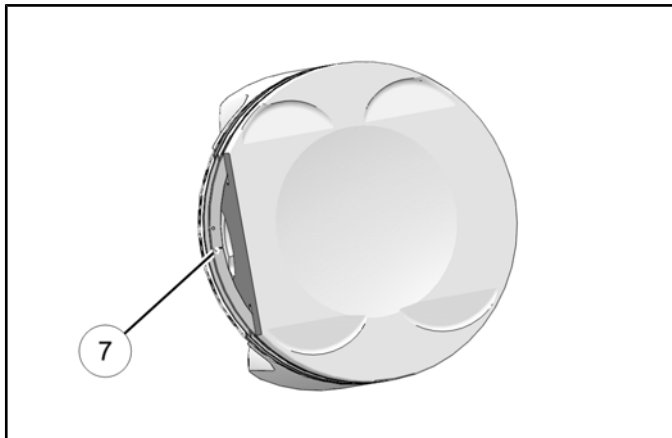


## ENGINE / COOLING SYSTEM

4. Install second ring with marking facing top of piston ⑥. Rotate ring to position the end gap toward intake side of piston as shown below.



5. Install top ring with mark facing top of piston ⑦. Rotate ring to position the end gap toward exhaust side of piston as shown below.



6. Be sure top and second rings rotate freely in their grooves and do not bind when compressed by hand.

### Piston / Connecting Rod Assembly

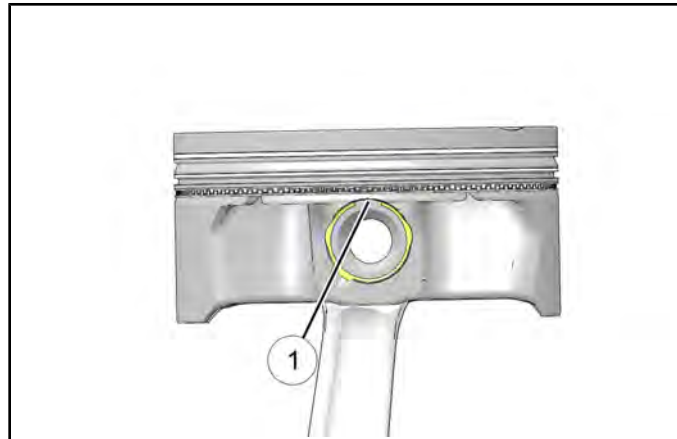
1. Lubricate connecting rod small end, piston pin bore and piston pin with engine oil.

#### CAUTION

Do not re-use circlips. Circlips become deformed during the removal process.

Do not compress the new clip more than necessary to prevent loss of radial tension. Severe engine damage may result if circlips are re-used or deformed during installation.

2. Install a new circlip ① on one side of piston with gap at the top (12:00 position) or bottom (6:00 position).



**NOTE: Never re-use a piston pin circlip.**

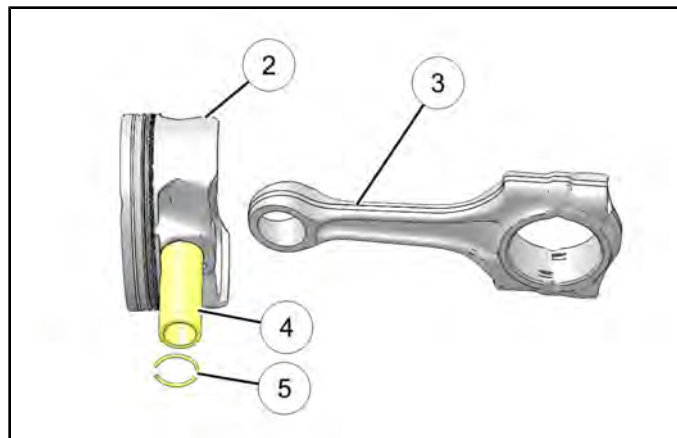
**If reinstalling the original connecting rods, orientate the rods the same as when removed. If new connecting rods are being installed, they can be installed either way (there is no piston pin offset in the rod), however it is recommended they be installed with rods facing the same direction.**

3. Place piston ② on connecting rod ③. Push piston pin ④ through rod and piston until it seats against the installed circlip.

#### CAUTION

Do not tap on pin or cause any sideways force to connecting rod. Warm piston crown with a heat gun if pin cannot be installed by hand, or use a piston pin installation tool.

DO NOT apply heat to piston rings or a loss of radial tension could result.



## ENGINE / COOLING SYSTEM

4. Install the remaining circlip ⑤ with gap at the top (12:00 position) or bottom (6:00 position). Push the piston pin in both directions to make sure the clips are properly seated in the groove.

### Cylinder / Piston Installation

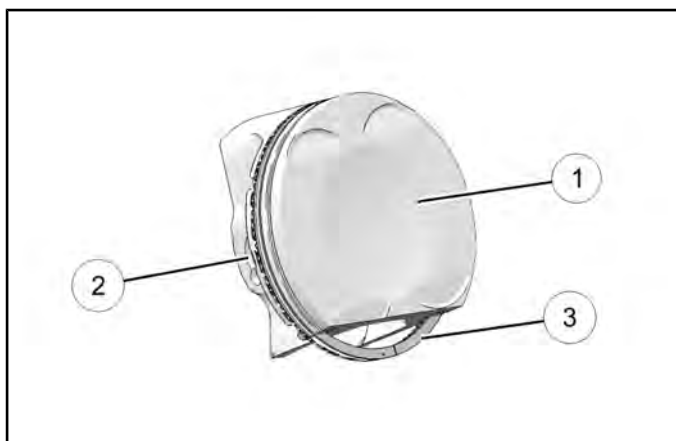
#### CAUTION

Pistons must be installed into the cylinders with the connecting rods attached.  
DO NOT attempt to service the cylinder or pistons without disassembling the crankcase. Although you can remove the cylinder and pistons without disassembly, you will not be able to reassemble the engine because of the unique cylinder skirt and crankcase design.

**NOTE:** If the pistons are being reused, reassemble in the same cylinder bore and direction from which they were removed (MAG / PTO).

**New pistons are directional (intake vs. exhaust), but can be placed in either cylinder.**

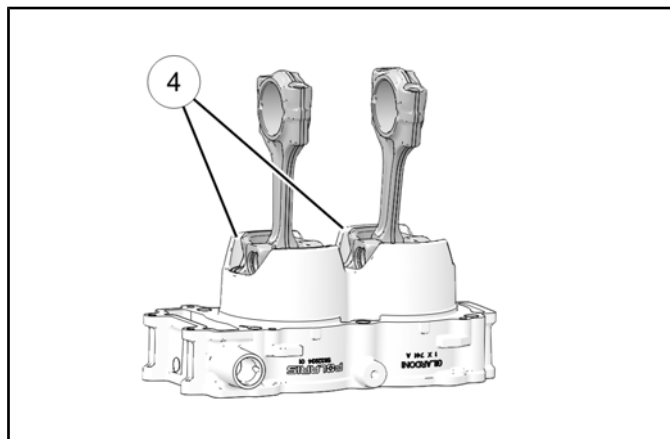
1. Apply clean engine oil to each piston assembly ①, cylinder bore ② and bottom tapered portion of each cylinder sleeve.
2. Verify that all ring end gaps ③ are correctly located on each piston (see Chapter 3 – Piston Ring Installation, page 3.63).
3. Note the piston orientation mark (arrow) located on top of the piston. Arrow should point toward the exhaust side.



**NOTE:** Orientation arrow is also located on the bottom side of piston as an additional reference.

4. Carefully compress the piston rings with your fingers and install the piston / connecting rod assemblies into the cylinder from the bottom side.

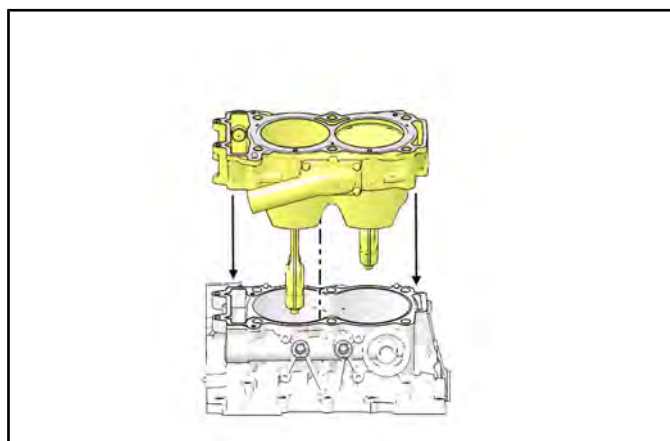
**NOTE:** Use a slight front to back rocking motion until all rings are captive in cylinder and past the cylinder sleeve opening ④.



5. Rotate the engine so the crankcase to cylinder mounting surface is facing up.
6. Clean base gasket sealing surface on cylinder and crankcase to remove all oil and grease.

**NOTE:** Base gasket and surfaces must be DRY and oil free. Use care upon assembly to keep oil away.

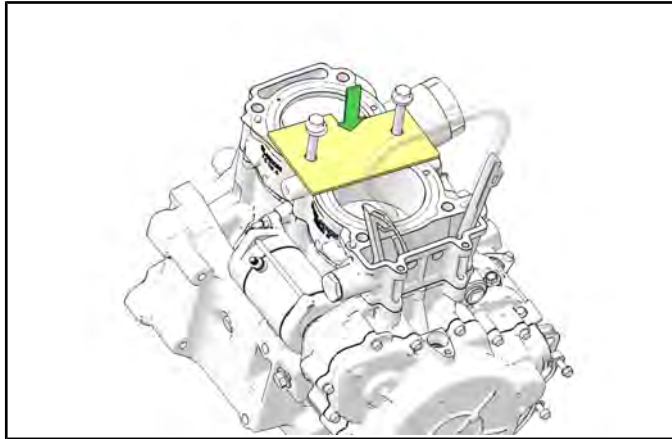
7. Reinstall dowel pins in crankcase if previously removed.
8. Install a new cylinder base gasket.
9. Verify piston orientation (arrow pointing toward exhaust) one last time prior to installation.
10. Carefully place the cylinder and pistons into the upper crankcase.



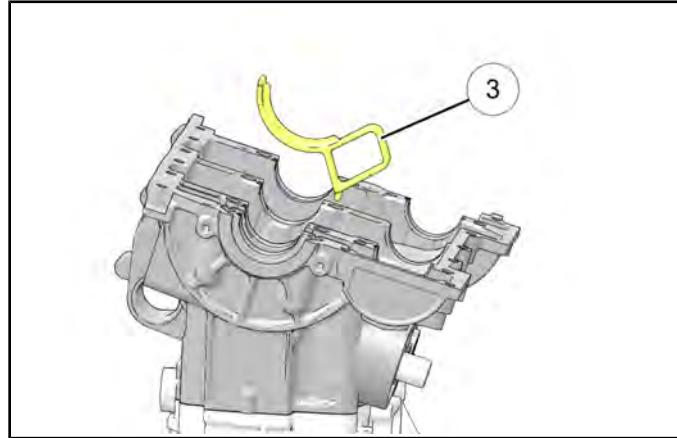
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## ENGINE / COOLING SYSTEM

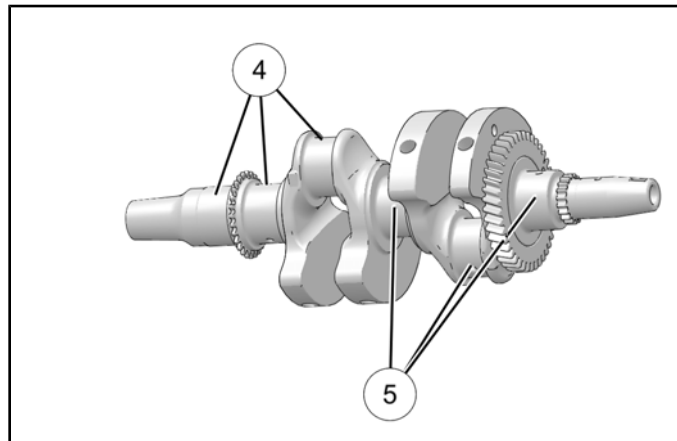
11. Install the Cylinder Holding & Camshaft Timing Plate (PU-50563) onto the cylinder. The cylinder holding tool retains the cylinder and pistons when the engine is rotated.



5. Install oil drain diverter ③ into the upper crankcase.



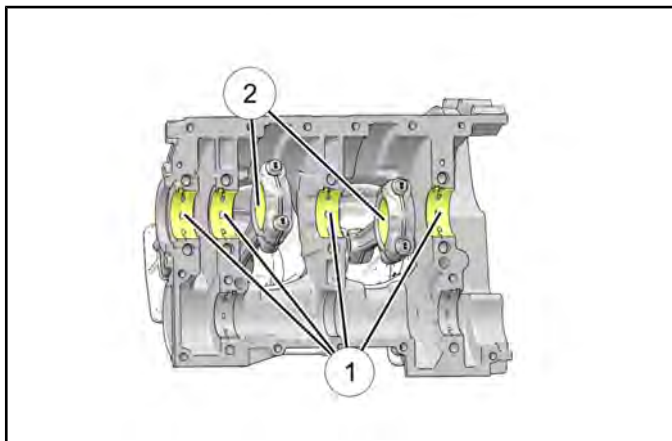
6. Apply Polaris PS-4 engine oil to each main and rod bearing journal of crankshaft ④&⑤.



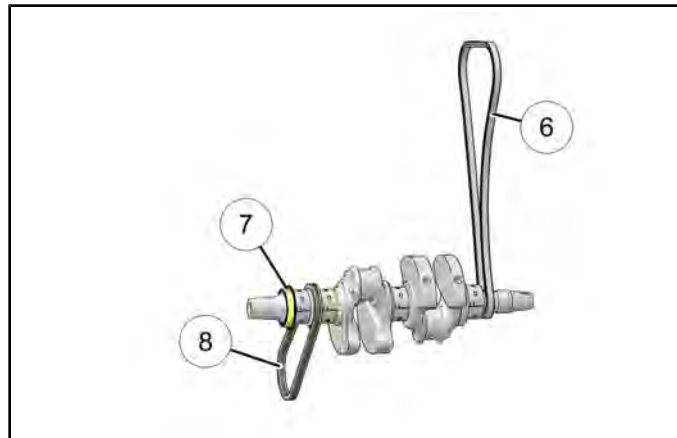
### Crankshaft Installation

**NOTE:** Whether installing a new crankshaft or re-installing the original, refer to the bearing selection charts (see Chapter 3 – Crankshaft Main Bearing Selection, page 3.62 and Connecting Rod Bearing Selection, page 3.62).

1. Rotate the engine so the cylinder is facing down.
2. Clean the bearing bore surfaces of upper crankcase (main bearings), connecting rods and connecting rod caps.
3. Align tab of new main bearing ① with the slot in main bearing bore of crankcase. Press bearing insert firmly into place. Repeat for all main bearings.
4. Align tab of new connecting rod bearings ② with the slot in the connecting rod stem and connecting rod end cap. Press bearing insert firmly into place. Repeat for the other connecting rod.

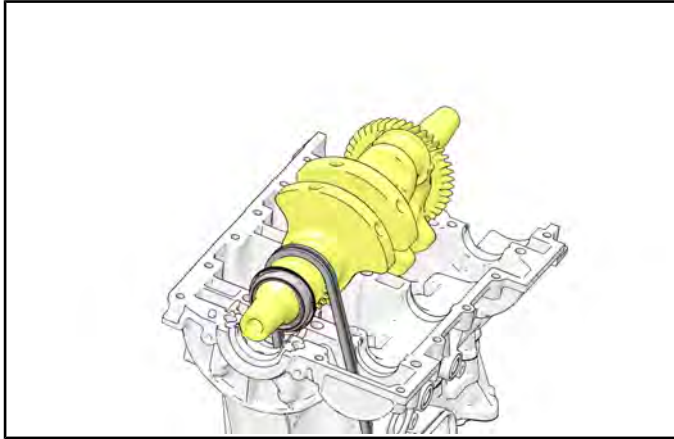


7. Loop cam chain ⑥ and oil pump drive chain ⑧ over crankshaft sprockets.
8. Apply Polaris PS-4 engine oil to the new crankshaft oil seal ⑦ and install the seal on the PTO end of the crankshaft.

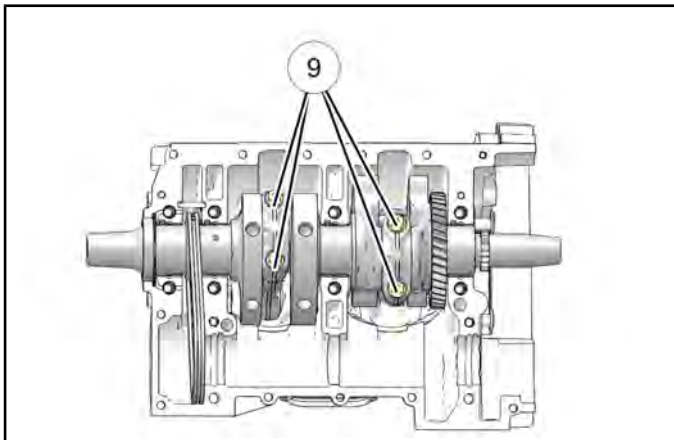


## ENGINE / COOLING SYSTEM

- Carefully lower the crankshaft into upper crankcase. Guide connecting rods onto the rod journals of crankshaft as necessary.



- Adjust the PTO crankshaft seal so it rests properly in the upper crankcase.
- Clean bolt hole threads in connecting rod to remove all oil.
- Install matching rod cap on connecting rod using markings made upon disassembly.
- Install *new bolts* and tighten evenly until snug.



- Torque connecting rod bolts to specification ⑨.

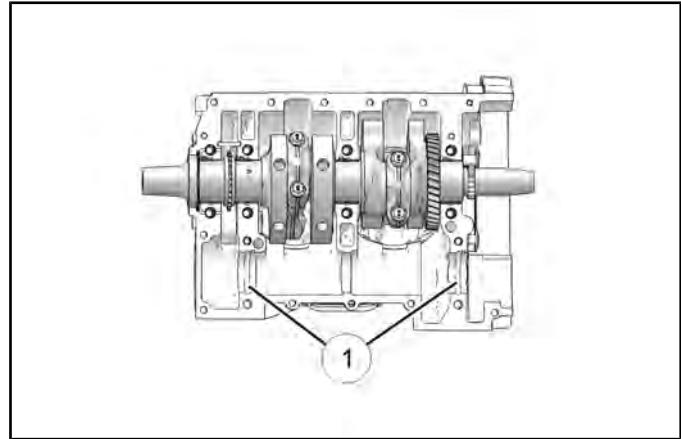


Connecting Rod Bolts:

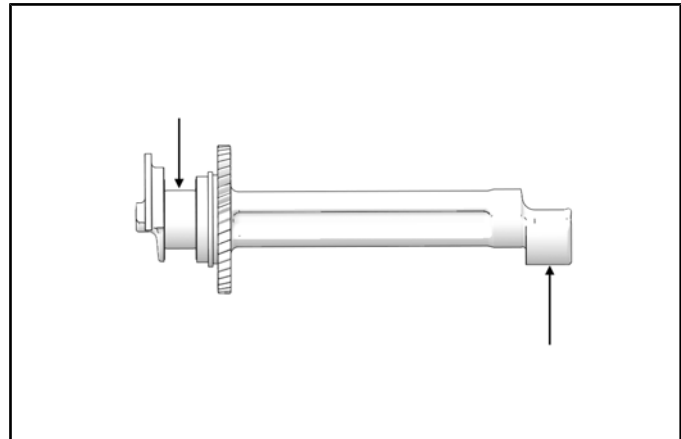
- Step 1: 9 ft-lb (12 Nm)**
- Step 2: 22 ft-lb (30 Nm)**
- Step 3: Tighten add'n 90°**

### Balance Shaft Installation

- Clean the upper crankcase balance shaft bearing bore surfaces.
- Align tab of new balance shaft bearings ① with the slot in each bearing bore of crankcase. Press bearing insert firmly into place.



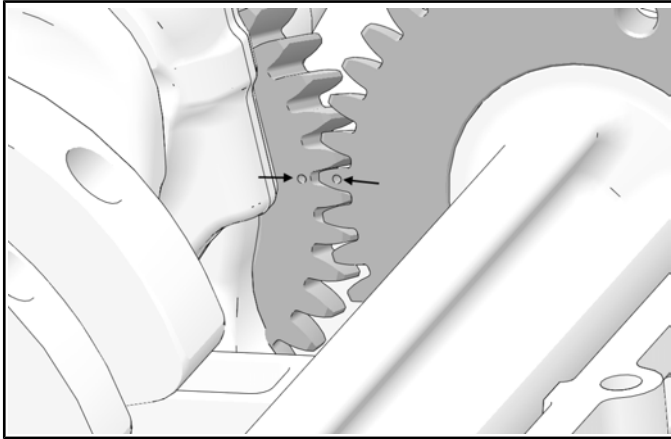
- Rotate the crankshaft until the alignment dot on the crankshaft MAG end gear is visible.
- Apply Polaris PS-4 engine oil to both balance shaft journals.



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## ENGINE / COOLING SYSTEM

5. Install the balance shaft, placing the tooth with the alignment dot in-line with the dot on the crankshaft gear.



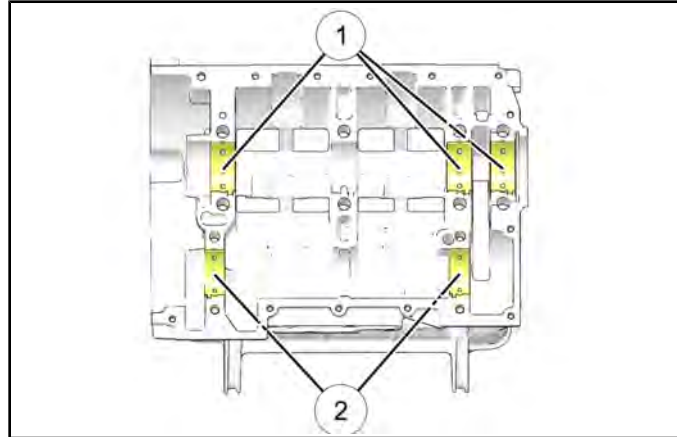
### Lower Crankcase Preparation

**NOTE:** Always replace plain bearings when the crankcase or connecting rods have been disassembled. Refer to bearing selection procedures.

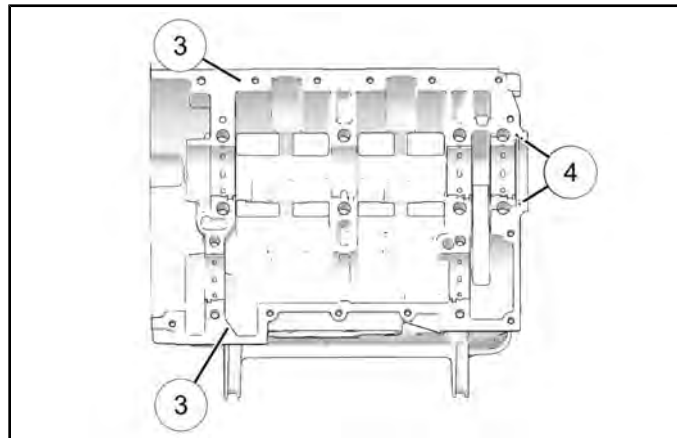
1. Remove all traces of crankcase sealant from the crankcase mating surfaces. Inspect the surfaces closely for nicks, burrs or damage.
2. Clean bolt hole threads to remove any oil or crankcase sealant.
3. Inspect crankcase bearing bores. Replace the crankcase assembly if a bearing bore is galled or if bearing inserts have rotated in the case.
4. Be sure alignment pins are in place where used.
5. Refer to "Oil Flow Chart" at the beginning of this chapter and trace the oil paths through the crankcase and cylinder.
6. Flush all oil passages with solvent and then warm soapy water. Rinse with clear, warm water and dry with compressed air.
7. Be sure passages are clean and dry before assembling the crankcase.

### Crankcase Assembly

1. Check to be sure the PTO crankshaft seal is resting properly in the upper crankcase.
2. Align tab of new main bearings ① and new balance shaft bearings ② with the slot in each bearing bore of the lower crankcase. Press bearing inserts firmly into place.



3. Apply Polaris PS-4 engine oil to the new bearings installed in the lower crankcase half.
4. Clean crankcase mating surfaces to remove any oil.
5. Apply a thin, continuous film of Crankcase Sealant (PN 2871557) to upper crankcase mating surface ③. Do not allow sealant to dry before assembly.

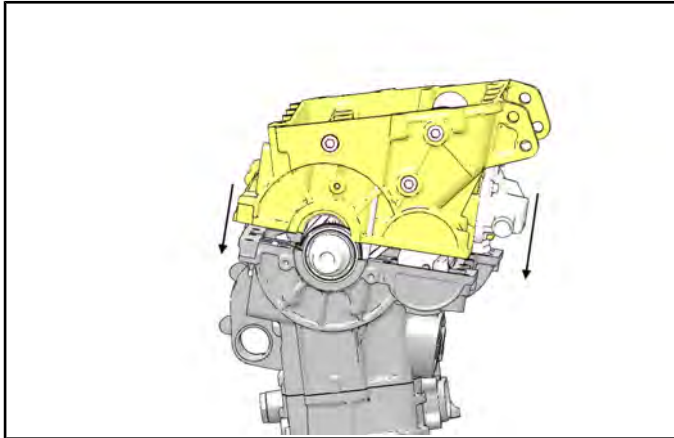


**NOTE:** DO NOT block oil passages ④ with crankcase sealant.

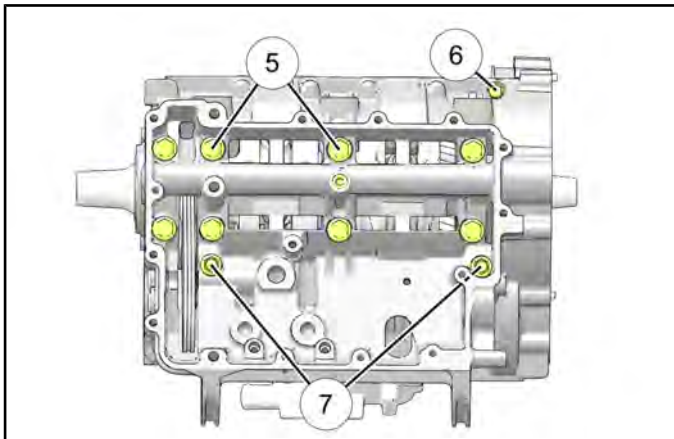


## ENGINE / COOLING SYSTEM

- Carefully place lower crankcase on upper case, making sure the oil pump drive chain is fed through the lower crankcase.

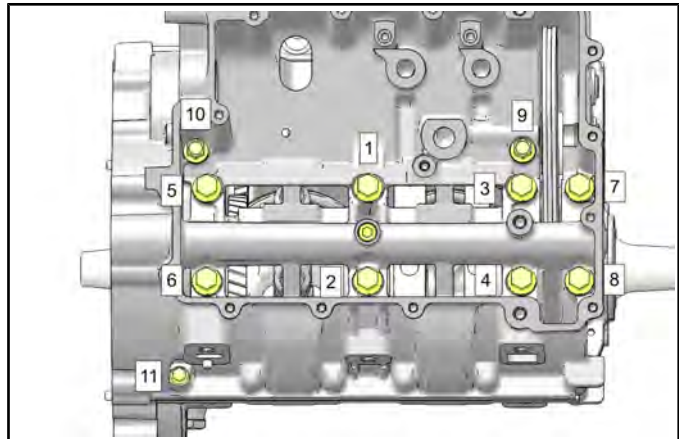


- Tap lower crankcase with a rubber hammer to seat the case halves together.
- Inspect crankcase mating surfaces to be sure they are joined properly. Investigate the cause of any gaps.
- Install the eight M10 (5), one M6 (6) and two M8 (7) lower crankcase bolts. Tighten all bolts lightly by hand.



**NOTE:** Install new M10 lower crankcase bolts.

- Torque lower crankcase bolts in sequence to specification. Repeat sequence to verify final torque.



Lower Crankcase Bolts:

*M10 Bolts:*

**Torque in sequence**

**Step 1: 9 ft-lb (12 Nm)**

**Step 2: 21 ft-lb (28 Nm)**

**Step 3: Tighten add'n 90°**

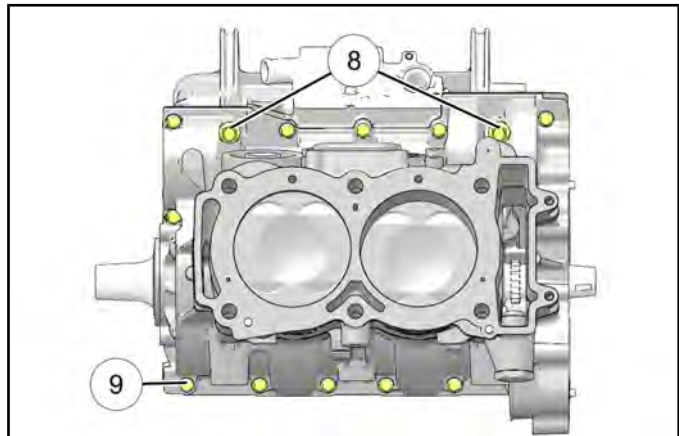
*M8 Bolts:*

**26 ft-lb (35 Nm)**

*M6 Bolts:*

**9 ft-lb (12 Nm)**

- Rotate the engine so the cylinder is facing up.
- Install the two M8 (8) and eleven M6 (9) upper crankcase bolts. Tighten all bolts lightly by hand.

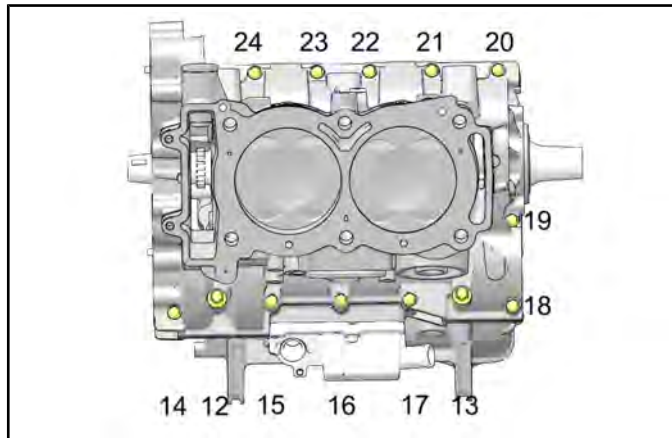


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## ENGINE / COOLING SYSTEM

13. Torque the upper crankcase bolts in sequence to specification (start with #12). Repeat the sequence to verify final torque.

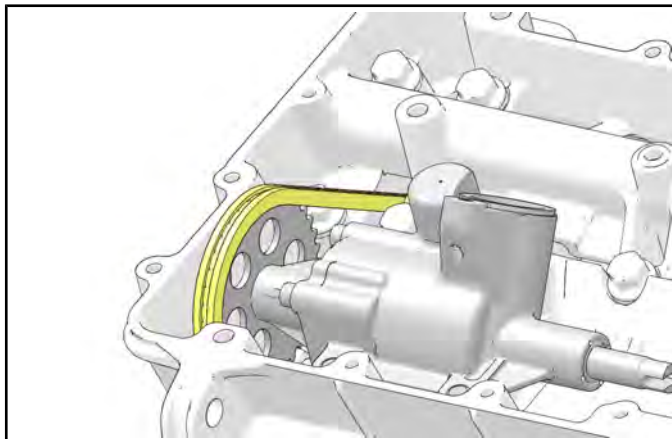


Upper Crankcase Bolts:

*M8 Bolts:*  
**26 ft-lb (35 Nm)**

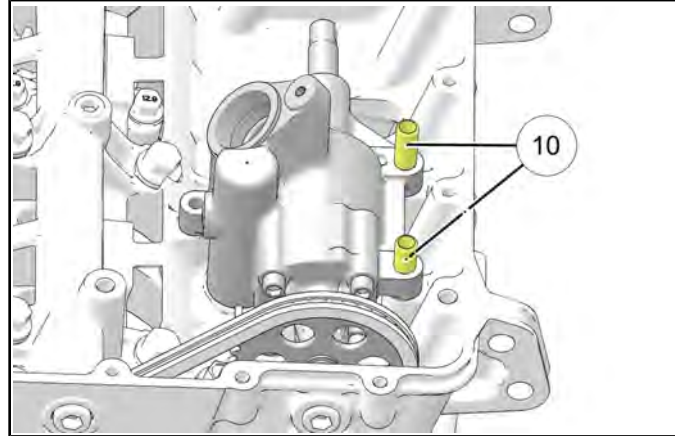
*M6 Bolts:*  
**9 ft-lb (12 Nm)**

14. Rotate the engine so the cylinder is facing down.  
15. Install a new seal on the oil pump.  
16. Lift the oil pump drive chain and install the oil pump.

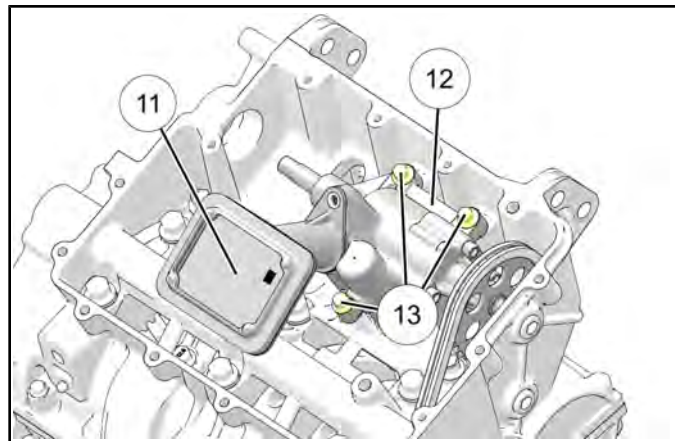


Oil Pump Mounting Bolts:  
**7 ft-lbs (10 Nm)**

17. Install dowel pins <sup>ⓐ</sup> into oil pump mounting holes.



18. Install the three bolts <sup>ⓑ</sup> that retain oil pump <sup>ⓐ</sup> to the crankcase. Torque mounting bolts to specification.



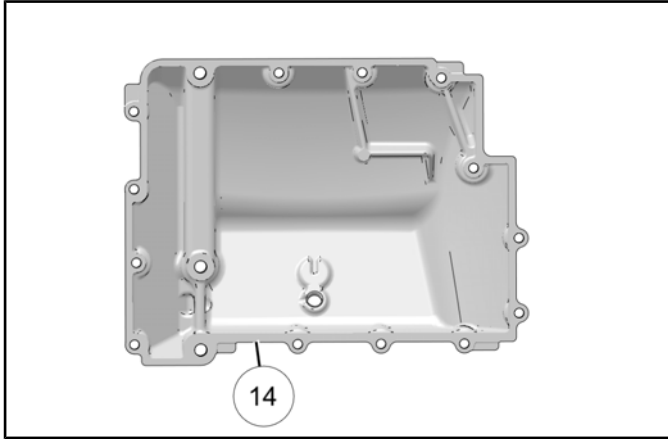
Oil Pump Pick-Up Retaining Screws:  
**7 ft-lb (10 Nm)**

19. Reinstall oil pump pick-up <sup>ⓐ</sup> if previously removed. Torque mounting screws to specification.

**NOTE: Gasket surfaces must be DRY and oil free. Use care upon assembly to keep oil away.**

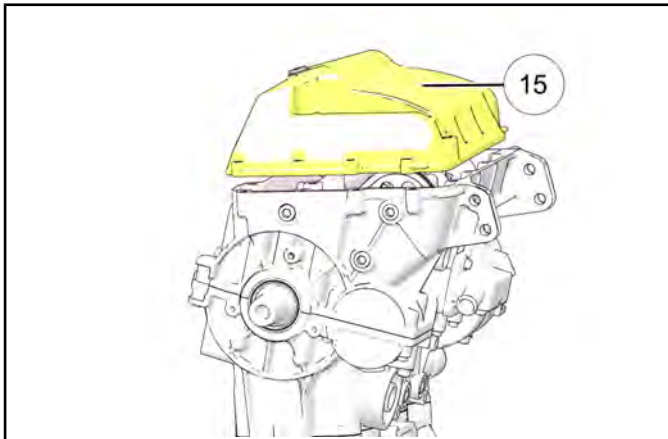
## ENGINE / COOLING SYSTEM

21. Apply a thin, continuous film of Crankcase Sealant (PN 2871557) to sump cover mating surface <sup>14</sup>. Do not allow sealant to dry before assembly.

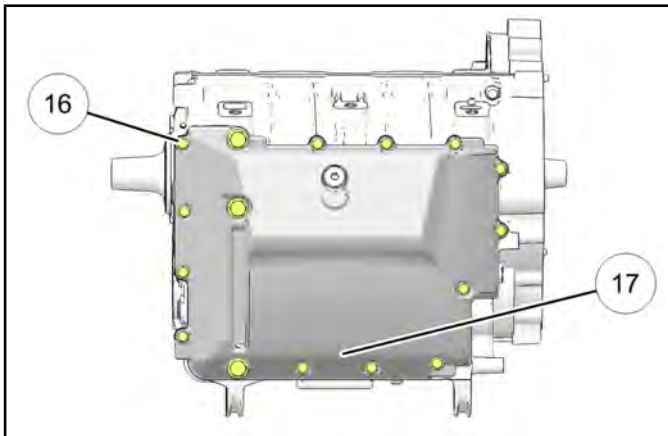


**NOTE:** Dipstick must be removed before oil pan is assembled to the engine. Failure to do this will damage the dipstick.

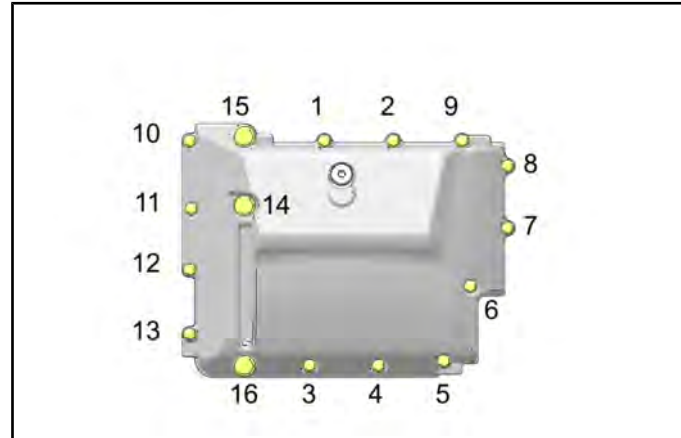
22. Install the oil sump cover <sup>15</sup> onto the crankcase.



23. Install the thirteen M6 <sup>16</sup> and three M8 bolts that retain the oil sump cover <sup>17</sup> to the crankcase.



24. Torque the oil sump cover bolts in sequence to specification. Repeat the sequence to verify final torque.



Oil Sump Cover Bolts:

*M6 Bolts:*  
**9 ft-lb (12 Nm)**

*M8 Bolts:*  
**26 ft-lb (35 Nm)**

25. Reinstall the crankcase drain plug if previously removed. Torque drain plug to specification.

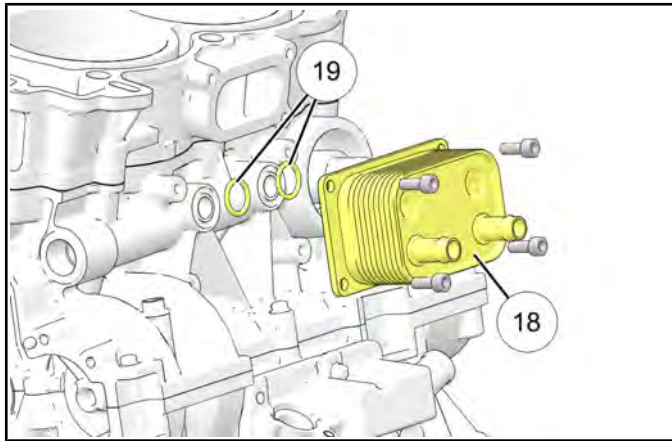


Crankcase Drain Plug:  
**11 ft-lbs (15 Nm)**

26. Rotate the engine so the cylinder is facing up.

## ENGINE / COOLING SYSTEM

27. Reinstall the oil cooler <sup>⑱</sup>, if previously removed. Use *new O-rings* upon installation <sup>⑱</sup>.



28. Torque oil cooler retaining bolts to specification.



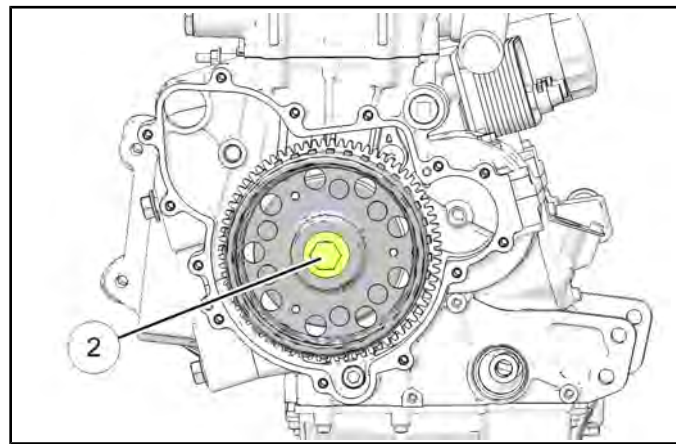
Oil Cooler Retaining Bolts:  
**7 ft-lb (10 Nm)**

29. Proceed to Flywheel Installation, page 3.72 and then Cylinder Head Installation, page 3.76.

### Flywheel Installation

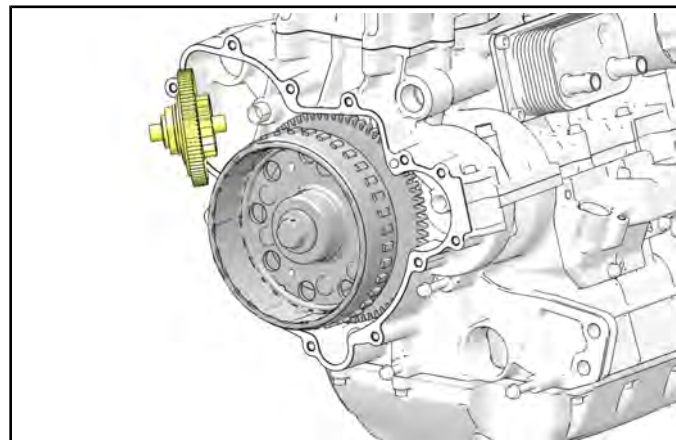
1. If previously removed, reinstall the flywheel key.
2. Clean taper of crankshaft to remove all oil or grease.
3. Clean flywheel taper to remove all oil or grease.
4. Align flywheel key-way with key and install the flywheel, seating it fully on taper.
5. Install flywheel retaining bolt. Using a commercially available strap wrench, hold the flywheel and torque the flywheel retaining bolt <sup>⑳</sup> to specification.

**NOTE:** If the Cylinder Holding & Camshaft Timing Plate (PU-50563) is installed, remove it before tightening the flywheel.



Flywheel Retaining Bolt:  
**133 ft-lbs (180 Nm)**

6. Install the starter torque limit gear as an assembly.



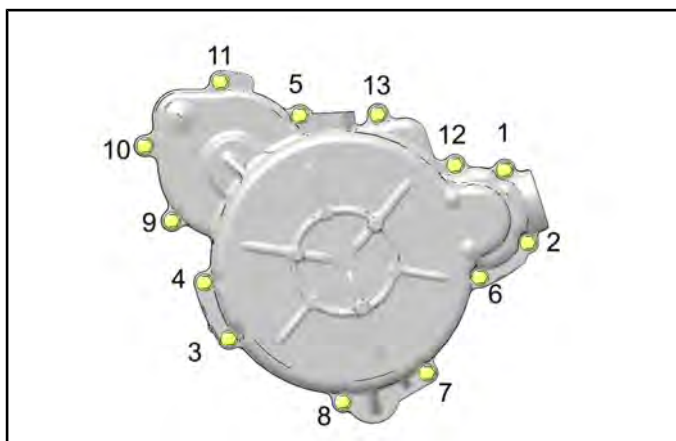
## Stator Cover Installation

1. Apply gasket tack adhesive to help hold gasket in place during assembly.
2. Install a new stator cover gasket over alignment pins.

 **CAUTION**

The flywheel contains powerful magnets. Use caution when removing and installing the stator cover. **DO NOT** place fingers between cover and crankcase at any time during the removal / installation process or injury could result.

3. Install stator cover and thirteen screws. Torque screws in sequence to specification.



Stator Cover Screws:  
**9 ft-lb (12 Nm)**

# ENGINE / COOLING SYSTEM

## ENGINE ASSEMBLY - TOP END

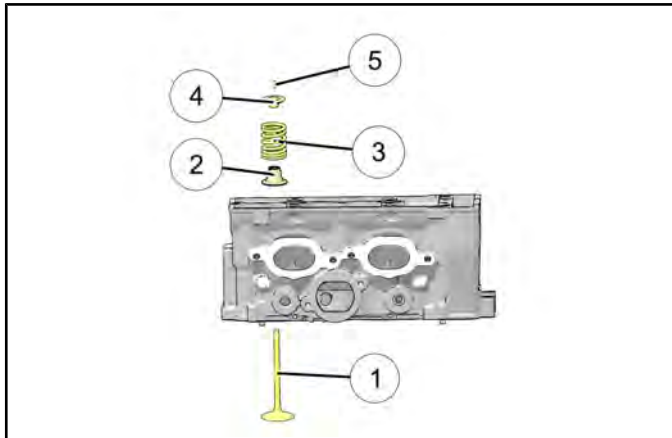
### Cylinder Head Assembly

**NOTE:** Assemble the valves one at a time to maintain proper order.

 **WARNING**

Wear eye protection during cylinder head disassembly and reassembly or when working with the valve springs.

1. Apply engine oil to valve guides and seats.
2. Coat valve stem with Premium Starter Grease (2871460).
3. Install the valve ① in the cylinder head, through the guide.

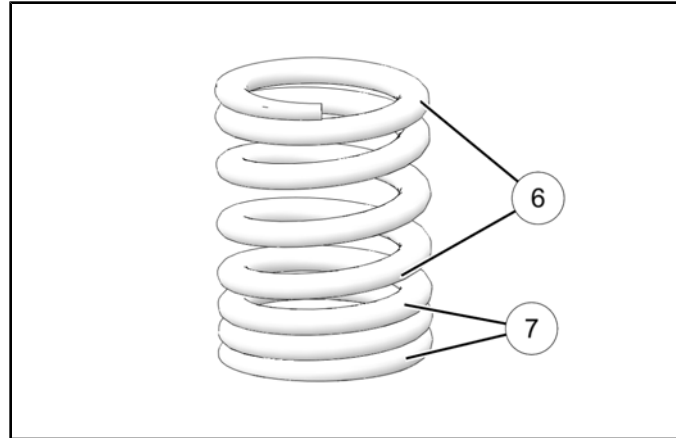


4. Carefully install a new valve seal / seat ② on the valve guide with a rotating motion. Push firmly until seated in retaining groove and square with the guide

**NOTE:** Valve seals should be installed AFTER the valves are in the head to avoid valve seal damage.

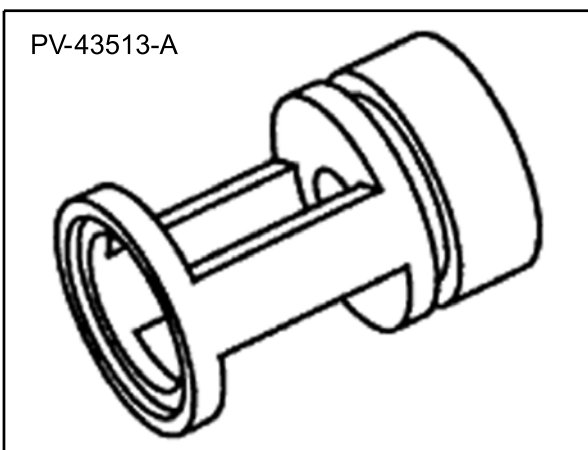
5. Dip the valve spring ③ and retainer ④ in clean engine oil.

6. Install the valve spring with widely spaced coils ⑥ on the top and tightly spaced coils ⑦ facing down toward the cylinder head.



**NOTE:** Valve springs to be installed with paint mark facing up.

7. Place the valve retainer on the spring.
8. Compress the valve spring by hand using valve spring compressor adapter (PV-43513-A). Compress spring only enough to allow split keeper installation.

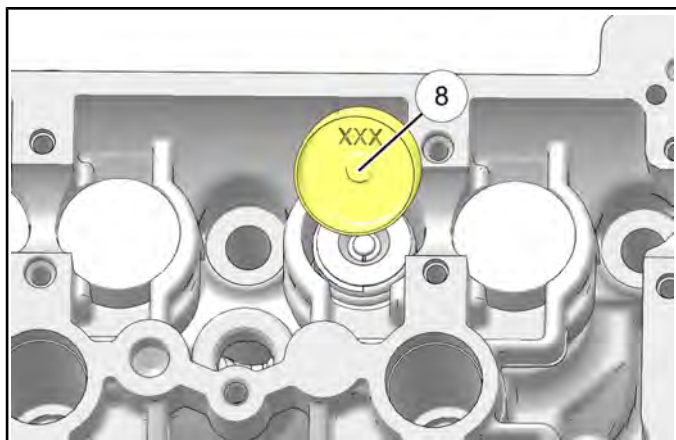


**NOTE:** To prevent damage to the valve seals, do not compress the valve spring more than necessary to install the keepers.

9. Install split keepers with gap even on both sides.
10. Repeat this procedure for remaining valves.



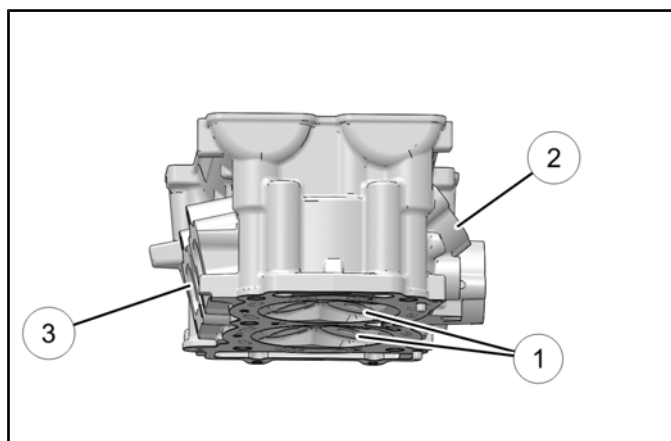
11. Install the valve tappet ⑧ for each valve in the order they were removed.



**NOTE:** Oil the tappet prior to installing.  
If any valve train components were replaced,  
refer to **Valve Clearance Adjustment**, page 3.82.

### Valve Sealing Test

1. Clean and dry the combustion chamber area ①.
2. Pour a small amount of clean solvent into each intake port ② and check for leakage around the valves. The valve seats should hold fluid with no seepage.
3. Repeat for exhaust valves by pouring fluid into each exhaust port ③.



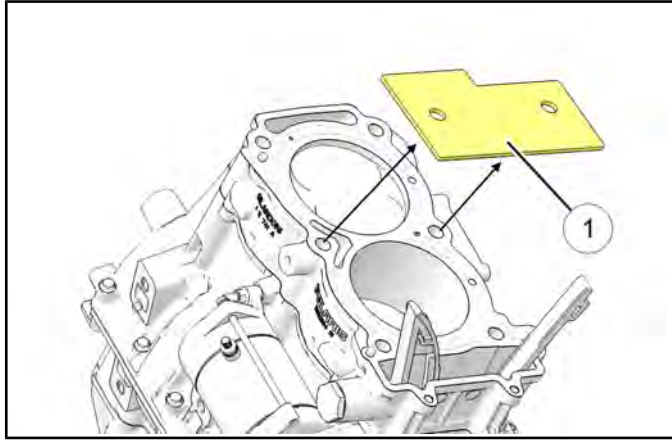
3



# ENGINE / COOLING SYSTEM

## Cylinder Head Installation

1. If necessary, rotate the engine so the cylinder is facing up.
2. If installed, remove the Cylinder Holding & Camshaft Timing Plate ① from the cylinder.



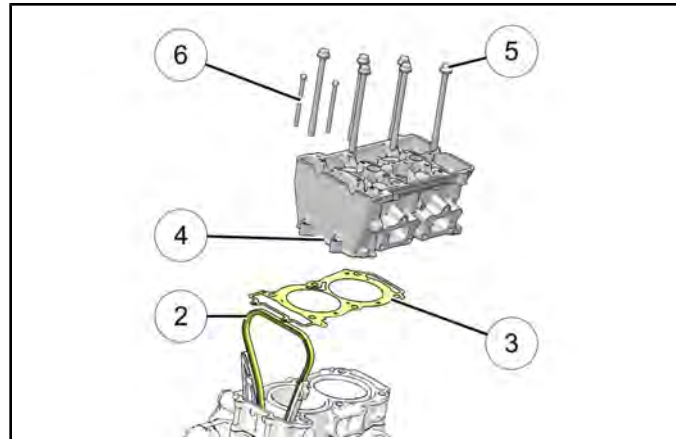
**NOTE:** Once the cylinder head is removed, nothing retains the cylinder to the engine. **DO NOT** rotate the engine without using the Cylinder Holding & Camshaft Timing Plate (PU-50563).

3. Prepare cylinder head gasket sealing surfaces by cleaning thoroughly to remove all residue. The head gasket must be installed clean and dry, free from oil or grease.

**NOTE:** Do not touch sealing surfaces of gasket.

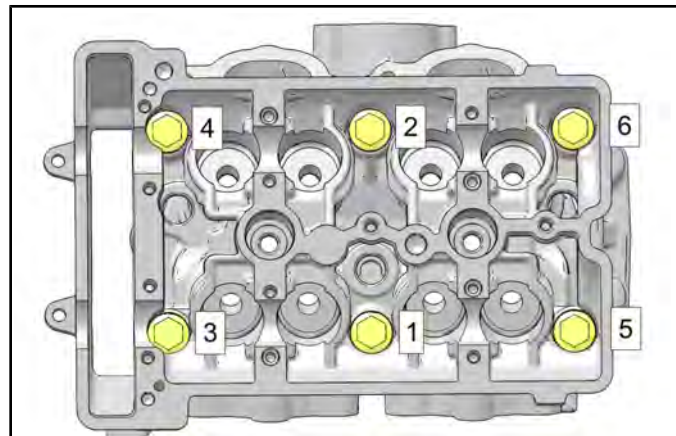
4. Guide cam chain ② through a new head gasket ③ and install the gasket on the cylinder, locating it on the alignment pins.
5. Carefully set the cylinder head ④ in place on alignment pins.
6. Install *new bolts* and finger tighten the six cylinder head bolts ⑤ evenly.

7. Install and finger tighten the two outer M6 bolts ⑥ evenly.



**NOTE:** Install new cylinder head bolts.

8. Torque cylinder head bolts in sequence to specification.



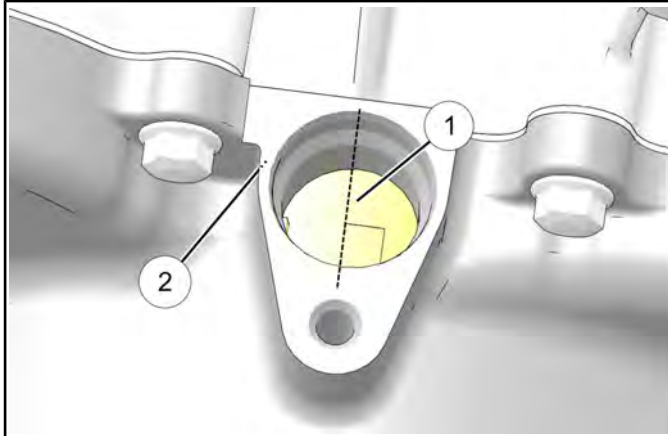
Cylinder Head Torque Procedure:

**Torque in sequence**  
**Step 1: 9 ft-lbs (12 Nm)**  
**Step 2: 26 ft-lb (35 Nm)**  
**Step 3: Additional 180°**  
**Step 4: M6 bolts: 7 ft-lb (10 Nm)**

### Camshaft Installation / Timing

**NOTE:** If any valve train components were replaced, refer to “Valve Clearance Adjustment” procedure prior to “Camshaft Installation / Timing”.

1. Rotate the engine until the flywheel Top Dead Center (TDC) mark ① is aligned or centered in the Crankshaft Position Sensor (CPS) mounting hole ②. This places the PTO cylinder at TDC for camshaft installation.



**NOTE:** DO NOT use the “V” mark located on the flywheel opposite of the “I” mark. Only the “I” mark should be used as a TDC reference.

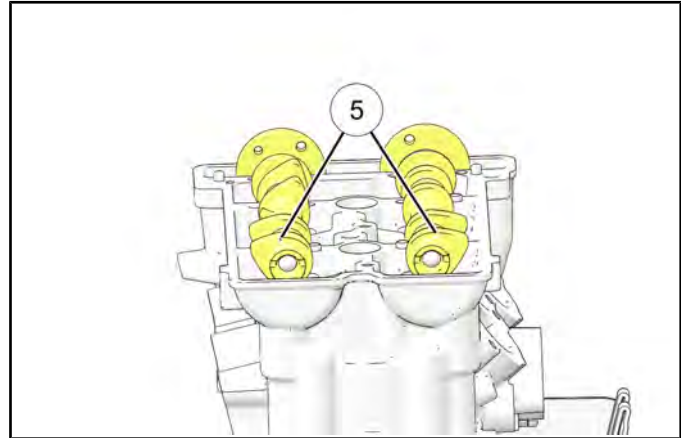
2. Reference the intake and exhaust markings made during disassembly. If installing new camshafts or if camshafts were not marked, you can reference the part number stamped on the end of the shafts.

**Intake Camshaft - PN 1204583**

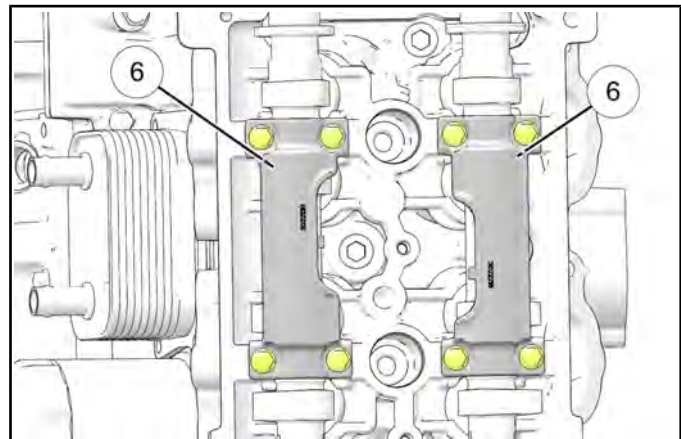
**Exhaust Camshaft - PN 1204584**

3. Lubricate all camshaft lobes and bearing journal surfaces with Polaris PS-4 engine oil prior to installation.

4. Carefully install the camshafts into the cylinder head. The PTO camshaft lobes ⑤ should face out as shown.

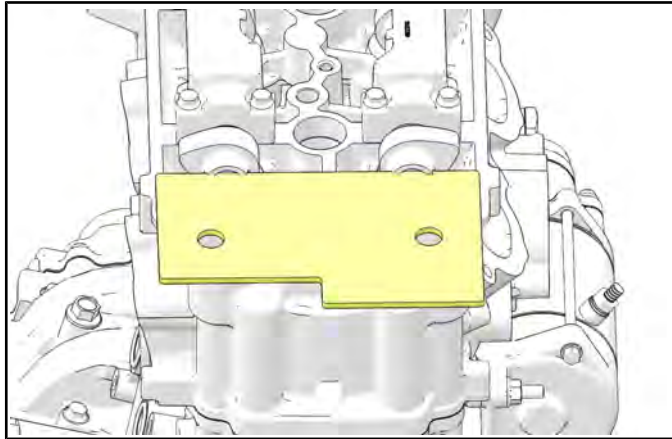


5. Carefully install the rear camshaft carriers onto the camshafts. Carrier openings should face each other when installed properly.
6. Install the four bolts that retain each rear camshaft carrier ⑥ and tighten the bolts evenly until snug.

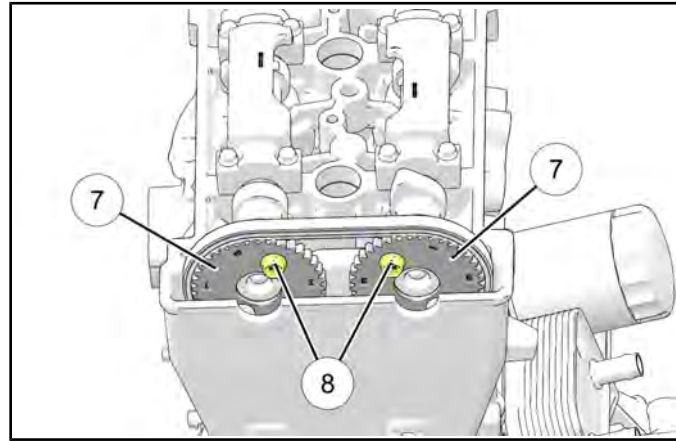


## ENGINE / COOLING SYSTEM

7. Install the Cylinder Holding & Camshaft Timing Plate (PU-50563) into the end of camshafts as shown. Use an open-end wrench to rotate camshafts slightly if needed.



12. Use *new* camshaft sprocket retaining bolts upon assembly. Install the top bolt ⑧ in each camshaft sprocket ⑦. Do not torque the bolts at this time.



8. Verify TDC mark on the flywheel is still properly aligned (see Step 1).
9. Pull cam chain upward, making sure it is engaged with the drive sprocket on the crankshaft.
10. While lifting the cam chain up, engage the cam sprockets into the chain with the "I" and "E" marks facing out.
11. Install the sprockets onto the camshafts and align the sprocket marks with the valve cover gasket surface (see sprocket timing illustration).

**NOTE:** Intake cam sprocket should have "I" marks aligned with gasket surface and the exhaust cam sprocket should have "E" marks aligned with gasket surface.

**Install the exhaust cam sprocket first (opposite the cam chain tensioner) to ensure proper cam timing.**

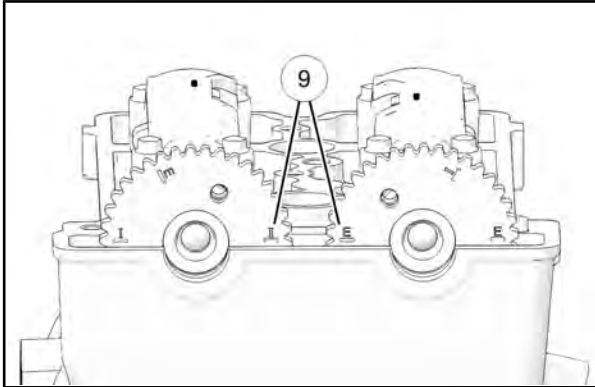
**NOTE:** Use new sprocket retaining bolts upon assembly.

## ENGINE / COOLING SYSTEM

13. Verify cam timing is correct. Flywheel TDC mark should still be aligned (see Step 1) and cam sprocket markings should line up as shown.

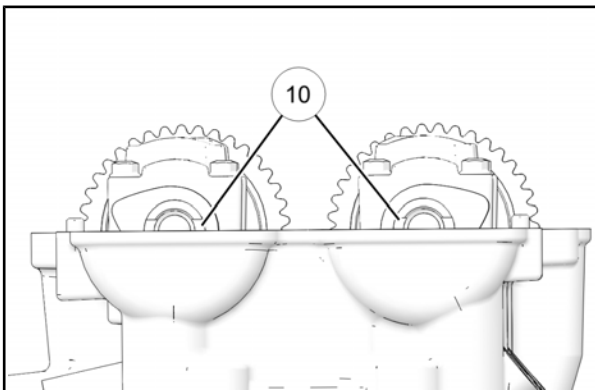
### Timing View for Sprockets

For correct sprocket orientation, insure the "I" for intake on cam 1204052 and the "E" for exhaust on cam 1204053 are positioned as shown ⑨. View from mag side.



### Timing View for Camshafts

Align slot of both cams with the top deck of the head ⑩. Position 4mm thick flat bar through slots to lock cams in correct position.



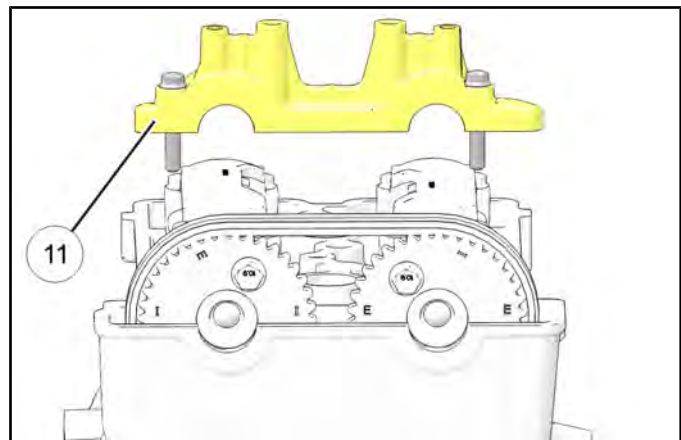
14. If timing marks are not aligned, remove sprockets and correct alignment.
15. Remove the Cylinder Holding & Camshaft Timing Plate (PU-50563) from the end of the camshafts.
16. Apply Polaris PS-4 engine oil to the cam chain tensioner bore prior to assembly.

17. Rotate the engine using the flywheel and install the remaining bolt in each camshaft sprocket. Hold camshafts in place with an open-end wrench and torque the sprocket bolts to specification.

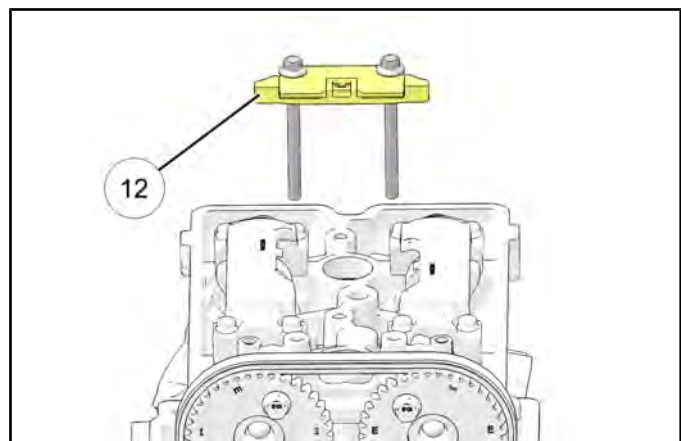


Camshaft Sprocket Bolts:  
**11 ft-lb (15 Nm)**

18. Rotate the engine using the flywheel and torque the remaining sprocket bolts to specification.
19. Install the front camshaft carrier ⑪ and two outer retaining bolts.



20. Install the fixed cam chain guide ⑫ and two retaining bolts.

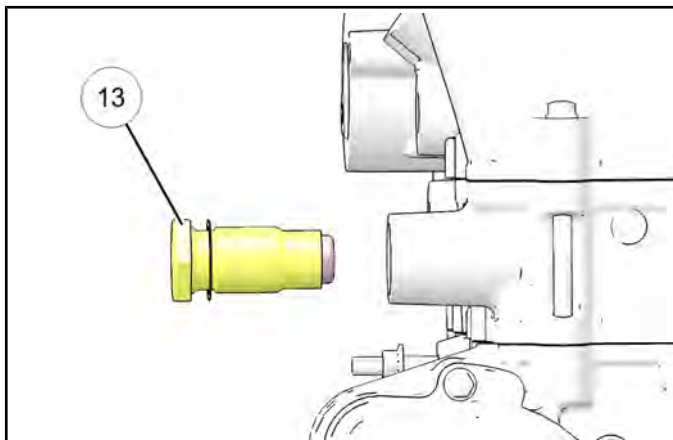


3

## ENGINE / COOLING SYSTEM

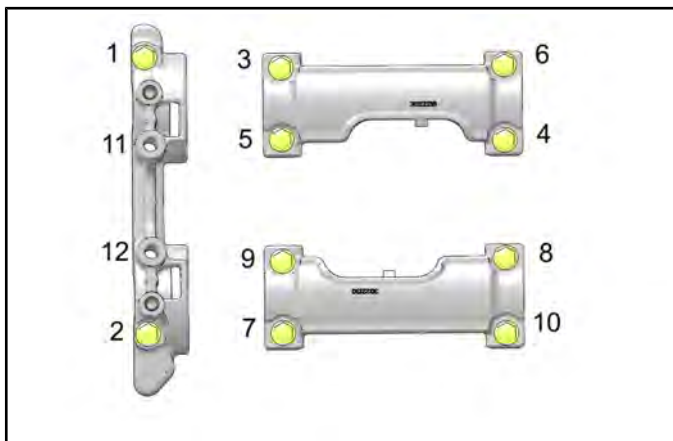
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21. Using a *new* gasket, install the hydraulic cam chain tensioner <sup>13</sup> into the cylinder and torque to specification.



Cam Chain Tensioner:  
**29 ft-lb (40 Nm)**

22. Torque the camshaft carrier bolts in sequence to specification.

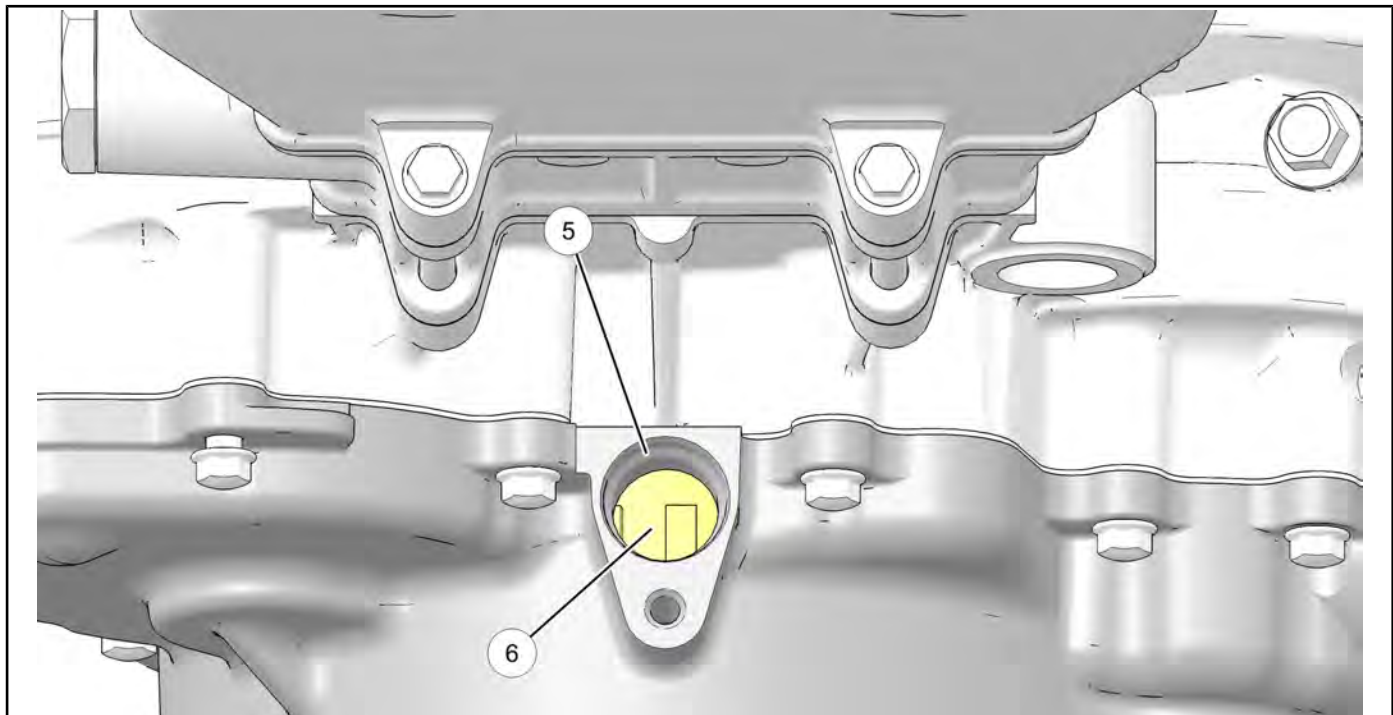
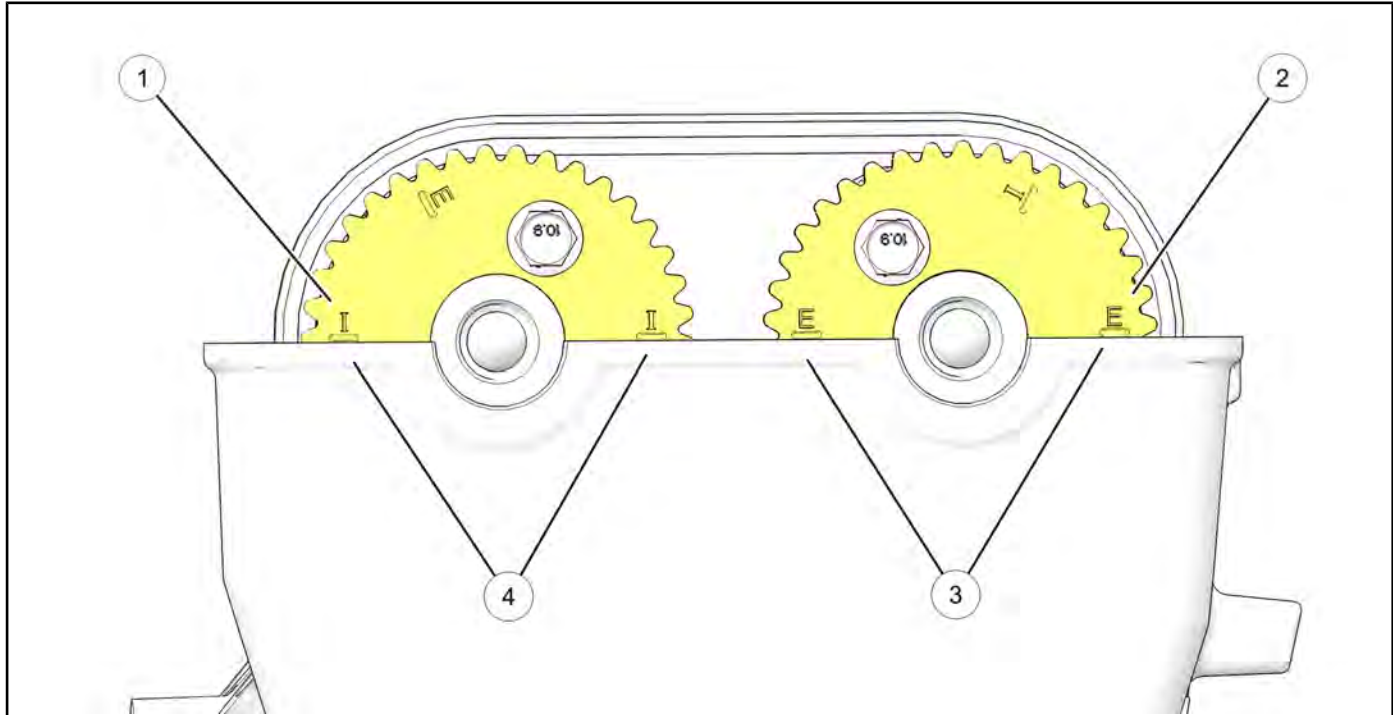


Camshaft Carrier Bolts:  
**7 ft-lb (10 Nm)**

23. Rotate crankshaft through two revolutions and verify camshaft timing is correct.



## Camshaft Timing - Quick Reference



① Intake Cam	④ Align Exhaust Marks With Surface
② Exhaust Cam	⑤ CPS Mounting Hole
③ Align Intake Marks With Surface	⑥ Align Flywheel Mark in Mounting Hole

3



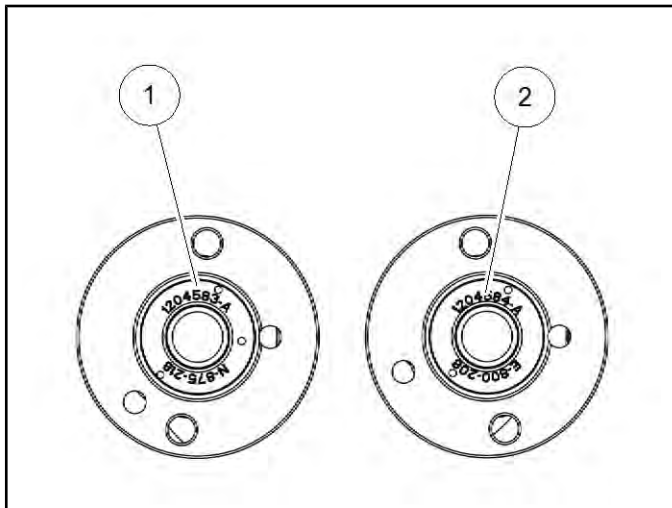
# ENGINE / COOLING SYSTEM

## Valve Clearance Adjustment

**IMPORTANT:** Do not rotate the engine backwards. The timing chain may jump teeth and lead to poor performance.

**NOTE:** Always inspect valve clearance prior to camshaft installation or final engine assembly.

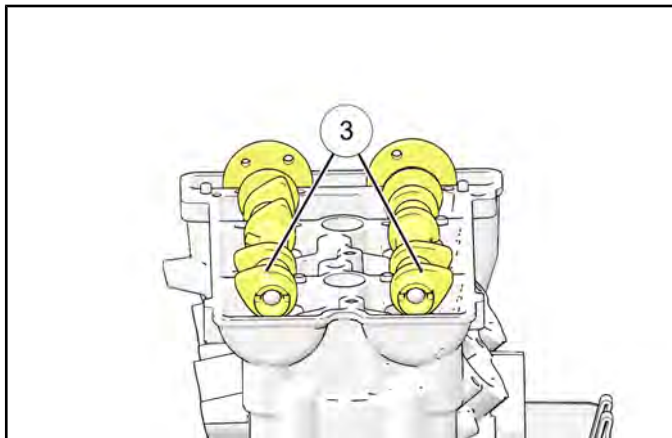
1. Reference the camshaft intake and exhaust markings made during disassembly. If installing new camshafts or if camshafts were not marked, you can reference the part number stamped on the end of the shafts.



**Intake Camshaft ① - PN 1204583**

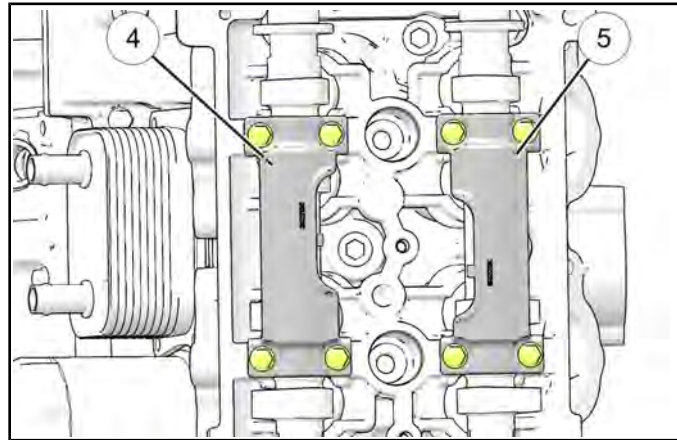
**Exhaust Camshaft ② - PN 1204584**

2. Lubricate the camshaft bearing journal surfaces with Polaris PS-4 engine oil prior to installation.
3. Carefully install the camshafts into the cylinder head. The PTO camshaft lobes ③ should face out as shown.



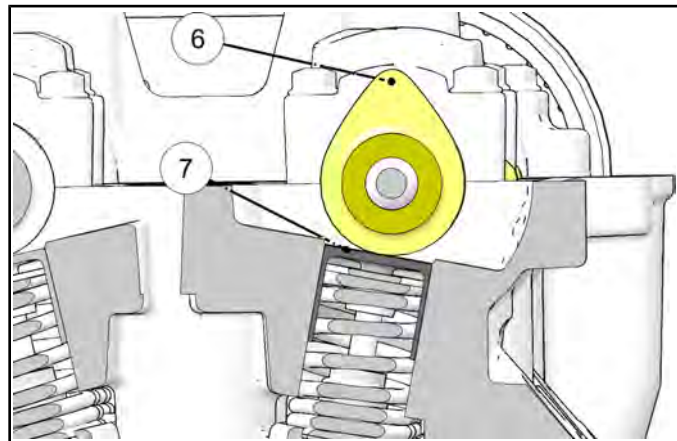
4. Carefully install the rear camshaft carriers onto the camshafts. Carrier openings should face each other when installed properly.

5. Install the four bolts that retain each rear camshaft carrier ④ & ⑤ and tighten the bolts evenly to specification.

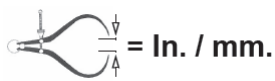


**Camshaft Carrier Bolts:  
89 in-lbs (10 Nm)**

6. Rotate the camshaft until the cam lobes above the valves you are inspecting are facing up ⑥.



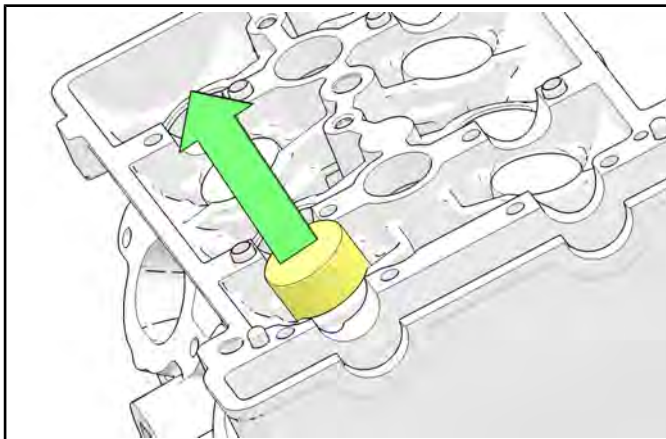
7. Measure the valve clearance  $\textcircled{7}$  using a thickness (feeler) gauge. Record the measurement if clearance is out of specification.


<p>Intake Valve Clearance (cold):  <math>0.006 \pm .002"</math> (<math>0.15 \pm 0.05</math> mm)</p> <p>Exhaust Valve Clearance (cold):  <math>0.008 \pm .002"</math> (<math>0.20 \pm 0.05</math> mm)</p>

8. Repeat steps 6 and 7 until all eight valves have been inspected.
9. If any of the valve clearance measurements are out of specification, remove the camshaft carriers and camshafts and proceed with this procedure.

**NOTE:** If all valve clearance measurements are within specification, remove the camshaft carriers and proceed to **Camshaft Installation / Timing**, page 3.77.

10. Remove the valve tappet from a valve that was out of specification.

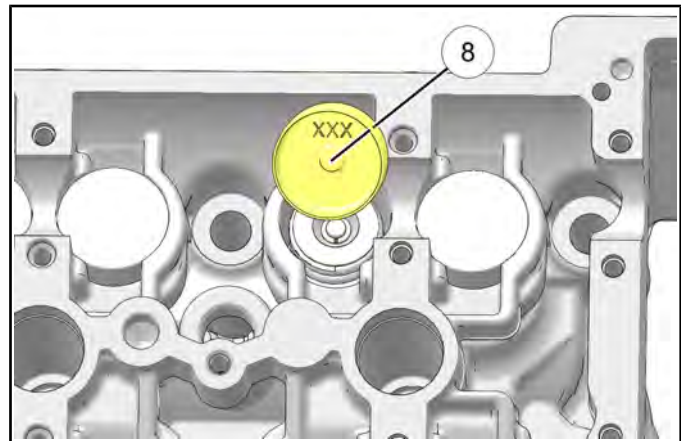


**NOTE:** Keep mated parts together and in order with respect to their location in the cylinder head for assembly purposes. Mark each component or place them in an organized rack as you remove them.

### CAUTION

If performing this procedure with the cylinder head installed on the engine, cover the spark plug holes and the cam chain opening to prevent a valve adjustment shim from falling into the cylinder or crankcase.

11. Record the 3 digit number on the bottom of the tappet  $\textcircled{8}$ .



12. Reference the valve clearance measurement recorded for that valve, along with the 3-digit tappet number.
13. Refer to the appropriate tappet selection matrix (Intake or Exhaust) on the following pages and select the proper tappet.
14. Install the appropriate tappet.

**NOTE:** Lubricate the outer portion of the valve bucket upon installation.

15. Repeat steps 10-14 until all necessary valves have been adjusted.
16. Reinstall the camshafts and camshaft carriers and tighten the bolts evenly to specification.



Camshaft Carrier Bolts:  
**89 in-lbs (10 Nm)**

17. Measure and confirm that valve clearance is now within specification for each valve.
18. If valve clearance is not within specification, repeat this procedure.
19. If all valve clearance measurements are now within specification, remove the camshaft carriers and proceed to **Camshaft Installation / Timing**, page 3.77.

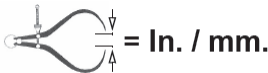


# ENGINE / COOLING SYSTEM

### Exhaust Valve Lash - Shim Selection Matrix

**Example:**

Tappet Thickness: Example 440 equals thickness of 4.40 mm. Part Number: 5138477-XXX (X's represent 3 digits on tappet)



Exhaust Valve Clearance (cold):  
0.008 ± .002" (0.200 ± .50 mm)

		Existing Valve Lash Tappet Marking (3 digits on tappet)																																			
		440	442	445	448	450	452	455	458	460	462	465	468	470	472	475	478	480	482	485	488	490	492	495	498	500	502	505	508	510	512	515	518	520	522	525	
		Correct Valve Lash Tappet Marking (3 digits on tappet)																																			
Exhaust Valve Clearance Before Adjusting (mm)	0.000-0.024	420	422	425	428	430	432	435	438	440	442	445	448	450	452	455	458	460	462	465	468	470	472	475	478	480	482	485	488	490	492	495	498	500	502	505	
	0.025-0.049	422	425	428	430	432	435	438	440	442	445	448	450	452	455	458	460	462	465	468	470	472	475	478	480	482	485	488	490	492	495	498	500	502	505	508	
	0.050-0.074	425	428	430	432	435	438	440	442	445	448	450	452	455	458	460	462	465	468	470	472	475	478	480	482	485	488	490	492	495	498	500	502	505	508	510	
	0.075-0.099	428	430	432	435	438	440	442	445	448	450	452	455	458	460	462	465	468	470	472	475	478	480	482	485	488	490	492	495	498	500	502	505	508	510	512	
	0.100-0.124	430	432	435	438	440	442	445	448	450	452	455	458	460	462	465	468	470	472	475	478	480	482	485	488	490	492	495	498	500	502	505	508	510	512	515	
	0.125-0.149	432	435	438	440	442	445	448	450	452	455	458	460	462	465	468	470	472	475	478	480	482	485	488	490	492	495	498	500	502	505	508	510	512	515	518	
	0.150-0.174	435	438	440	442	445	448	450	452	455	458	460	462	465	468	470	472	475	478	480	482	485	488	490	492	495	498	500	502	505	508	510	512	515	518	520	
	0.175-0.199	438	440	442	445	448	450	452	455	458	460	462	465	468	470	472	475	478	480	482	485	488	490	492	495	498	500	502	505	508	510	512	515	518	520	522	
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## ENGINE / COOLING SYSTEM

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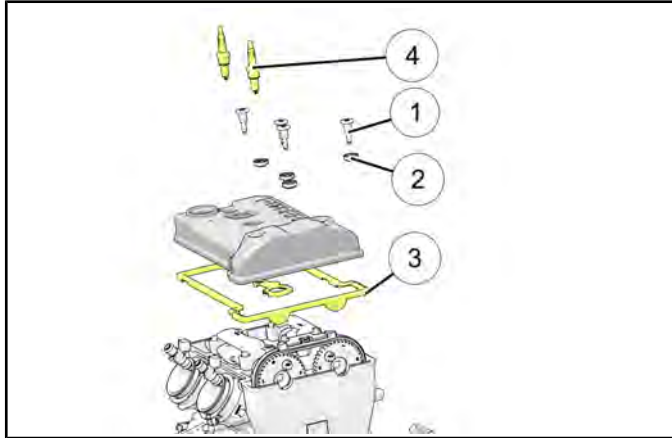
### Valve Cover Installation

1. Apply anti-seize compound to spark plug threads.
2. Install spark plugs ④ and torque to specification.



Spark Plugs:  
**7 ft-lbs (10 Nm)**

3. Prepare valve cover sealing surfaces by cleaning thoroughly to remove all residue.
4. Inspect the valve cover seal ③ and replace if necessary.
5. Replace the isolators ② around each T40 bolt.
6. Install the four valve cover shoulder bolts ① and isolators using a T40 driver.



7. Torque valve cover bolts to specification.



Valve Cover Bolts:  
**7 ft-lbs (10 Nm)**

## TROUBLESHOOTING

### Engine / Cooling System

#### Spark Plug Fouling

- Spark plug cap loose or faulty
- Incorrect spark plug heat range or gap
- PVT system calibrated incorrectly/ components worn or mis-adjusted
- Fuel quality poor (old) or octane too high
- Low compression
- Restricted exhaust
- Weak ignition (loose coil ground, faulty coil, or stator)
- Restricted air filter (main or pre-cleaner) or breather system
- Improperly assembled air intake system
- Restricted engine breather system
- Oil contaminated with fuel

#### Engine Turns Over But Fails To Start

- No fuel
- Dirt in fuel line or filter
- Fuel will not pass through fuel valve
- Fuel pump inoperative/restricted
- Tank vent plugged or pinched
- Engine flooded
- Low compression (high cylinder leakage)
- No spark (Spark plug fouled), ignition component failure

#### Engine Does Not Turn Over

- Dead battery
- Starter motor does not turn
- Engine seized, rusted, or mechanical failure

#### Engine Runs But Will Not Idle

- Restricted fuel supply
- Low compression
- Crankcase breather restricted

#### Engine Idles But Will Not Accelerate

- Spark plug fouled/weak spark
- Obstruction in air intake

- Air box removed (reinstall all intake components)
- Incorrect ignition timing
- Restricted exhaust system
- Cam worn excessively

#### Engine Has Low Power

- Spark plug fouled
- Cylinder, piston, ring, or valve wear or damage (check compression)
- PVT not operating properly
- Restricted exhaust muffler
- Cam worn excessively

#### Piston Failure - Scoring

- Lack of lubrication
- Dirt entering engine through cracks in air filter or ducts
- Engine oil dirty or contaminated

#### Excessive Smoke and Carbon Buildup

- Excessive piston-to-cylinder clearance
- Wet sumping
- Worn rings, piston, or cylinder
- Worn valve guides or seals
- Restricted breather
- Air filter dirty or contaminated

#### Piston Failure - Scoring

- Lack of lubrication
- Dirt entering engine through cracks in air filter or ducts
- Engine oil dirty or contaminated

#### Excessive Smoke and Carbon Buildup

- Excessive piston-to-cylinder clearance
- Wet sumping due to over-full crankcase
- Worn rings, piston, or cylinder
- Worn valve guides or seals
- Restricted breather
- Air filter dirty or contaminated

#### Low Compression



## ENGINE / COOLING SYSTEM

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- Cylinder head gasket leak
- No valve clearance (cam wear)
- Cylinder or piston worn
- Piston rings worn, leaking, broken, or sticking
- Bent valve or stuck valve
- Valve spring broken or weak
- Valve not seating properly (bent or carbon accumulated on sealing surface)
- Rocker arm sticking

### Backfiring

- Fouled spark plug or incorrect plug or plug gap
- Intake system air leaks
- Exhaust system air leaks
- Valve sticking
- Ignition system faulty:
- Spark plug cap cracked / broken
- Ignition coil faulty
- Ignition or kill switch circuit faulty
- Poor connections in ignition system
- Ignition timing incorrect
- Sheared flywheel key

### Overheating

- Low coolant level
- Air in cooling system
- Wrong type/mix of coolant
- Faulty pressure cap or system leaks
- Restricted system (mud or debris in radiator fins causing restriction to air flow, passages blocked in radiator, lines, pump, or water jacket, accident damage)
- Lean mixture (vents, fuel pump or fuel valve)
- Fuel pump output weak
- Electrical malfunction
- Water pump failure/ Loose impeller
- Thermistor failure
- Cooling fan inoperative or turning too slowly (perform current draw test)
- Low oil level
- Spark plug incorrect heat range
- Faulty hot light circuit

- Thermostat stuck closed or not opening completely

### Temperature Too Low

- Thermostat stuck open

### Leak at Water Pump Weep Hole

- Faulty water pump mechanical seal (coolant leak)
- Faulty pump shaft oil seal (oil leak)

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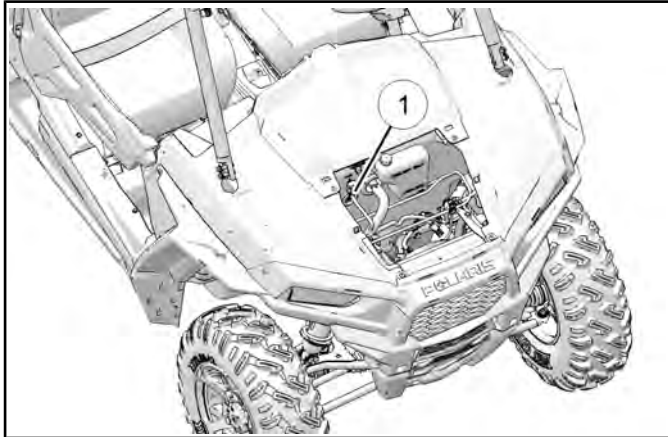
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## GENERAL INFORMATION

### Special Tools

PART NUMBER	TOOL DESCRIPTION
PU-43506-A	Fuel Pressure Gauge Kit
PV-48656	Fuel Pressure Gauge Adapter
PU-47063-B	Digital Wrench Diagnostic Software (includes CD w/ serial number, interface cable, USB serial adapter cable and Smartlink Module Kit)

**Bosch Automotive Service Solutions:**  
1-800-345-2233 or <http://polaris.service-solutions.com/>



### Torque Specifications

CPS Retaining Fastener	9 ft-lb (12 Nm)
ETC Mounting Bolts	7 ft-lb (10 Nm)
Fuel Pump PFA Nut	70 ft-lbs (95 Nm)
Fuel Rail Mounting Screws	7 ft-lb (10 Nm)
Hose Clamp (Ducting)	35 in-lb (4 Nm)
Intake Manifold Mounting Fasteners (lower)	22 ft-lb (30 Nm)
Intake Manifold to Engine Fasteners	17 ft-lb (23 Nm)

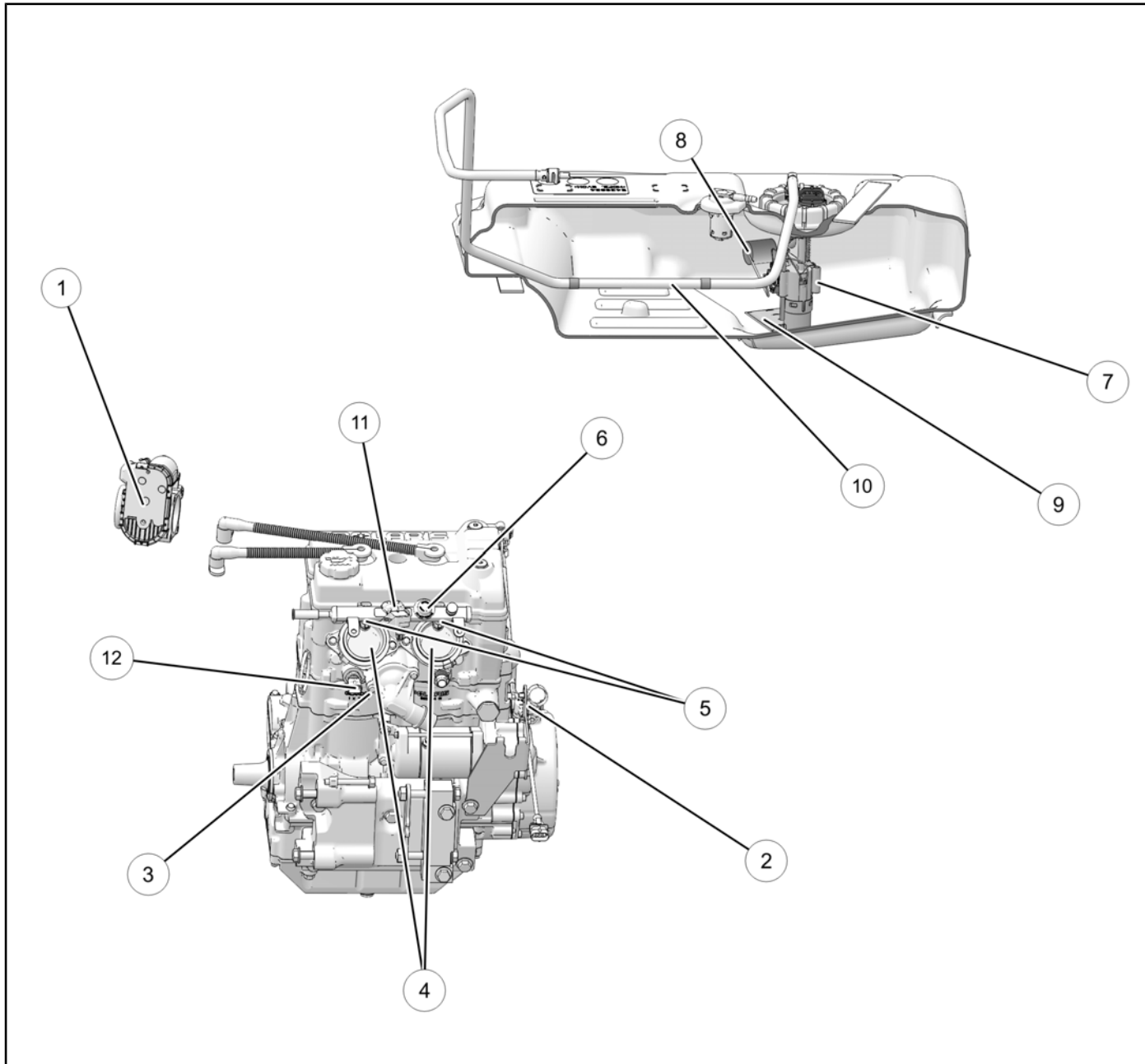
# FUEL SYSTEM

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## EFI Service Notes

- For more convenient and accurate testing of EFI components, it is recommended dealers utilize the Digital Wrench® Diagnostic Software (dealer only). Some testing may be done manually using the procedures provided in this chapter.
- **80% of all EFI problems are caused by wiring harness connections.**
- For the purpose of troubleshooting difficult running issues, a known-good ECU from another RZR of the same model and year may be used without damaging system or engine components.
- Never attempt to service any fuel system component while engine is running or ignition switch is "on."
- Cleanliness is essential and must be maintained at all times when servicing or working on the EFI system. Dirt, even in small quantities, can cause significant problems.
- Do not use compressed air if the system is open. Cover any parts removed and wrap any open joints with plastic if they will remain open for any length of time. New parts should be removed from their protective packaging just prior to installation.
- Clean any connector before opening to prevent dirt from entering the system.
- Although every precaution has been taken to prevent water intrusion failure, avoid direct water or spray contact with system components.
- Do not disconnect or reconnect the wiring harness connector to the control unit or any individual components with the ignition "on." This can send a damaging voltage spike through the ECU.
- Do not allow the battery cables to touch opposing terminals. When connecting battery cables attach the positive (red) cable to positive (+) battery terminal first, followed by negative (black) cable to negative (-) battery terminal.
- Never start the engine when the cables are loose or poorly connected to the battery terminals.
- Never disconnect battery while engine is running.
- Never use a battery boost-pack to start the engine.
- Do not charge battery with key switch "on."
- Always disconnect negative (-) battery cable lead before charging battery.
- Always unplug ECU from the wire harness before performing any welding on the unit.

## Fuel System Assembly View



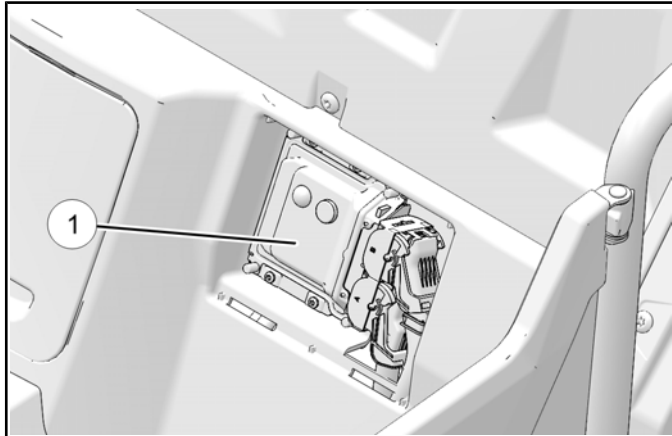
① Electronic Control Unit (ECU)	⑦ Fuel Pump/Regulator
② Crankshaft Position Sensor (CPS)	⑧ Fuel Level Sender
③ Engine Coolant Temperature Sensor (ECT)	⑨ Fuel Filter
④ Throttle Body/Electronic Throttle Control (ETC)	⑩ Fuel Supply Line
⑤ Fuel Injectors	⑪ TMAP Sensor
⑥ Fuel Rail/Regulator	⑫ Engine Coolant Temp Sensor



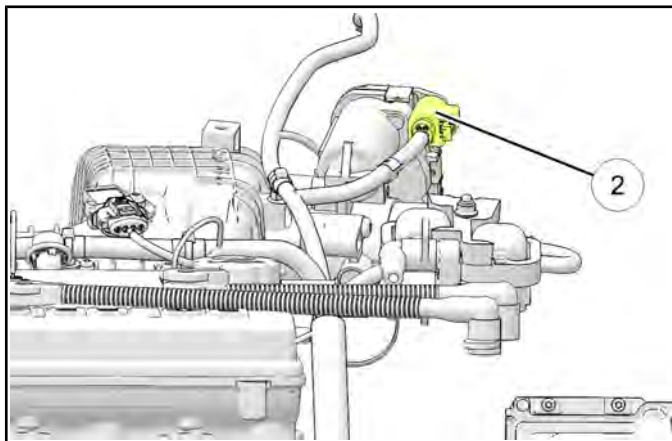
# FUEL SYSTEM

## Fuel System Component Locations

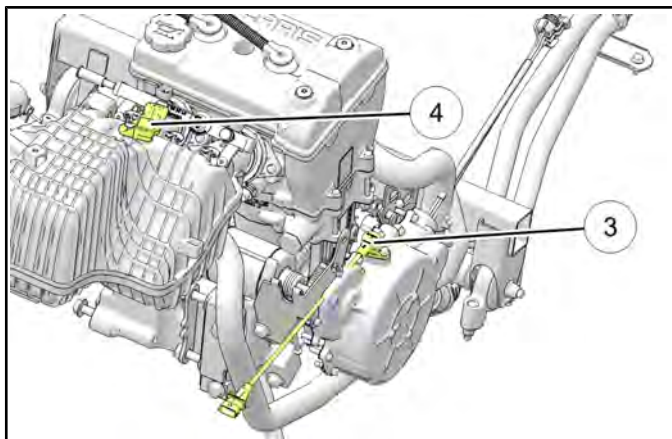
- **Electronic Control Unit (ECU) ①**  
Located behind the driver's seat



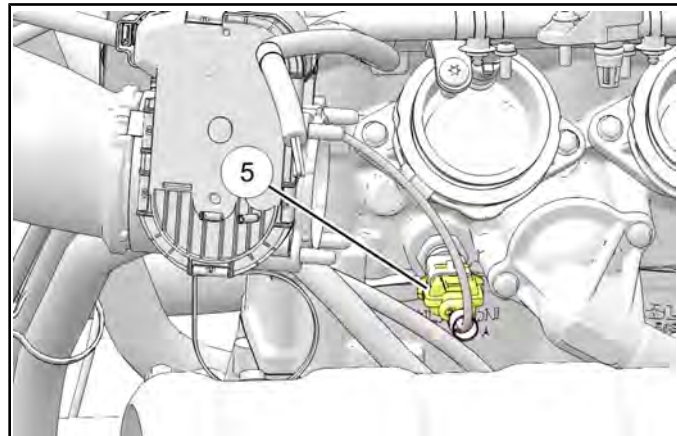
- **Electronic Throttle Control (ETC) ②**  
Located on the throttle body before the intake manifold



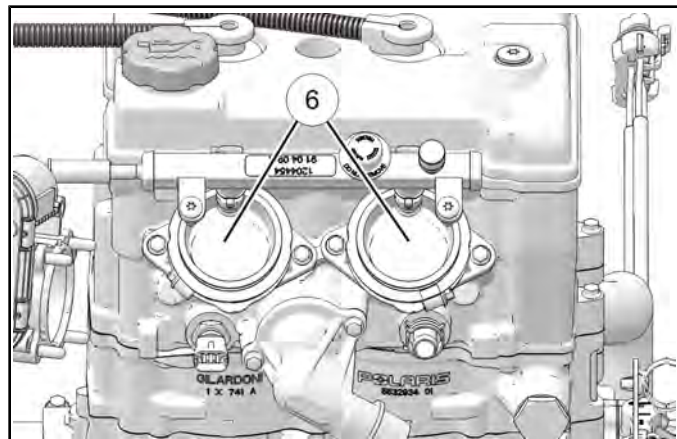
- **Crankshaft Position Sensor (CPS) ③**  
Located on top of the stator cover
- **Temperature and Manifold Absolute Pressure (TMAP) Sensor ④**  
Located on top of the intake manifold



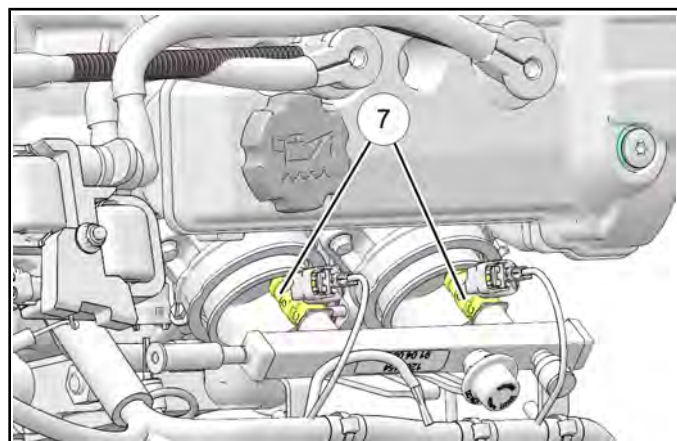
- **Engine Coolant Temperature (ECT) Sensor ⑤**  
Located right by the thermostat housing. The sensor can be accessed by removing the intake manifold.



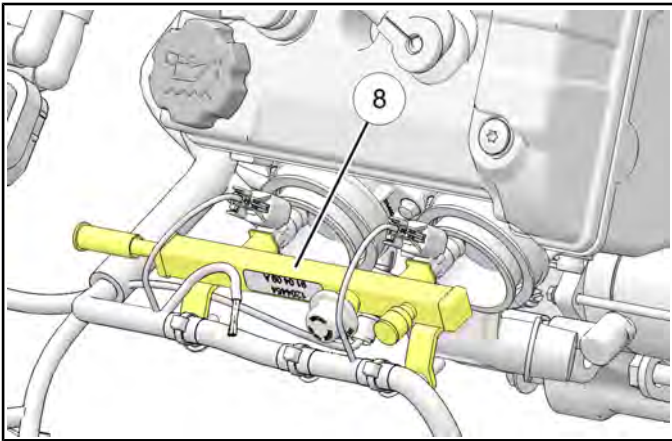
- **Throttle Body Assembly ⑥**  
Located between the intake duct and the intake manifold.



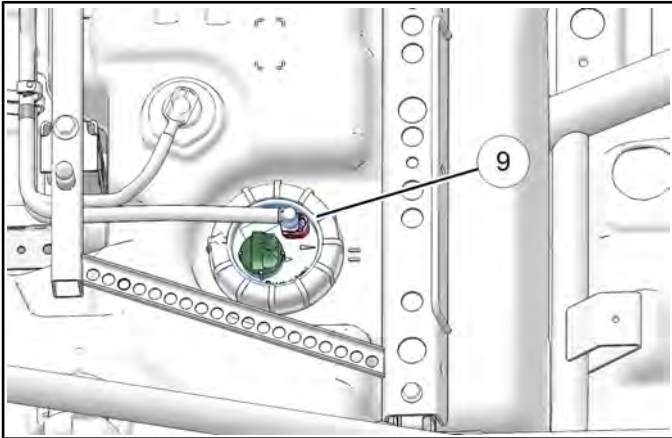
- **Fuel Injectors ⑦**  
Located on the top of the intake manifold, retained by the fuel rail.



- **Fuel Rail** ⑧  
Located on top of the intake manifold.



- **Fuel Pump / Fuel Regulator / Fuel Sender** ⑨  
Located under the passenger seat.



# FUEL SYSTEM

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## ELECTRONIC FUEL INJECTION

### Principal Components

The Electronic Fuel Injection (EFI) system is a complete engine fuel and ignition management design. This system includes the following principal components:

- Check Engine Light
- Crankshaft Position Sensor (CPS)
- Dual Throttle Body / Intake Adapter
- Engine Control Unit (ECU)
- Engine Coolant Temperature Sensor (ECT)
- Fuel Filter(s)
- Fuel Injectors
- Fuel Pressure Regulators
- Fuel Pump
- Fuel Rail
- Fuel Supply/Return Lines
- Idle Air Control Valve (IAC)
- Ignition Coil
- Temperature and Manifold Pressure Sensor (TMAP)
- Wire Harness Assembly

### EFI Operation Overview

The EFI system is designed to provide peak engine performance with optimum fuel efficiency and lowest possible emissions. The ignition and injection functions are electronically controlled, monitored and continually corrected during operation to maintain peak performance.

The central component of the system is the Bosch ME17 Electronic Control Unit (ECU) which manages system operation, determining the best combination of fuel mixture and ignition timing for the current operating conditions.

An electric fuel pump is used to move fuel from the tank, through the fuel supply line, to the fuel rail. Fuel pressure regulators located in the tank and on the end of the fuel rail, maintain system operating pressure and return excess fuel back into the fuel tank. At the engine, fuel fed through the fuel rail supplies fuel to the injectors, which inject into the intake ports. The ECU controls the amount of fuel by varying the length of time that the injectors are "on." This range can vary depending on fuel requirements. The controlled injection of the fuel occurs every other crankshaft revolution, or once for each 4-stroke cycle. When the intake valve opens, the fuel/air mixture is drawn into the combustion chamber, ignited and burned.

The ECU controls the amount of fuel being injected and the ignition timing by monitoring the primary sensor signals for intake air temperature, manifold absolute pressure (load), engine temperature, engine speed (RPM) and throttle position. These primary signals are compared to the programming in the ECU computer chip, and the ECU adjusts the fuel delivery and ignition timing based on these values.

During operation, the ECU has the ability to re-adjust temporarily; providing compensation for changes in overall engine condition and operating environment, so it will be able to maintain the ideal air/fuel ratio.

During certain operating periods such as cold starts, warm up, acceleration, etc., a richer air / fuel ratio is automatically calculated by the ECU.

### Initial Priming / Starting Procedure

**NOTE: The injection system must be purged of all air prior to the initial start up, and / or any time the system has been disassembled.**

If the EFI system is completely empty of fuel or has been disassembled and repaired:

1. Cycle the key switch from "OFF" to "ON" 6 times, waiting for approximately 3 seconds at each "ON" cycle to allow the fuel pump to cycle and shut down.
2. Once step 1 is completed, turn the key switch to "START" until the engine starts or 5 seconds has passed.
3. If the engine failed to start, repeat step 1 for 2 more cycles and attempt to start the engine.

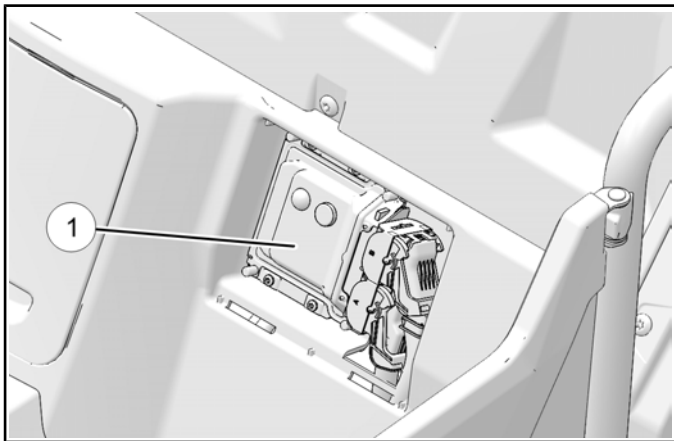
If the engine fails to start, a problem may still exist, and should be diagnosed.

**NOTE: Accurate testing of EFI components is recommended utilizing the Digital Wrench® Diagnostic Software (dealer only).**

## ELECTRONIC CONTROL UNIT (ECU)

### Operation Overview

The ECU ① is the brain or central processing computer of the entire EFI fuel/ignition management system. During operation, sensors continuously gather data which is relayed through the wiring harness to input circuits within the ECU. Signals to the ECU include: ignition power (on/off), intake air temperature, manifold absolute pressure (load), engine coolant temperature, crankshaft position and engine speed (RPM), throttle position and battery voltage. The ECU compares the input signals to the programmed maps in its memory and determines the appropriate fuel and ignition requirements for the immediate operating conditions. The ECU then sends output signals to set injector duration and ignition timing.



During operation, the ECU continually performs a diagnostic check of itself, each of the sensors, and system performance. If a fault is detected, the ECU turns on the "Check Engine" light on the instrument cluster and stores the fault code in its fault memory. Depending on the significance or severity of the fault, normal operation may continue, or "Fail-Safe" operation (slowed speed, richer running) may be initiated. A technician can determine the cause of the "Check Engine" light by referencing the "Instrument Cluster Trouble Code Display" and "Diagnostic Trouble Code Table" or by using Digital Wrench®. The ECU requires a minimum of 7.0 volts to operate. The memory in the ECU is operational the moment the battery cables are connected.

To prevent engine over-speed and possible failure, an RPM limiting feature is programmed into the ECU. If the maximum RPM limit is exceeded, the ECU suppresses the injection signals, cutting off the fuel flow and retards the ignition timing. This process repeats itself in rapid succession, limiting operation to the preset maximum.

**RPM Limit: 8300**

### ECU Service

Never attempt to disassemble the ECU. It is sealed to prevent damaged to internal components. Warranty is void if the case is opened or tampered with in any way.

All operating and control functions within the ECU are preset. No internal servicing or readjustment may be performed. If a problem is encountered and you determine the ECU to be faulty, contact Polaris Technical Service for specific handling instructions. Do not replace the ECU under warranty without factory authorization.

For the purpose of troubleshooting, a known-good ECU from another Polaris RZR 900 of the same model and year may be used without system or engine component damage.

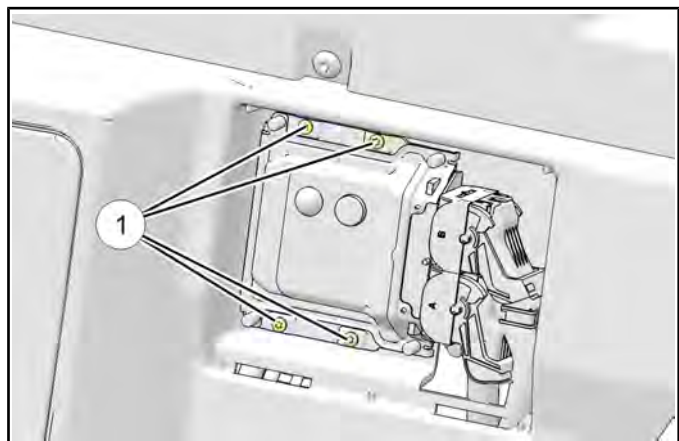
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### ECU Replacement

Although the need for ECU replacement is unlikely, a specific replacement procedure is required to ensure that all essential data contained within the original ECU is transferred to the replacement ECU.

**IMPORTANT: Refer to this procedure and carefully follow all instructions provided in Digital Wrench.**

1. Remove the driver's seat and the ECU access panel.
2. Connect the Vehicle Interface Cable to the Digital Wrench diagnostic connector. Go to the Special Tests menu and select ECU Replacement. Carefully follow the ECU replacement instructions.
3. Remove the four T-25 Torx screws ① retaining the ECU to the rear panel.

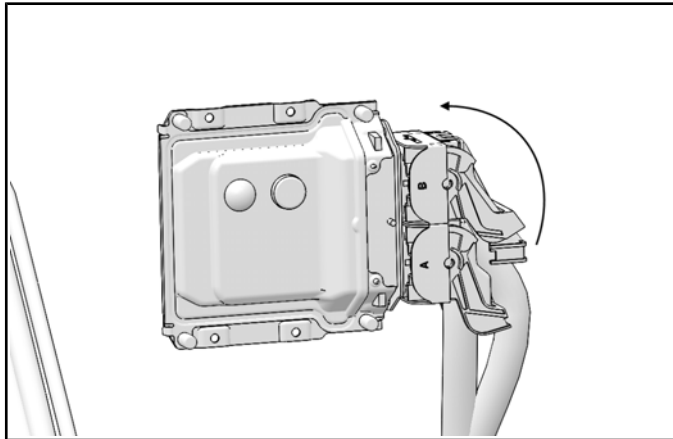


## FUEL SYSTEM

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4. With the ignition turned off, disconnect the wire harness from the ECU. Lift the connector locking levers and rotate them up until the connectors are free from the ECU.

**NOTE:** Upon removing the ECU connectors, you should hear a “click” when the connectors are fully open.



5. Remove the ECU from the vehicle.
6. To install, reverse the procedure and tighten the ECU mounting screws to specification.



ECU Mounting Screws:  
**24 in-lb (3 Nm)**

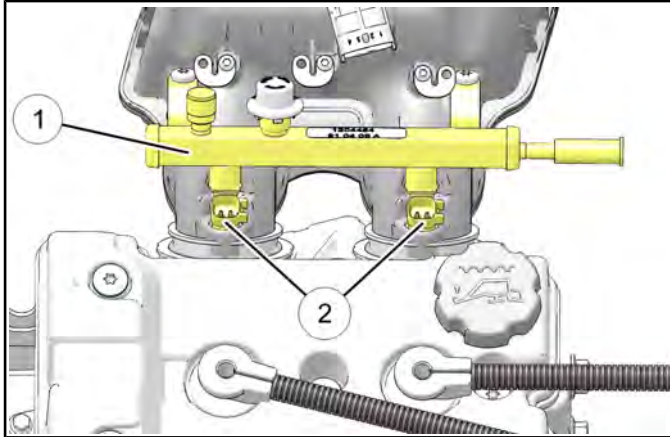
**NOTE:** Upon installing the ECU connectors, you should hear a “click” when the connectors are fully closed.



## FUEL INJECTORS

### Operation Overview

The fuel rail ①, located on the intake manifold, retains the fuel injectors ② to the intake assembly. O-rings on both ends of the injectors prevent external fuel leaks and also insulate the injectors from heat and vibration.



When the key switch is on, the fuel rail is pressurized, and the EFI relay provides voltage to the injectors. During engine operation, the ECU completes the ground circuit, energizing the injectors. The valve needle in each injector is opened electromagnetically, and the pressure in the fuel rail forces fuel down through the inside. The “director plate” at the tip of the injector contains a series of calibrated openings which directs the fuel into the intake port in a cone-shaped spray pattern.

The amount of fuel injected is controlled by the ECU and determined by the length of time the valve needle is held open, also referred to as the “injection duration” or “pulse width”. It may vary in length depending on the speed and load requirements of the engine.

The ECU gathers fuel injection timing information from the Crankshaft Position Sensor (CPS) and the Pedal Position Sensor (PPS) to allow for sequential fuel injection.

### Fuel Injector Troubleshooting

Injector problems typically fall into three general categories- electrical, dirty / clogged, or leakage. An electrical problem usually causes one or both of the injectors to stop functioning. Several methods may be used to check if the injectors are operating.

- With the engine running at idle, feel for operational vibration, indicating that they are opening and closing.
- When temperatures prohibit touching, listen for a buzzing or clicking sound with a screwdriver or mechanic's stethoscope.
- Disconnect the electrical connector from an injector and listen for a change in idle performance (only running on one cylinder) or a change in injector noise or vibration.

**NOTE: Do not apply voltage directly to the fuel injector(s). Excessive voltage will burn out the injector(s). Do not ground the injector(s) with the ignition on. Injector(s) will open/turn on if relay is energized.**

If an injector is not operating, it can indicate either a bad injector, or a wiring/electrical connection problem. Check as follows:

Injector leakage is very unlikely, but in rare instances it can be internal (past the tip of the valve needle), or external (weeping around the injector body). The loss of system pressure from the leakage can cause hot restart problems and longer cranking times.

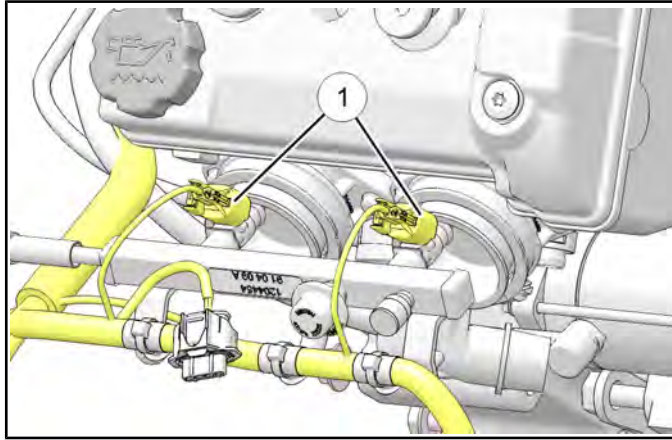
Injector problems due to dirt or clogging are unlikely due to the design of the injectors, the high fuel pressure, the use of filters and the detergent additives in the gasoline. Symptoms that could be caused by dirty/clogged injectors include rough idle, hesitation/stumble during acceleration, or triggering of fault codes related to fuel delivery. Injector clogging is usually caused by a buildup of deposits on the director plate, restricting the flow of fuel, resulting in a poor spray pattern. Some contributing factors to injector clogging include; dirty air filters, higher than normal operating temperatures, short operating intervals and dirty, incorrect, or poor quality fuel. Cleaning of clogged injectors is not recommended; they should be replaced. Additives and higher grades of fuel can be used as a preventative measure if clogging has been a problem.



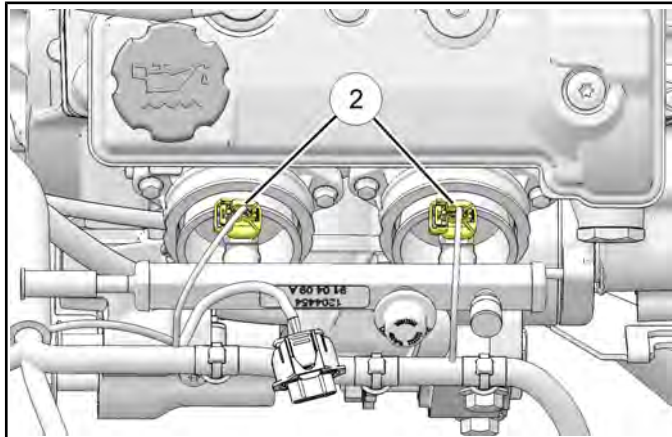
# FUEL SYSTEM

## Fuel Injector Test

**NOTE:** Take note of PTO and MAG fuel injector harness connectors before disconnecting them. The harness leads are marked with PTO and MAG identifiers ①.



The fuel injectors are non-serviceable. If diagnosis indicates a problem with either injector, test the resistance of the fuel injector(s) by measuring between the two pin terminals ②:



**Fuel Injector Resistance Specification:**  
11.4 - 12.6  $\Omega$

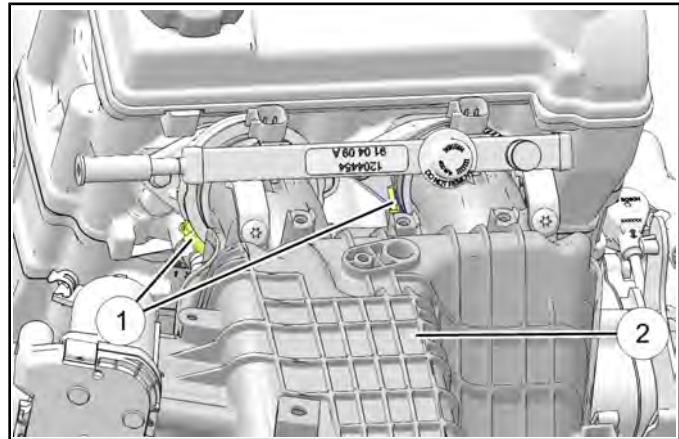
**NOTE:** Be sure to connect the PTO harness lead to the PTO injector and the MAG harness lead to the MAG injector to ensure proper engine operation.

## Fuel Injector Replacement

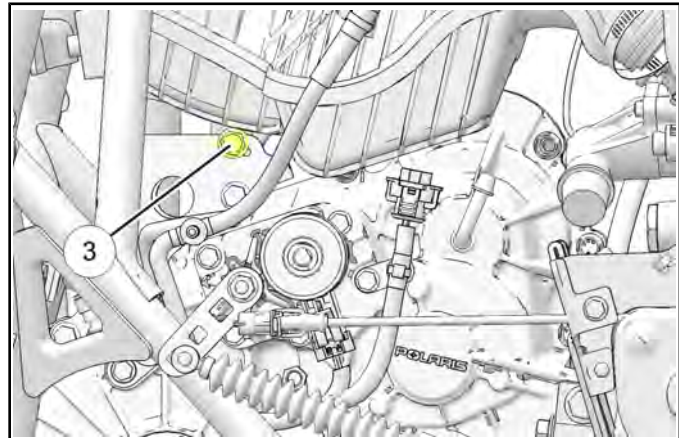
**CAUTION**

Be sure the engine has cooled enough to work on.

1. Remove the cargo box assembly (see Chapter 10 – Cargo Box Removal, page 10.14).
2. Loosen the hose clamps ① retaining the intake plenum ② to the throttle body.



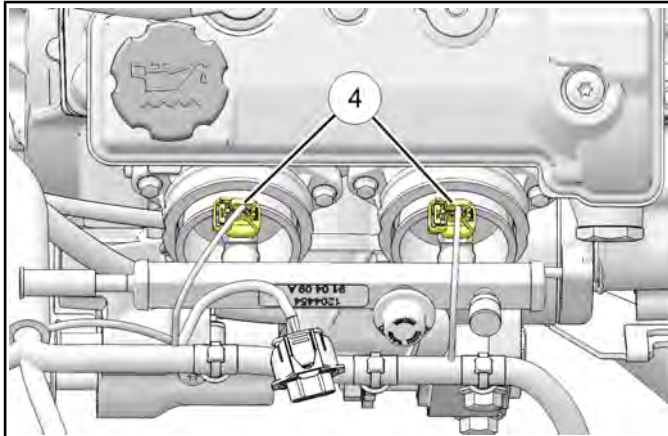
3. Remove the two screws ③ retaining the intake plenum.



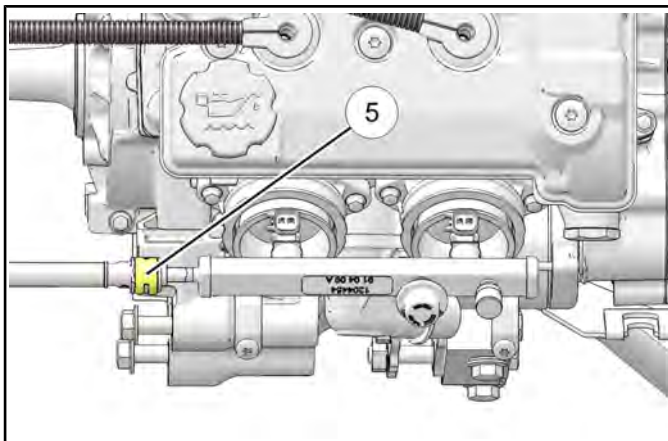
4. Remove the driver's seat and disconnect the negative battery cable.

## FUEL SYSTEM

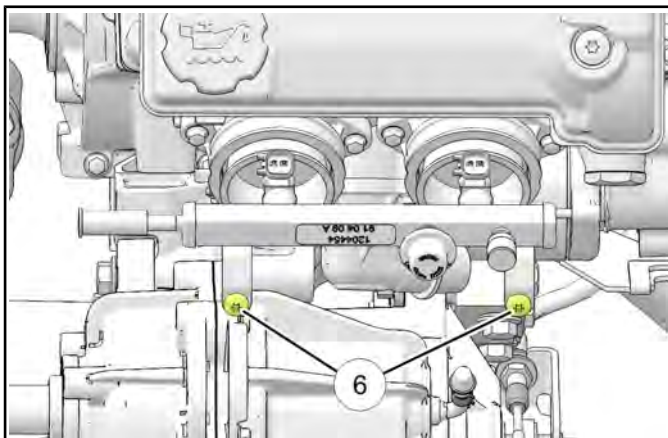
5. Disconnect the fuel injector harness leads ④.



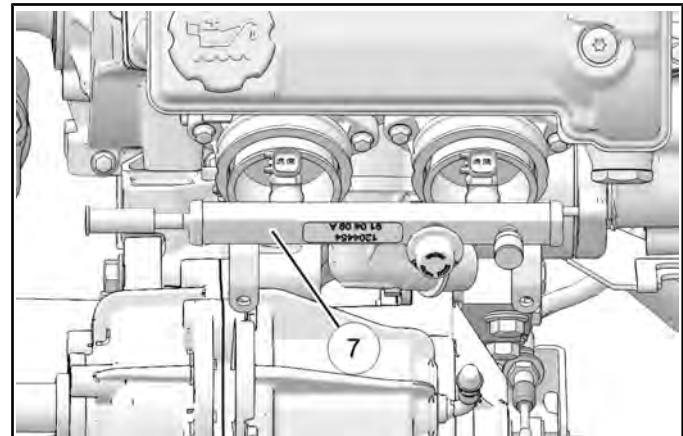
6. Hold a shop towel over the fuel line fitting and remove the fuel supply line ⑤ from the fuel rail.



7. Remove tie strap retaining the injector harness leads to the fuel rail. Remove the two screws ⑥ that mount the fuel rail to the throttle body using a 5 mm Allen wrench.



8. Carefully pull up on the fuel rail ⑦ and injectors and remove them from the throttle body as an assembly. Take care not to damage the fuel injector ends during removal.



4

9. Upon installation of the new fuel injectors, lightly lubricate the injector O-rings to aid installation.  
 10. Install the new injector(s) into the fuel rail.  
 11. Thoroughly clean the area around the fuel injector ports on the throttle body.  
 12. Lightly lubricate the injector O-rings and reinstall the fuel rail / injector assembly into the throttle body.  
 13. Install the fuel rail mounting screws and torque to specification.



Fuel Rail Mounting Screws:  
**7 ft-lb (10 Nm)**

14. Reinstall the fuel line to the fuel rail.  
 15. Connect the harness leads to the fuel injectors.

**NOTE: Be sure to connect the PTO harness lead to the PTO injector and the MAG harness lead to the MAG injector to ensure proper engine operation.**

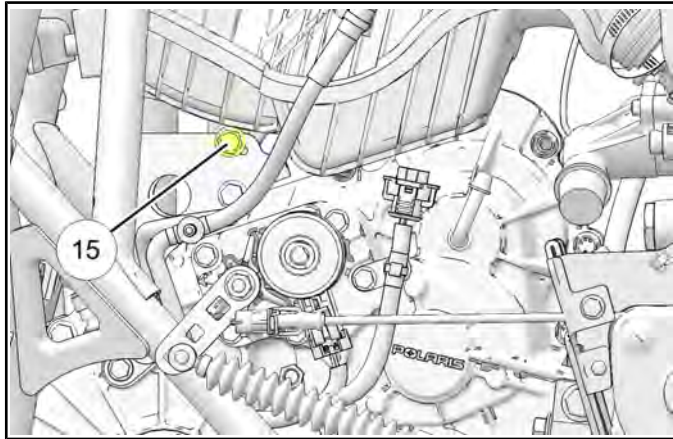
16. Use a tie strap to retain the harness leads to the fuel rail.  
 17. Reconnect the negative battery cable and reinstall the driver's seat.  
 18. Turn key on to allow the fuel system to prime and inspect the fuel rail and injectors for fuel leaks.

## FUEL SYSTEM

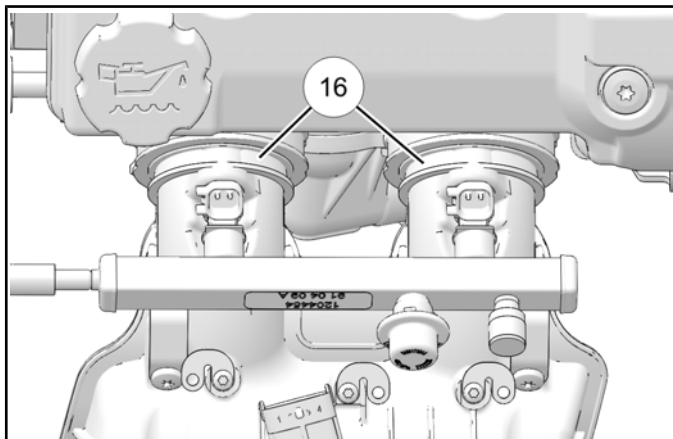
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19. Reinstall the intake plenum assembly and fasten the lower mount to the transmission mount bracket <sup>15</sup>.

**NOTE:** Be sure the lower air box post is placed properly into the rubber grommet.



**NOTE:** Be sure the air box boots fully seat onto the dual throttle body before tightening the hose clamps <sup>16</sup>.



Hose Clamps:  
**35 in-lb (4 Nm)**

Intake Plenum Mount Screw:  
**22 ft-lb (30 Nm)**

20. Reinstall the breather into the air box and tighten the hose clamps retaining the air box to the throttle body assembly.

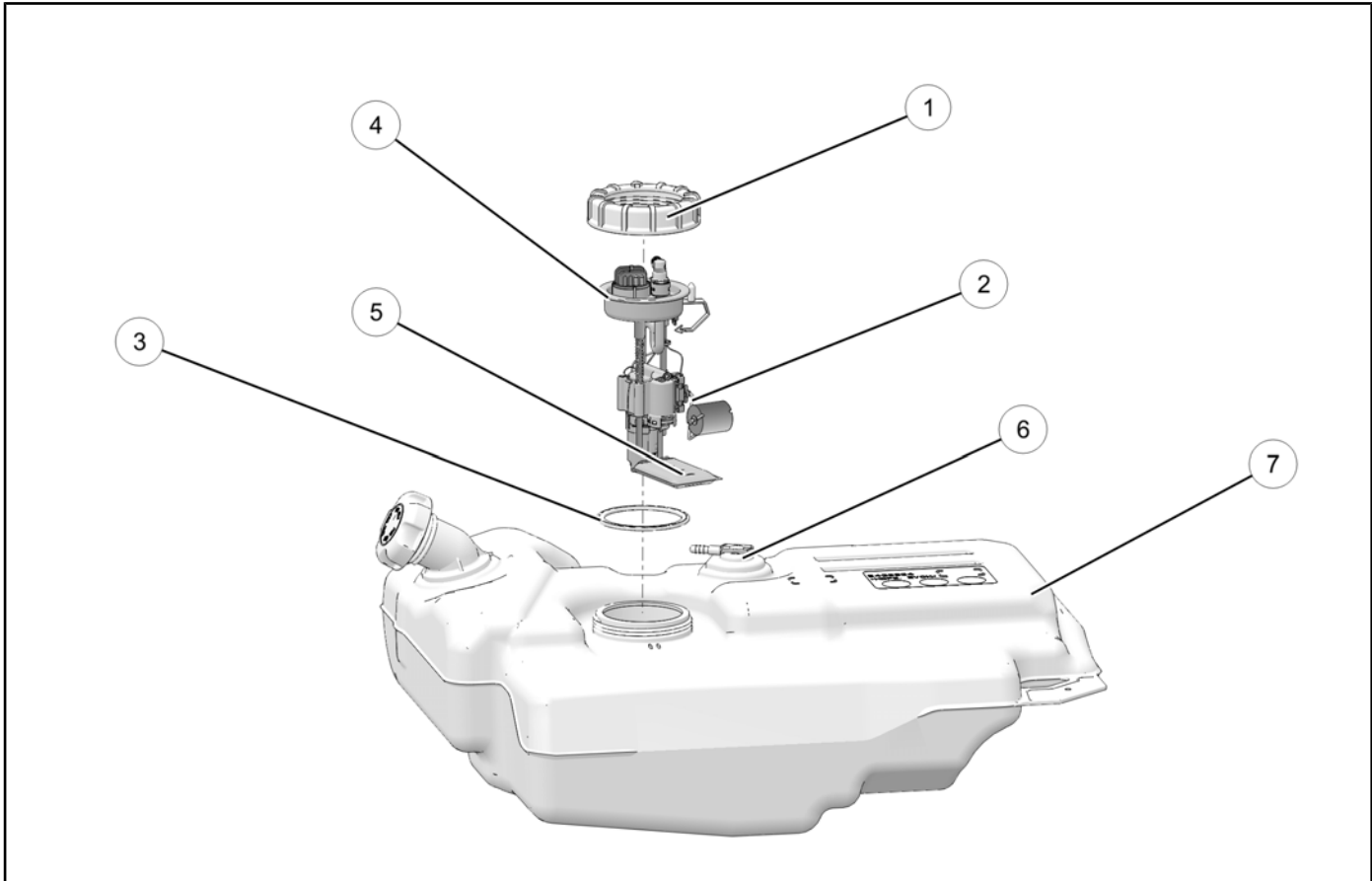
21. Reinstall the two screws retaining the air box assembly.

22. Position the intake hose onto the air box and tighten the hose clamp.

23. Reinstall the cargo box access panel.

**FUEL TANK**

**Fuel Tank Assembly View**



**4**

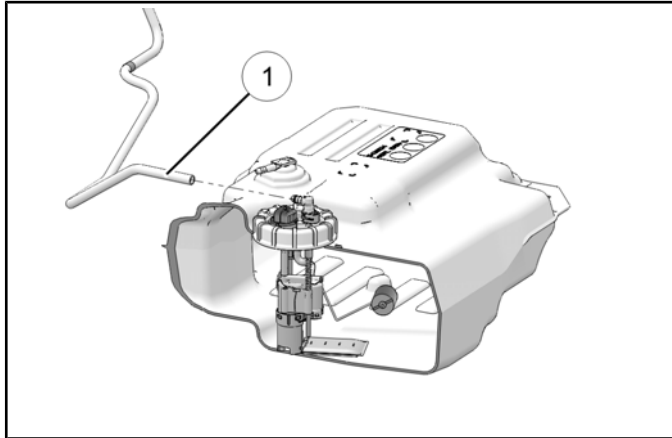
① PFA Nut	⑤ Preliminary Filter
② Fuel Sender Float Arm	⑥ Fuel Tank Vent
③ PFA Gasket (*replace if removed)	⑦ Fuel Tank Assembly
④ Fuel Pump/Regulator	



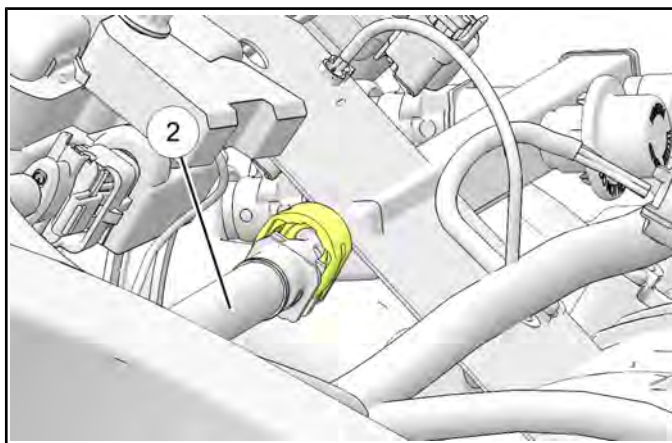
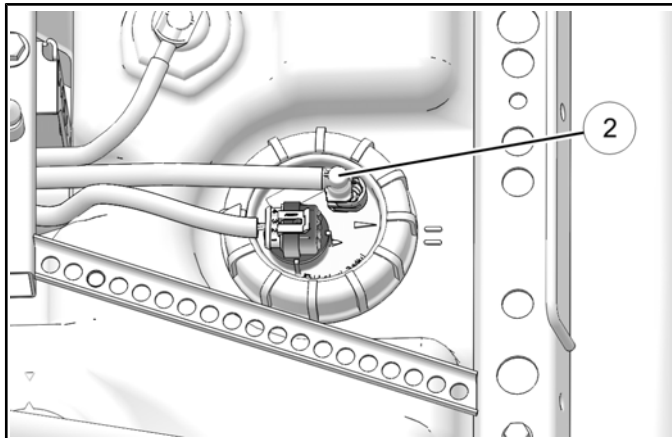
# FUEL SYSTEM

## Fuel Line Removal / Installation

1. Place a shop towel around the fuel line ① to catch any dripping fuel.



2. If removing either end of the supply line ②, pull open tabs while moving the green connector out to release the line.



3. Pull on the fuel line to remove.
4. To install, verify the connections are clean and undamaged.

5. Place the fuel line back over the fitting and slide the green connector locking mechanism back into place. Verify the connector tabs snap back into place.
6. Be sure the fuel line is routed and retained properly and lightly tug on the fuel line to ensure it is fastened.

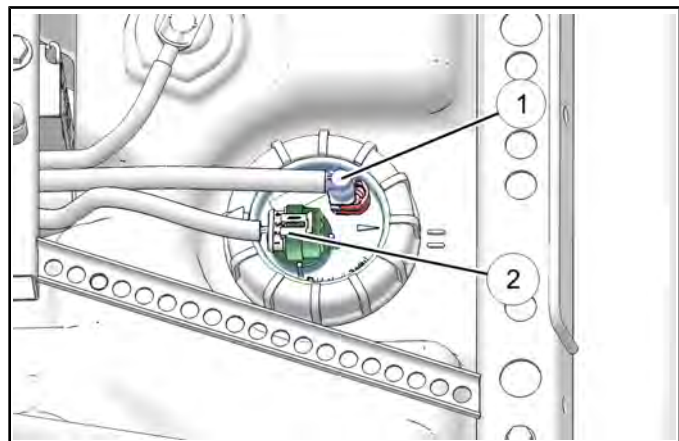
## Fuel Tank Removal

**NOTE:** Syphon as much fuel from the tank as possible before attempting to remove it from the vehicle.

### WARNING

Always wear safety goggles when working with high pressure or flammable fluids. Failure to do so could result in serious injury or complications.

1. Remove the driver and passenger seats.
2. Disconnect the negative and positive battery cables from the battery, located under the driver's seat. Remove the bolt retaining the battery bracket and remove the battery from the vehicle.
3. While holding a shop towel over the fuel line connectors, disconnect the fuel supply line ① from the pump. (see Chapter 4 – Fuel Line Removal / Installation, page 4.16 .

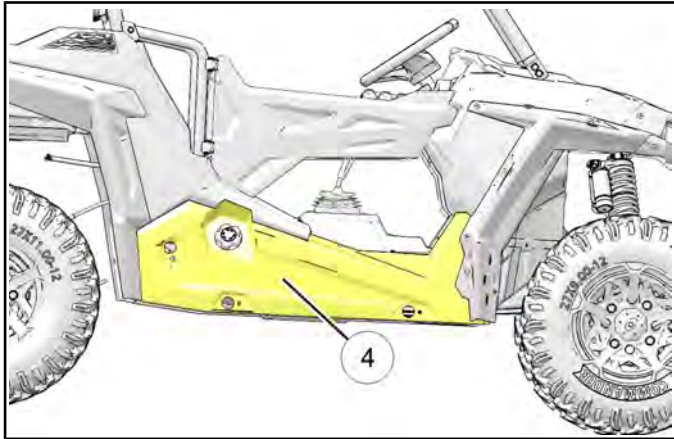


**NOTE:** A small amount of fuel may come out of the fuel lines or pump fittings. Properly drain fuel into a suitable container.

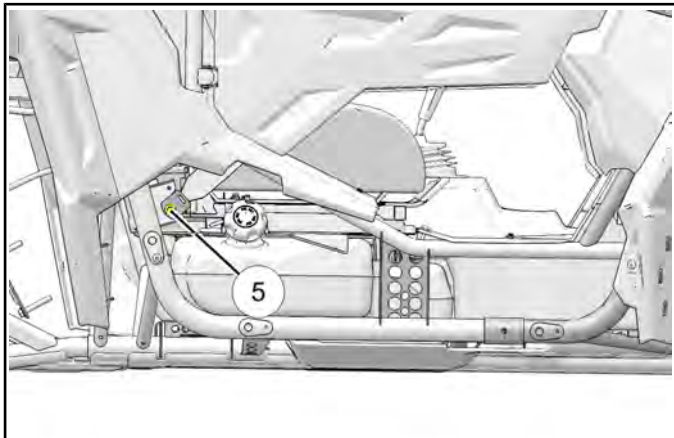
4. Disconnect the fuel pump electrical harness ②.

## FUEL SYSTEM

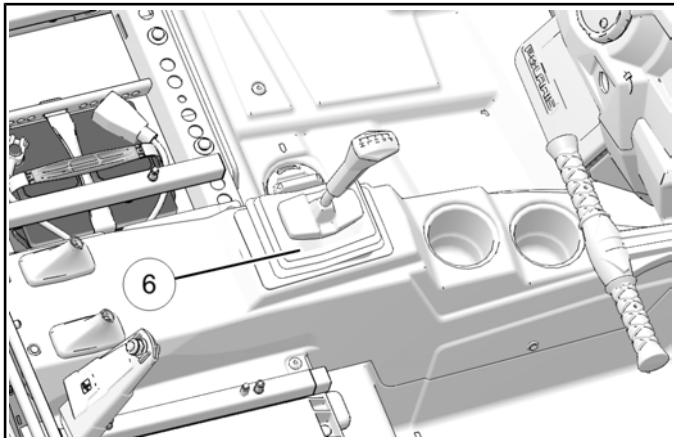
5. Remove the push rivets and Torx screws retaining the right rocker panel ④ using the multi-function pliers and a T40 Torx bit. Remove the rocker panel from the vehicle.



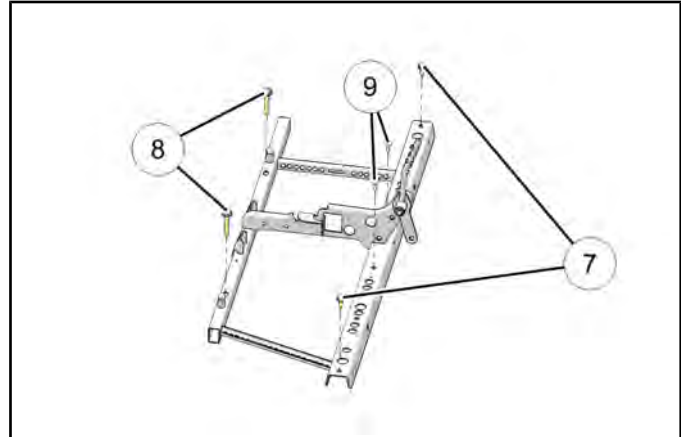
6. Remove the fastener ⑤ retaining the seat belt mechanism to the frame near the right rear portion of the fuel tank. Once removed, place the mechanism in the rear cargo box to keep out of the way.



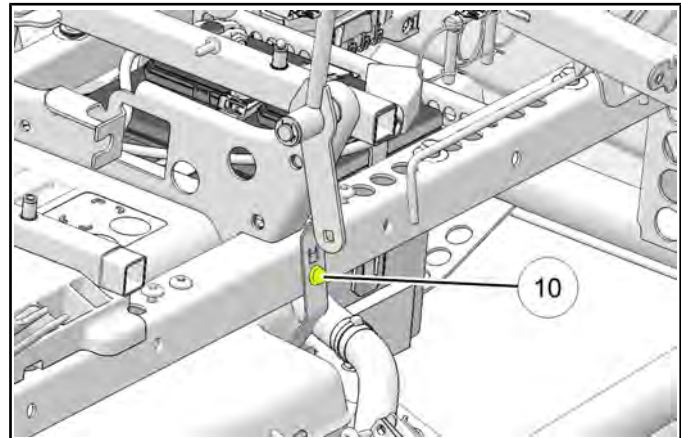
7. Push the shifter boot ⑥ so it is no longer attached to the console. Remove the console from the vehicle.



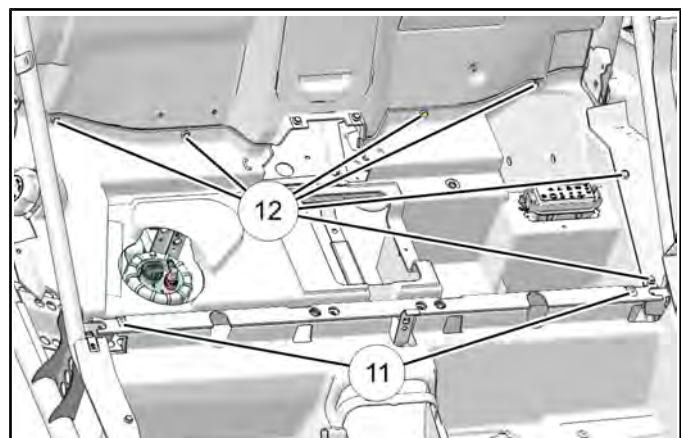
8. Remove the two bolts ⑦ retaining the front and two rear bolts ⑧ retaining the rear of the seat base frame. Remove the two T40 Torx screws ⑨ retaining the front of the seat base frame. Remove the rear seat base assembly from the vehicle.



9. Remove the T40 Torx screw ⑩ retaining the fuel tank strap to the seat base frame. Remove the strap from the other side of the seat base frame.



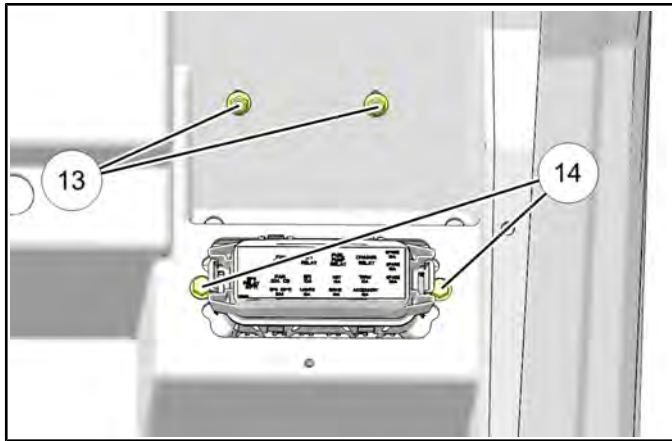
10. Remove the Torx screws ⑪ and plastic rivets ⑫ retaining the block-off panel using a T40 Torx bit.



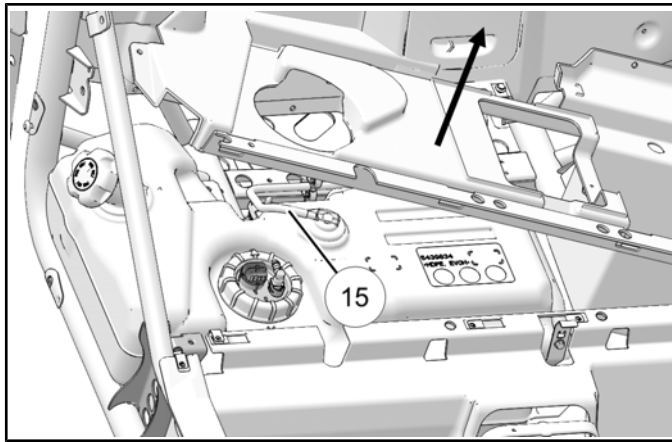


# FUEL SYSTEM

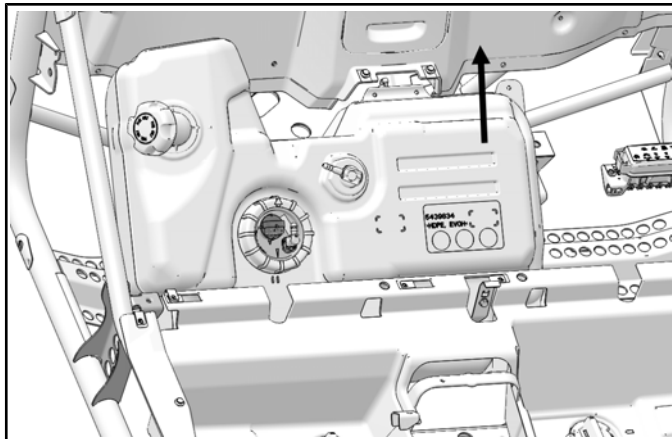
11. Remove the nuts <sup>13</sup> retaining the regulator and Torx screws <sup>14</sup> retaining the fuse box.



12. Remove the fuel tank vent line <sup>15</sup> from the tank fitting



13. Lift the rear of the fuel tank up first. Carefully pull the fuel tank out of the vehicle.



## Fuel Tank Installation

1. Carefully install the fuel tank assembly. Install the inner tank bracket with the fuel tank to ensure the bracket is inserted properly into the lower fuel tank mount.
2. Reinstall the fuel tank bracket and fasteners.
3. Install the vent line onto the tank fitting.
4. Reinstall the block-off panel. Secure with plastic rivets and torque screws to specification.



Block-off Panel Screws:  
8 ft-lb (11 Nm)

5. Install the seat base frame and torque fasteners to specification.



Seat Base Frame Fasteners:  
8 ft-lb (11 Nm)

6. Install regulator and fuse box to the block-off panel. Torque fasteners to specification.



Regulator / Fuse Box Fasteners:  
5 ft-lb (7 Nm)

7. Install fuel tank strap screw. Torque screw to specification.



Fuel Tank Strap Screw:  
8 ft-lbs (11 Nm)

8. Install center console and secure the shifter boot to the console.

9. Install seat belt mechanism. Torque bolt to specification.



Seat Belt Mechanism Bolt:  
**40 ft-lbs (54 Nm)**

10. Install right rocker panel and all body fasteners.  
11. Connect the fuel line and fuel pump electrical harness. Verify connections are secure.  
12. Install the battery and battery bracket. Torque fasteners to specification.



Battery Bracket Fasteners:  
**8 ft-lb (11 Nm)**

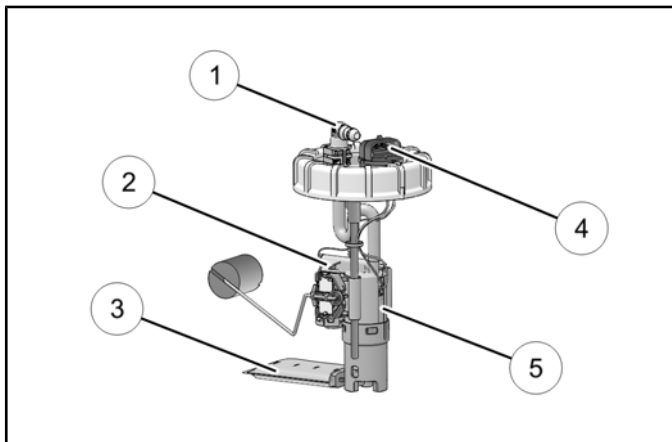
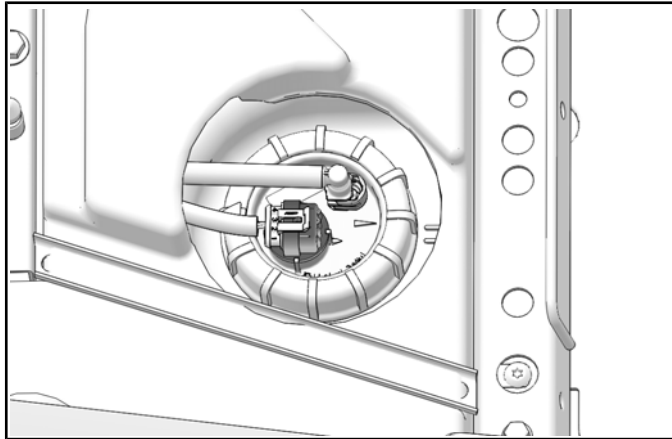
13. Install both seats and test the fuel pump by turning the ignition key ON and listening for the fuel pump to activate. Check fuel line fittings for leaks.

# FUEL SYSTEM

## FUEL PUMP

### Operation Overview

An electric fuel pump assembly is used to transfer fuel to the EFI system from inside the fuel tank. This assembly includes the fuel pump, fuel filters, regulator and fuel gauge sender. The pump is rated for a minimum output of 25 liters per hour at  $58 \pm 2$  psi ( $400 \pm 14$  kPa) and has two non-serviceable fuel filters.



① Fuel Line Connection	④ Pump / Sending Unit Electrical Connection
② Fuel Pump	⑤ Regulator
③ Fuel Pick-up Filter	

When the key switch is turned to "ON", the ECU activates the fuel pump, which pressurizes the system for start-up.

The ECU switches off the pump preventing the continued delivery of fuel in these instances:

- If the key switch is not promptly turned to the "start" position.
- If the engine fails to start.

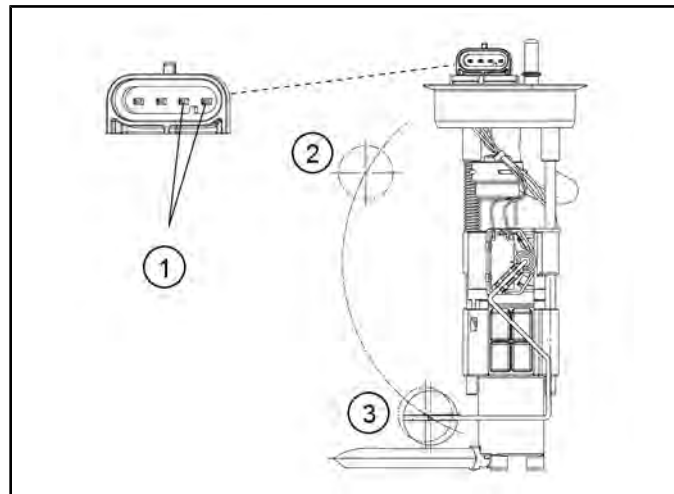
- If the engine is stopped with the key switch "on" (as in the case of an accident).

In these situations, the "check engine" light will go on, but will turn off after 4 cranking revolutions if system function is OK. Once the engine is running, the fuel pump remains on.

### Fuel Sender Test

If the fuel gauge reading on the instrument cluster is not working, or if the display reading differs in large comparison to the fuel in the tank, perform a resistance test on the fuel sender.

Disconnect the fuel pump / sending unit connection and measure the resistance between sender pins ①. If out of specification, replace the fuel pump assembly.



**Fuel Sender Resistance Specifications:**  
**Full ②:  $100 \pm 3 \Omega$**   
**Empty ③:  $450 \pm 5 \Omega$**

## Fuel Pump Test

If a fuel delivery problem is suspected, make certain the fuel pump filters are not plugged, that the pump is being activated through the ECU, all electrical connections are properly secured, the fuses are good, and a minimum of 7.0 volts is being supplied. If during starting the battery voltage drops below 7.0 volts, the ECU will fail to operate the system.

### WARNING

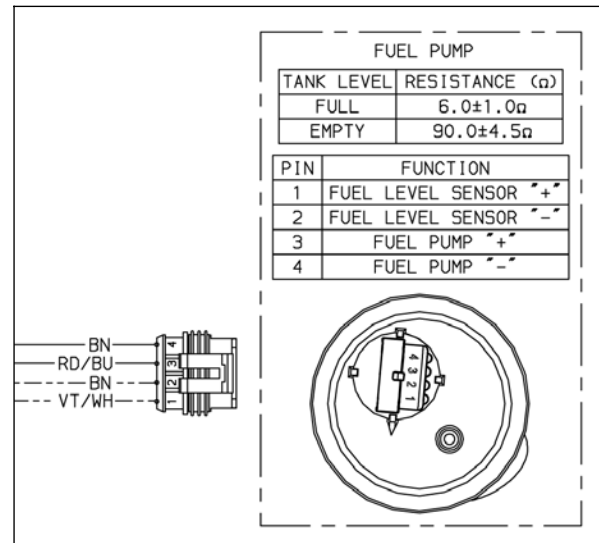
Fuel is extremely flammable and may cause severe burns, injury, or death.  
Do not use any device that produces a flame or electrical devices that may spark around fuel or fuel vapors.

1. Remove the passenger seat from the vehicle.
2. Cover the fuel line connection at the fuel tank with a shop towel and disconnect the line from the fuel pump outlet.
3. Install the Fuel Pressure Gauge Adapter (PV-48656) in-line between the fuel pump outlet and fuel line.
4. Connect the hose from the Fuel Pressure Gauge Kit (PU-43506-A) to the test valve on the Fuel Pressure Gauge Adapter (PV-48656). Route clear hose into a portable gasoline container or the vehicle's fuel tank.
5. Turn on key switch to activate the pump and check the system pressure on the gauge. If system pressure of  $58 \pm 2$  psi ( $400 \pm 14$  kPa) is observed, the ignition switch, ECU, fuel pump, and pressure regulator are working properly. Turn the key switch off and depress the valve button on the tester to relieve the system pressure.

**Fuel Pressure:**  
 **$58 \pm 2$  psi ( $400 \pm 14$  kPa).**

**NOTE: If the fuel pressure is out of specification, replace the fuel pump assembly.**

6. If the pump did not activate (Step 5), disconnect the harness connector from the fuel pump. Connect a DC voltmeter across terminals "3" and "4" in the plug on the vehicle fuel pump harness. Turn on the key switch and observe voltage to ensure a minimum of 7 volts is present.



**NOTE: If the voltage was below 7 VDC, test the battery, ignition switch, relay (s), wiring harness and ECU.**

7. If the reading is between 7 and 14 volts, turn key switch off and connect an ohmmeter between terminals "3" and "4" at the white fuel pump connector to check for continuity within the fuel pump.

**NOTE: If there was no continuity between the pump terminals, replace the fuel pump assembly.**

8. If voltage at the plug was within the specified range, and there was continuity across the pump terminals, reconnect the plug to the fuel pump, making sure you have a clean connection. Turn on the key switch and listen for the pump to activate.

**NOTE: If the pump starts, repeat steps 3, 4 and 5 to verify correct pressure.**

9. If the pump still does not operate, check for correct ECU operation by plugging in a known-good ECU of the same model.

**NOTE: If the pump still does not operate, replace the fuel pump assembly.**

# FUEL SYSTEM

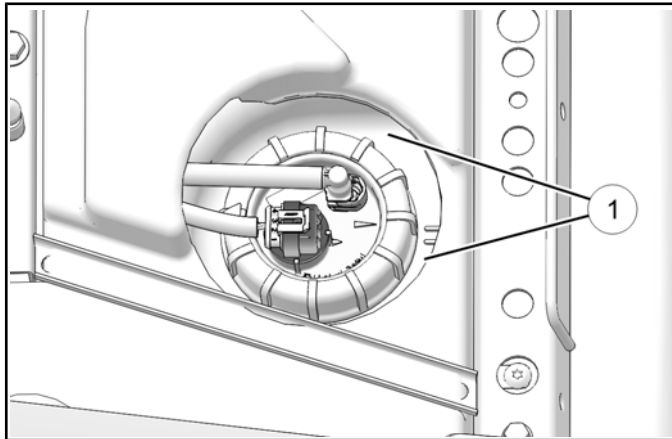
## Fuel Pump Replacement

1. Move the vehicle to a well ventilated area. Shift the transmission into Park and turn the ignition key off.
2. Remove the passenger seat to access the fuel pump.

### WARNING

Always wear safety goggles when working with high pressure or flammable fluids. Failure to do so could result in serious injury or complications.

3. Be sure the top of the fuel tank is clean ①. If it requires cleaning, hand wash the top of the tank to ensure no debris will enter the fuel system when the fuel pump is removed.



### CAUTION

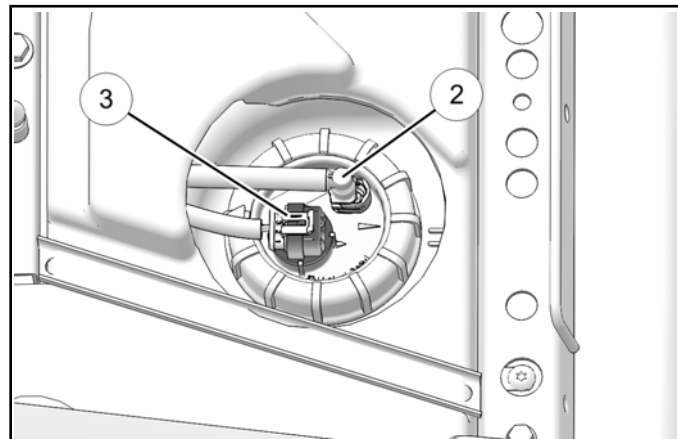
Failure to clean area around fuel pump may lead to debris entering the fuel tank during service. Excessive debris in fuel tank may cause premature wear of fuel pump and/or clogging of internal fuel filters.

4. Ensure that static has been discharged by touching a ground source such as the engine or frame.
5. While holding a shop towel over the fuel line connectors, disconnect the fuel supply line ② from the pump.

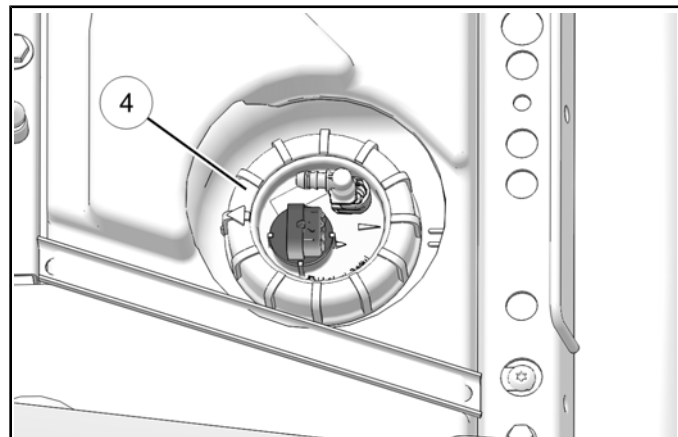
### CAUTION

It is possible for pressurized fuel to be present when disconnecting the fuel line. It is recommended to allow the vehicle to sit for a period of one hour after shutting off the engine before servicing the fuel pump. This allows the exhaust to cool and fuel pressure to drop.

**NOTE: A small amount of fuel may come out of the fuel lines or pump fitting. Properly drain fuel into a suitable container.**



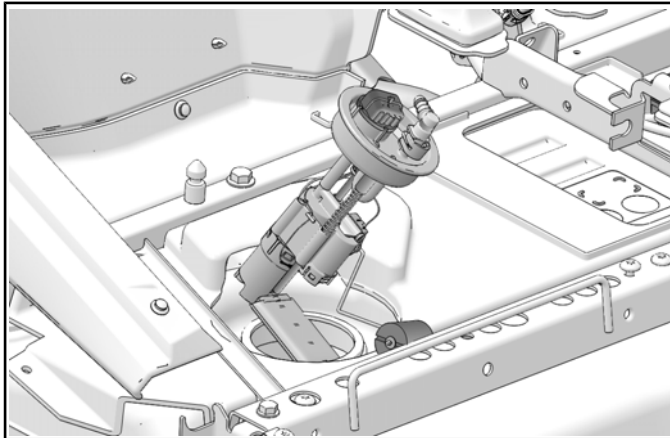
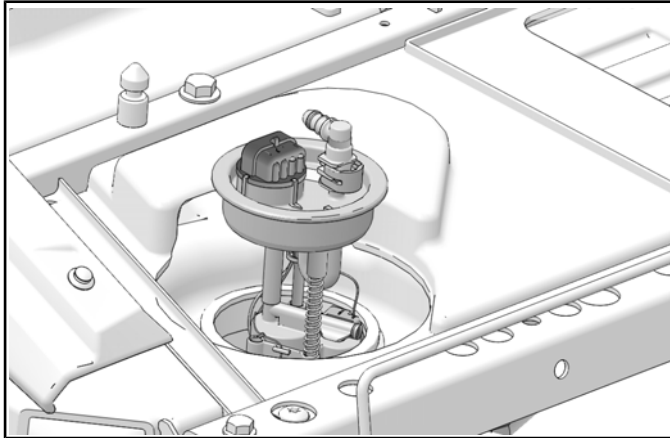
6. Disconnect the fuel pump electrical harness ③.
7. Place the Fuel Pump Service Tool (PU-50326) over the fuel pump PFA nut ④. Using a 1/2" drive ratchet or breaker bar, loosen and remove the PFA nut. Discard the PFA nut.



**NOTE: Apply downward force on the fuel pump flange while removing the fuel pump PFA nut.**

## FUEL SYSTEM

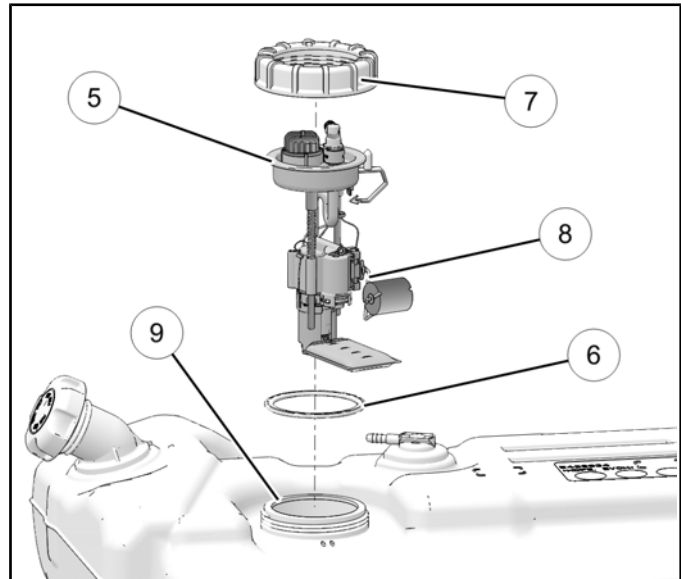
8. Carefully lift the fuel pump out of the fuel tank. As the fuel pump assembly is being removed, be aware of float arm and pump pre-filter. Hold the float arm to the pump body as you lift and tilt the pump to ensure that the float arm is not bent when removed from the tank.



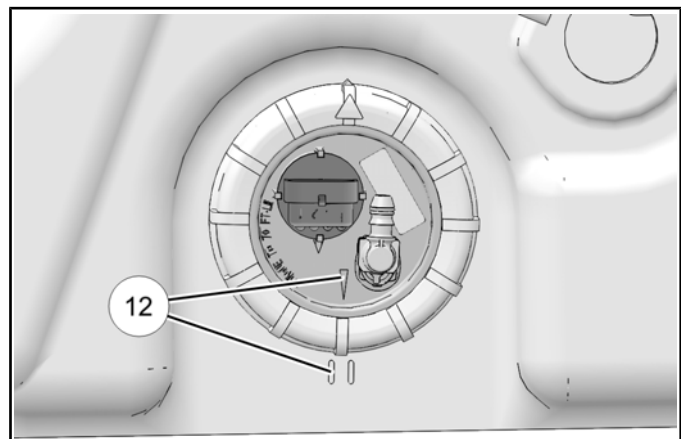
9. Transfer old fuel pump to a suitable container capable of safely holding fuel. The fuel pump will retain some fuel.
10. Inspect the inside of the fuel tank for debris (may require flashlight and mirror). If debris like mud or sand is present, fuel tank should be flushed and cleaned out prior to installation of new fuel pump assembly.

**NOTE:** It is recommended to remove the fuel tank from the vehicle and rinse it with a small amount of clean fuel. Do not use water or any other chemicals to remove debris.

11. Remove new fuel pump assembly ⑤, gasket ⑥ and PFA nut ⑦ from packaging. Use care not to bend float arm ⑧ during un-packaging. Do not lift or carry fuel pump assembly by the float arm.



12. Use cleaning wipes provided to clean fuel tank surface and threads ⑨. Remove all debris, grease and oil. Allow surfaces to dry completely.
13. Install new PFA gasket onto fuel pump assembly using care not to damage gasket or bend float arm.
14. Install fuel pump into fuel tank, hold float arm to the pump body and tilt assembly to ensure float arm does not get caught or bent during installation.
15. Gently push down on fuel pump flange ensuring flange is centered.
16. Roughly align orientation mark on fuel pump between the orientation marks on fuel tank ⑫ to ensure float arm does not get bent or snagged.




**IMPORTANT:** Failure to align the orientation marks may lead to interferences with the fuel level float arm and cause incorrect function.



## FUEL SYSTEM

---

17. While maintaining downward pressure, thread new PFA nut onto fuel tank and hand tighten. Use care when starting PFA nut, ensuring threads are properly aligned. Verify orientation marks are still aligned between fuel pump and fuel tank.
18. Torque PFA nut to specification using the Fuel Pump Service Tool (PU-50326) and a calibrated torque wrench.

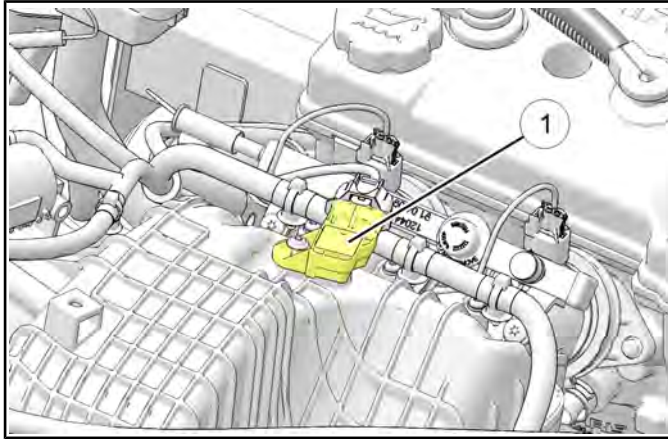
 = T
Fuel Pump PFA Nut: <b>70 ft-lbs (95 Nm)</b>

19. Verify alignment of fuel pump and tank orientation marks.
20. Connect the fuel supply line to the pump (see Chapter 2 – Fuel Lines, page 2.11 for specific installation procedures).  
  
**NOTE: Be sure to engage the retainers on each fuel line until each snaps into place. Pull on fuel lines lightly to confirm connection.**
21. Install the fuel tank vent line onto the tank fitting.
22. Connect the fuel pump electrical harness.
23. Test the fuel pump by turning on the key and listening for the pump to activate. Cycle the key several times to prime the system.
24. Install the seat.

## T-MAP SENSOR

### Operation Overview

Mounted on the end of the intake, the T-MAP ① performs two functions in one unit. The T-MAP detects intake air temperature as well as manifold absolute pressure.



These sensor signals, comprised of separate intake air temperature and manifold absolute pressure readings are processed by the ECU and compared to its programming for determining the fuel and ignition requirements during engine operation. The T-MAP provides the ECU with engine load data.

### TMAP Test / Replacement

The T-MAP is a non-serviceable item and can only be tested using Digital Wrench®. If the sensor is faulty, it must be replaced.

**NOTE:** This sensor should only be tested using Digital Wrench® Diagnostic Software (dealer only).

To replace the TMAP sensor:

1. Remove the engine access cover in the cargo box.
2. Remove the TMAP mounting bolt.
3. Install new TMAP sensor and torque the mounting bolt to specification.

**4**



TMAP Mounting Bolt:  
**5 ft-lb (7 Nm)**

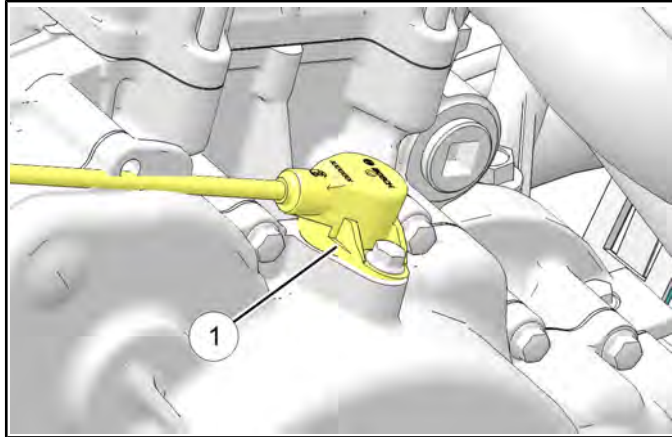
4. Install the engine access cover.

# FUEL SYSTEM

## CRANKSHAFT POSITION SENSOR (CPS)

### Operation Overview

Mounted on top of the stator cover, the crankshaft position sensor ① is essential to engine operation, constantly monitoring the rotational speed (RPM) and position of the crankshaft.



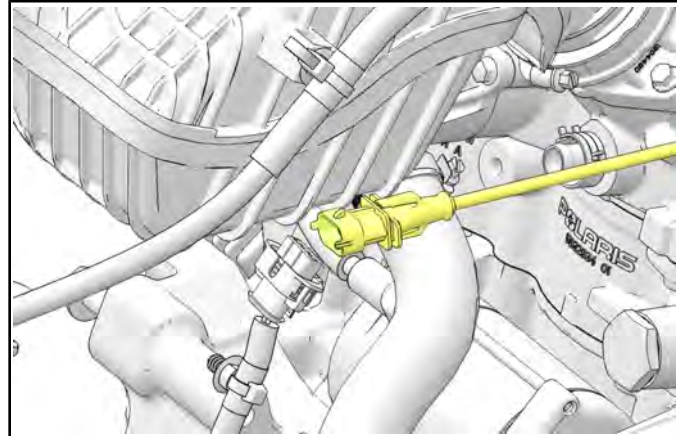
A ferromagnetic 35-tooth encoder ring with a missing tooth is built onto the flywheel. The inductive speed sensor is mounted  $1.0 \pm 0.26 \text{ mm}$  ( $0.059 \pm 0.010 \text{ in.}$ ) away from the encoder ring. During rotation, an AC pulse is created within the sensor for each passing tooth. The ECU calculates engine speed from the time interval between the consecutive pulses.

The encoder ring missing tooth creates an “interrupt” input signal, corresponding to specific crankshaft position. This signal serves as a reference for the control of ignition timing by the ECU. Synchronization of the CPS and crankshaft position takes place during the first two revolutions each time the engine is started. This sensor must be properly connected at all times. If the sensor fails or becomes disconnected for any reason, the engine will stop running.

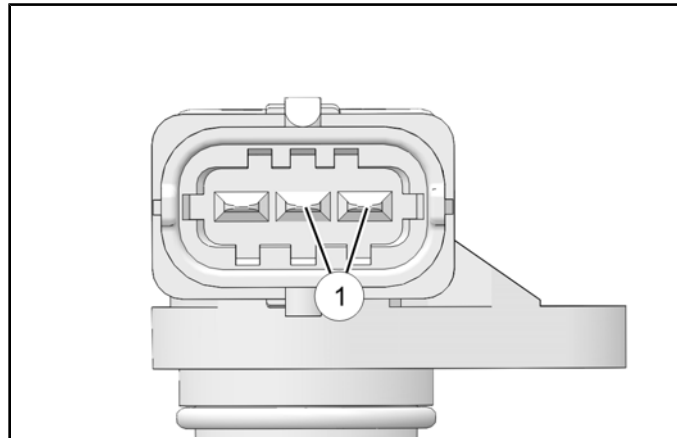
### CPS Test

The CPS is a sealed, non-serviceable assembly. If fault code diagnosis indicates a problem with this sensor, test as follows:

1. Locate the CPS harness connector above the shift cable on the right side of the vehicle and disconnect the harness.



2. Connect an ohmmeter between the CPS pin terminals ① shown below. A resistance value of  $1000\Omega \pm 10\%$  at room temperature should be obtained.

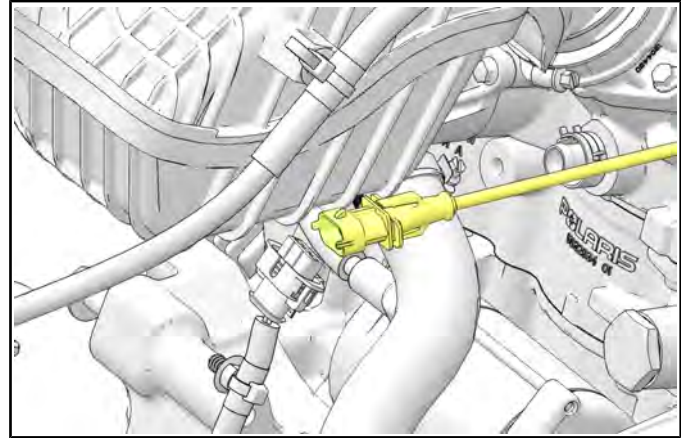


**CPS Resistance Specification:**  
 $1000\Omega \pm 10\%$

3. If the resistance is correct:
  - Test the main harness circuit between the sensor connector terminals and the corresponding pin terminals at the ECU (see wiring diagram).
  - Check the sensor mounting, air gap, flywheel encoder ring for damage or runout, and flywheel key. Inspect CPS and flywheel encoder ring for damage (see Chapter 4 – CPS Replacement, page 4.27).
4. If the resistance is incorrect, follow the CPS Replacement, page 4.27 procedure.

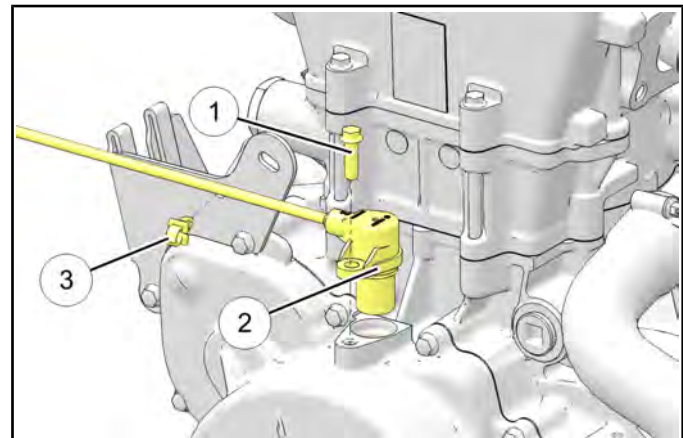
## CPS Replacement

1. Access the CPS harness from the right rear side of the vehicle.
2. Disconnect the CPS harness connector.




4

3. Remove CPS retaining bolt ① and remove the sensor ② from the stator cover.



4. Remove CPS wire lead from wire clip ③.
5. Install new sensor using a light coating of oil on the O-ring to aid installation.
6. Torque CPS retaining bolt to specification.

 = T
CPS Retaining Bolt: <b>9 ft-lb (12 Nm)</b>

7. Route CPS wire lead through wire clip and reconnect CPS harness connector.

# FUEL SYSTEM

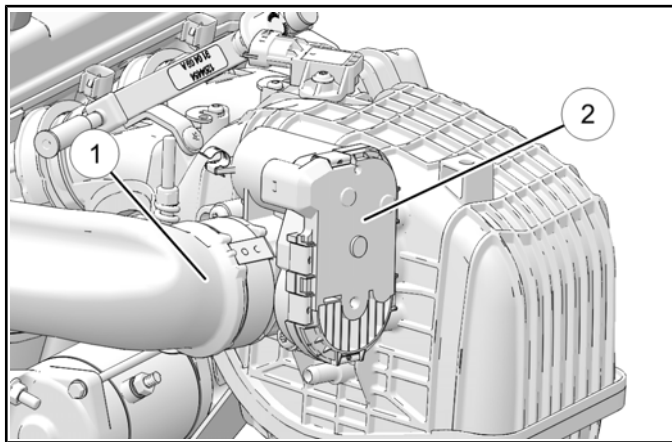
## ELECTRONIC THROTTLE CONTROL (ETC) / THROTTLE BODY

### Throttle Body Operation Overview

Mounted to the intake duct right before the intake manifold ①, the throttle body ② assembly provides the proper air/fuel ratio needed for engine operation. The throttle body is electronically controlled by the ECU based on pedal position.

The throttle body assembly includes the Electronic Throttle Control and Idle Air Control.

**NOTE: DO NOT attempt to service the ETC ①. The ETC is a non-serviceable component and can only be tested using Digital Wrench®. If the ETC is faulty, the entire assembly must be replaced.**



### ETC Test

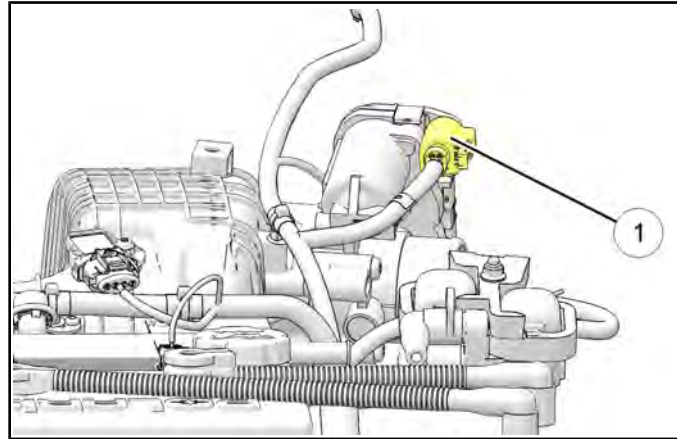
Never attempt to disassemble the ETC assembly. Warranty is void if the end cover is opened or tampered with in any way.

All operating and control functions within the ETC are pre-set. No internal servicing or adjustments may be performed. If a problem is encountered, and you determine the ETC to be faulty, contact the Polaris Service Department for specific handling instructions. Do not replace the ETC without factory authorization.

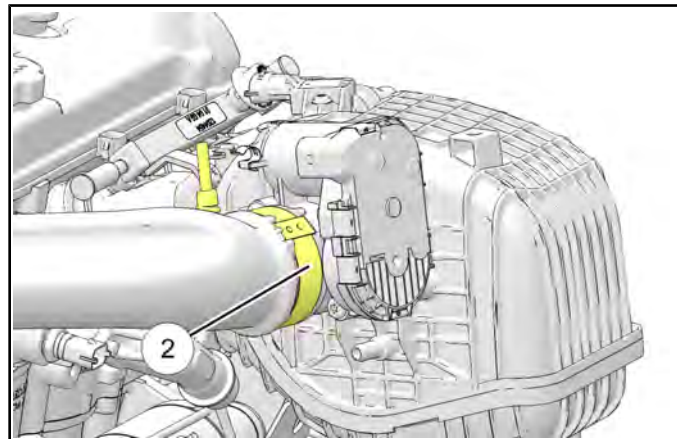
Use Digital Wrench® to perform all troubleshooting of this component. Use a Volt Ohm meter to test the vehicle harness continuity between the ETC connector and ECU connector. Refer to the wire diagram for pin-out details. If the ETC is faulty, the entire ETC assembly must be replaced (see Chapter 4 – ETC Replacement, page 4.28).

### ETC Replacement

1. Remove the access panel in the cargo box.
2. Remove wire harness from ETC retainer clip ① and remove the ETC connector.



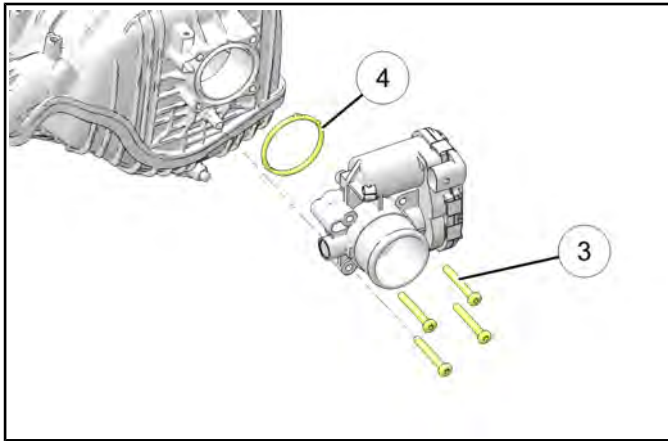
3. Loosen the clamp ② retaining the intake boot to the ETC. Remove the boot from the ETC.



4. Remove the four bolts ③ retaining the ETC housing to intake plenum.



5. Remove the ETC housing and gasket ④ from intake plenum.



6. Reverse these steps for installation. Torque the ETC housing retaining bolts and intake boot clamp to specification.



ETC Housing Retaining Bolts:  
**7 ft-lb (10 Nm)**

Intake Boot Clamp:  
**35 in-lb (4 Nm)**



# FUEL SYSTEM

## PEDAL POSITION SENSOR (PPS)

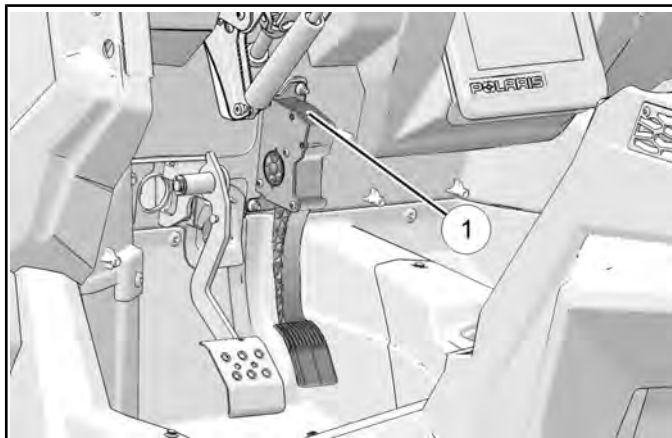
### Operation Overview

**NOTE: DO NOT attempt to service the PPS. The PPS is a non-serviceable component and can only be tested using Digital Wrench®. If the PPS is faulty, the entire throttle pedal assembly must be replaced.**

Mounted to the throttle pedal assembly, the PPS acts as a throttle position sensor. The PPS provides throttle pedal position to the Electronic Control Unit (ECU) to increase or decrease engine RPM using the Electronic Throttle Control (ETC). The PPS is the primary input used to control engine speed during vehicle operation.

### PPS Location

The pedal position sensor ① is located on the top of the accelerator pedal lever.



### PPS Test

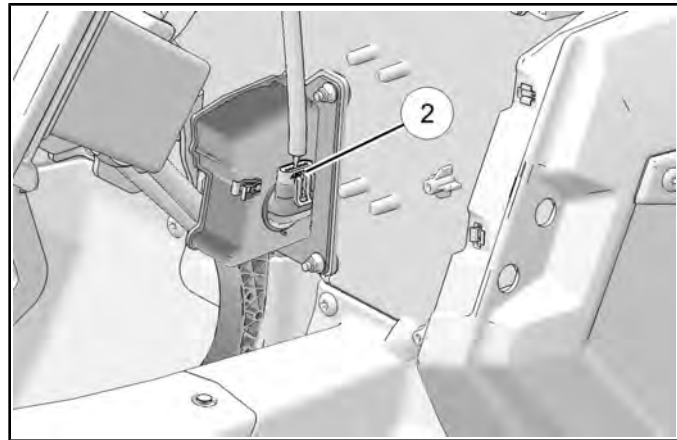
The PPS can be tested utilizing Digital Wrench by verifying that the throttle position readout varies as the pedal is pressed. Reference the Data Display section and be sure Throttle Position is displayed. Throttle Position should display as follows:

- Key on for less than 10 seconds and pedal released,  $\approx$  2.8%
- Key on for more than 10 seconds and pedal released  $\approx$  10.8%
- Pedal fully depressed  $\approx$  99.6%

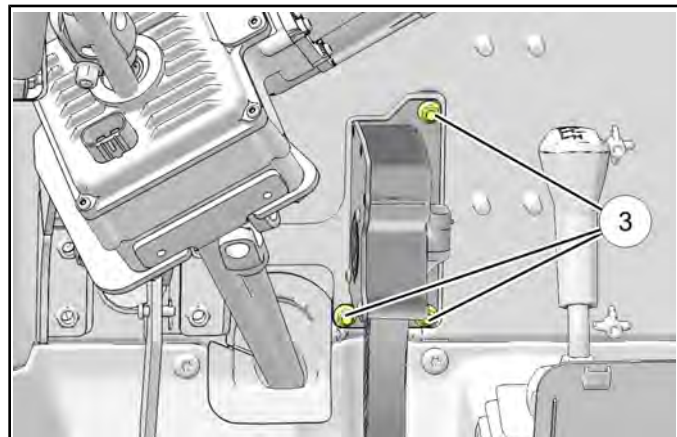
The PPS is calibrated to the throttle pedal. If the PPS is faulty, the throttle pedal assembly must be replaced.

### PPS Replacement

1. Disconnect the PPS harness connection ② located on the throttle pedal.



2. Remove the drivers seat and disconnect the negative (-) battery cable.
3. Remove the three bolts ③ securing the throttle pedal assembly to the frame support.



4. Remove the pedal assembly from the vehicle.

## EFI DIAGNOSTICS

### Data Display Definitions

The table shown below is a guide for using the Data Display to diagnose a vehicle. A more accurate representation is to compare the readings to a known good vehicle under the same conditions.

DATA DISPLAY ITEM	DEFINITION	VALUE	VALUE DESCRIPTION
AWD Driver	ECU control of the AWD coil	Active	ECU is grounding the AWD coil
		Inactive	ECU is not grounding the AWD coil
AWD Switch	Input to ECU to indicate if AWD is switched ON or OFF	Active	ECU receiving a signal that the AWD switch is in an AWD mode
		Inactive	ECU receiving a signal that the AWD switch is in 2WD or Turf mode.
Barometric Pressure	Reading of atmospheric pressure	28–30 InHg	Unit is being used at an elevation around sea-level
		19–21 InHg	Unit is being used at an elevation around 10,000 ft
		0	Default value to indicate an open circuit. Check for bad connection, broken wire, or faulty sensor.
Battery Voltage	Voltage seen on the power wire feeding the ECU	11.8 to 12.8V	typical key on voltage
		12.8 to 14.5V	typical engine running voltage
Brake Switch	Indicates if the brake pedal is being pushed	Active	Brake pedal is being pushed
		Inactive	Brake pedal released, open circuit, or faulty switch
Cam Sensor Signal Status	Indicates if the ECU is seeing a hall-effect signal from the cam sensor	Yes	Camshaft is turning
		No	No signal from camshaft sensor / engine not running
Cooling Fan Relay Driver	ECU control of the cooling fan relay	Active	ECU is grounding the cooling fan relay. Fan should be running
		Inactive	ECU is not grounding the fan relay
Crankshaft Signal Present	Indicates if the ECU is seeing a hall-effect signal from the crankshaft sensor	Yes	ECU is receiving an RPM signal from the CPS. Crankshaft should be turning
		No	ECU does not see the crankshaft turning
Cycle Synchronization	Checks for engine misfire	Yes	Engine is synchronized. No spark loss
		No	Engine out of synchronization. Intermittent spark loss
Differential Lock Driver	ECU control of the turf solenoid	Active	ECU is grounding the diff relay to activate the turf function. Differential unlocked
		Inactive	ECU is not grounding the diff relay. Differential is locked.
Engine Runtime Since Key On	Time the engine has been running since the key was last cycled on	0 minutes to ∞	—
Engine Runtime Total	Total amount of engine run time	0 minutes to ∞	—
Engine Temperature	Coolant temperature at the ECT sensor	70° F (21° C)	Room temperature
		195° to 210° F (92° to 99° C)	Cooling fan running

## FUEL SYSTEM

DATA DISPLAY ITEM	DEFINITION	VALUE	VALUE DESCRIPTION
		≈ 232° F (111° C)	Hot light on – power limit
		≈ 237° F (114° C)	Engine protection (ignition misfire)
		≈ 252° F (122° C)	Engine protection (shutdown)
Fuel Pump	ECU control of the fuel pump	On	ECU is grounding the fuel pump relay. ECU ground this relay for the first 2–3 seconds after key on and any time RPM is seen from the CPS
		Off	ECU is not grounding the fuel pump relay. Pump not running
Idle Air Control Desired Position	Number of steps the ECU would like to have the IAC open	35–50	typical warm idle
Idle Air Control Position Command	Number of steps the ECU has the IAC valve open	35 – 50	typical warm idle
Ignition Coil Dwell	Time the ECU is grounding the coil	≈ 2–3 ms	–
Ignition Timing	Degrees BTDC that the ECU is signaling the coil to send spark to a cylinder	0 to 10° BTDC	Typical ignition timing on a warm engine at idle
		30 to 40° BTDC	Typical max spark at wide open throttle
Injector Pulse Width	Time the ECU is grounding the injectors	2–3 ms	Average reading on a warm engine at idle
		4–7 ms	Unit is start-up enrichment or under rapid acceleration
Intake Air Temperature	Measures air temperature at the TMAP sensor	varies	should be close to ambient air temperature. Warm engine at idle may cause reading to be higher
Manifold Absolute Pressure	Measures air pressure inside the intake manifold on the TMAP sensor. Reading will be high at key on and wide open throttle. Reading will be low at idle / closed throttle.	14.7 PSI (101 kPa)	Engine not running and unit is near sea level
		5–7 PSI (34–48 kPa)	Normal reading when warm engine is at idle
		7–11 PSI (48–76 kPa)	Normal reading when unit is 1/2 throttle to WOT
Percent Engine Load	How much load the engine is under	20–30%	Typical warm idle. Cold start up reading will be higher
RPM Limit	Indicates if the ECU is currently limiting RPM	Active	ECU is limiting the RPM
		Inactive	ECU is not limiting RPM
Selected Gear	Indicates what gear position the transmission switch is in	dependent on gear selected	High, Low, Neutral, Reverse, Park "–" or Null indicates no reading from the sensor / stuck between gear positions
Spark Angle	Same as ignition timing	—	—
Start Enable Driver	ECU control of the start solenoid	Active	ECU is grounding the start solenoid. Unit should crank when key is turned to START
		Inactive	ECU is not grounding the start solenoid

## FUEL SYSTEM

DATA DISPLAY ITEM	DEFINITION	VALUE	VALUE DESCRIPTION
Target Idle RPM	RPM the ECU is attempting to get to	varies	—
Throttle Body Initialization – Learning Success	Indicates if the ECU has learned to position of the ETC	Yes	The ECU successfully learned the position of the ETC when the engine was started.
		No	The ECU failed to learn the position of the ETC when the engine was started. Check throttle body and connections. Cycle the key switch.
Throttle Position	How far open the throttle plate is	0–100%	At warm idle, this can range from 0–3%
Throttle Limp-home Operation Condition	ETC error and ECU is limiting speed	Yes	There is an error in the throttle control and the vehicle is limiting
		No	Normal Operation
Turf Mode Switch Input	Input to ECU to indicate if turf mode is switch On or Off	Active	ECU receiving a signal that the AWD switch is in Turf Mode
		Inactive	ECU receiving signal that the AWD switch is in AWD or 2WD mode
Vehicle Speed	How fast the transmission output is turning (calculated to wheel speed)	varies	—

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# FUEL SYSTEM

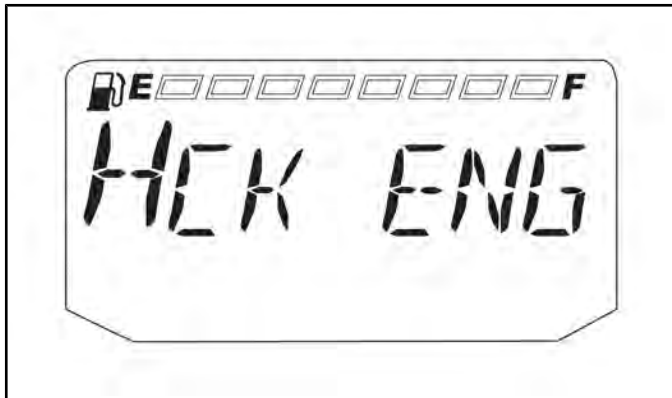
## Trouble Code Display (ETC)

**NOTE:** The diagnostic mode is accessible only when the check engine MIL has been activated.

Use the following procedure to display diagnostic trouble codes that were activated during current ignition cycle causing the MIL to illuminate. Diagnostic trouble codes will remain stored in the gauge (even if MIL turns off) until the key is turned off.

**NOTE:** If there is a diagnostic problem with the power steering system, the power steering MIL will illuminate and blink in place of the check engine MIL.

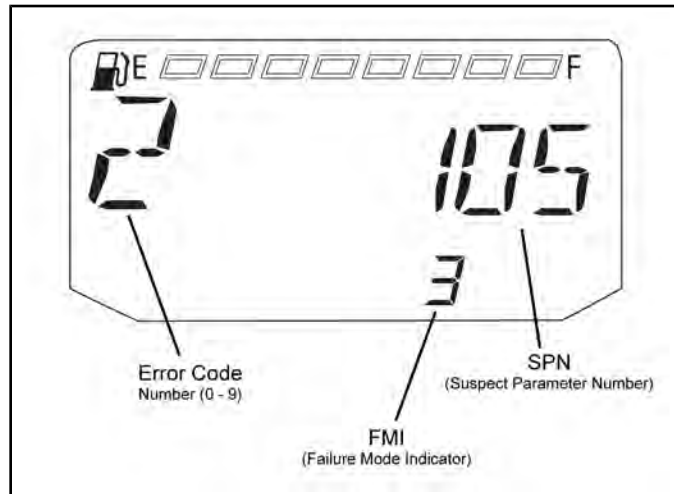
1. If the trouble code (s) are not displayed, use the MODE button to toggle until "CK ENG" displays on the information display area.



2. Press and hold the MODE button to enter the diagnostics code menu.

3. A set of three numbers will appear in the information area.

- The first number (located far left) can range from 0 to 9. This number represents the total number of trouble code present (example: 2 means there are 3 codes present).
- The second number (located top right) can be 2 to 6 digits in length. This number equates to the suspected area of fault (SPN).
- The third number (located bottom right) can be 1 to 2 digits in length. This number equates to the fault mode (FMI).



4. If more than one code exists, press the MODE button to advance to the next trouble code.
5. To exit the diagnostic mode, press and hold the MODE button or turn the ignition key OFF once the codes are recorded.

## DIAGNOSTIC TROUBLE CODE TABLE

COMPONENT	CONDITION	SPN	FMI	P-CODE	
Accelerator Position 2	Voltage Too High	29	3	P1228	
	Voltage Too Low		4	P1227	
	Not Plausible		2	P1225	
Throttle Position Sensor 1	Voltage Too High	51	3	P0123	
	Voltage Too Low		4	P0122	
	Signal Out of Range		2	P0121	
Vehicle Speed Signal	Data Erratic or Intermittent (or missing)	84	2	P0503	
	Received Vehicle Speed Has Error		19	C1069	
Accelerator Position 1	Voltage Too High	91	3	P0228	
	Voltage Too Low		4	P0227	
	Not Plausible		2	P0225	
Manifold Absolute Pressure Sensor (T-MAP)	Voltage Too High	102	3	P0108	
	Voltage Too Low		4	P0107	
Intake Air Temperature (T-MAP)	Voltage Too High	105	3	P0113	
	Voltage Too Low		4	P0112	
Engine Temperature Sensor (ECT)	Voltage Too High	110	3	P0118	
	Voltage Too Low		4	P0117	
	Temperature Too High		16	P0217	
	Engine Overheat Shutdown		0	P1217	
System Power (Battery Potential / Power Input)	Voltage Too High	168	3	P0563	
					C1063
	Voltage Too Low		4	P0562	
				C1064	
Engine Speed (This is applicable when the EPS module gets the engine speed from the ECM)	Error in Engine Speed Computation	190	31	P121C	
	Received Engine Speed Has Error		19	C1066	
Engine Speed	Error in Engine Speed Computation	400	31	P121D	
Gear Sensor Signal	Voltage Too Low	523	4	P0916	
ECU Memory	EEPROM: Read/Write Failure	628	12	C1073	
Calibration	Checksum/CRC Error	630	13	C1074	
Crankshaft Position Sensor (CPS)	Plausibility Fault	636	2	P0335	
Camshaft Phase Sensor	Circuit Fault	637	8	P0340	
Injector 1 (MAG)	Driver Circuit Open / Grounded	651	5	P0261	
	Driver Circuit Short to B+		3	P0262	
	Driver Circuit Grounded		4	P1262	
Injector 2 (PTO)	Driver Circuit Open / Grounded	652	5	P0264	
	Driver Circuit Short to B+		3	P0265	
	Driver Circuit Grounded		4	P1265	
Rear Differential Output	Driver Circuit Open / Grounded	746	5	P1691	
	Driver Circuit Short to B+		3	P1692	



## FUEL SYSTEM

COMPONENT	CONDITION	SPN	FMI	P-CODE
	Driver Circuit Grounded		4	P1693
Fan Relay Driver Circuit	Driver Circuit Open / Grounded	1071	5	P1481
	Driver Circuit Short to B+		3	P1482
	Driver Circuit Grounded		4	P1483
Ignition Coil Primary Driver 1 (MAG)	Driver Circuit Short to B+	1268	3	P1353
Ignition Coil Primary Driver 2 (PTO)	Driver Circuit Short to B+	1269	3	P1354
Fuel Pump Driver Circuit	Driver Circuit Open / Grounded	1347	5	P0230
	Driver Circuit Short to B+		3	P0232
	Driver Circuit Grounded		4	P0231
ECU Output Supply Voltage 1	Voltage Too High	3597	3	P16A2
	Voltage Too Low		4	P16A1
ECU Output Supply Voltage 2	Voltage Too High	3598	3	P16A9
	Voltage Too Low		4	P16A8
ECU Output Supply Voltage 3	Voltage Too High	3599	3	P17AA
	Voltage Too Low		4	P17AB
ETC Accelerator Position Sensor Outputs 1 & 2 Correlation	Correlation Fault	65613	2	P1135
Throttle Position Sensor 2	Voltage Too High	520198	3	P0223
	Voltage Too Low		4	P0222
	Signal Out of Range		2	P0221
All Wheel Drive Control Circuit (AWD)	Driver Circuit Open / Grounded	520207	5	P1836
	Driver Circuit Short to B+		3	P1835
	Driver Circuit Grounded		4	P1834
Steering Over Current Shut Down	Current Above Normal or Grounded	520221	6	C1050
Steering Excessive Current Error	Current Above Normal or Grounded	520222	6	C1051
Steering Torque Partial Failure	Condition Exists	520223	31	C1052
Steering Torque Full Failure	Condition Exists	520224	31	C1053
EPS Inverter Temperature	Greater than 110° C (230° F)	520225	16	C1054
	Greater than 120° C (248° F)		0	C1055
EPS CAN Communications Receive Error	No RX Message for 2 Seconds	520226	2	U0100
EPS CAN Communications Transmit Error	No TX Message for 2 Seconds	520227	2	U1100
Position Encoder Error	Position Encoder Error	520228	11	C1065
EPS Software Error	Software Error	520229	12	C1070
IC CAN Communication with EPS	EPS Off Line (EPS DM1 not seen)	520230	31	U0131
EPS Power Save Condition	EPS: Key On, Engine Off, 5 Minute Power Save/Timeout	520231	31	C1071
Idle Air Control Valve (IAC) M17; IAC Stepper Pin 3	Driver Circuit Open / Grounded	520268	5	P1515
	Driver Circuit Short to B+		3	P1519
	Driver Circuit Grounded		4	P1518

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## FUEL SYSTEM

COMPONENT	CONDITION	SPN	FMI	P-CODE
Idle Air Control Valve (IAC) M17; IAC Stepper Pin 4	Driver Circuit Open / Grounded	520269	5	P1525
	Driver Circuit Short to B+		3	P1529
	Driver Circuit Grounded		4	P1528
Idle Air Control Valve (IAC) M17; IAC Stepper Pin 6	Driver Circuit Open / Grounded	520270	5	P1535
	Driver Circuit Short to B+		3	P1539
	Driver Circuit Grounded		4	P1538
Idle Air Control Valve (IAC) M17; IAC Stepper Pin 1	Driver Circuit Open / Grounded	520271	5	P1505
	Driver Circuit Short to B+		3	P1509
	Driver Circuit Grounded		4	P1508
Accelerator Position / Brake Position Interaction	Condition Exists	520275	31	P150A
Throttle Position Sensor (1 or 2 Indeterminable)	Neither Position Sensor Passed Test	520276	12	P150B
	Position Sensor Correlation Fault		2	P150C
Throttle Body Control - Power Stage	Maximum	520277	3	P150D
	Minimum		4	P150E
	Not Plausible		2	P151A
	Signal Error		8	P151B
	Deactivated power stages due to 5V sensor supply error		31	P153F
Throttle Body Control - Return Spring Check Failed	Condition Exists	520278	31	P151C
Throttle Body Control - Adaptation Aborted	Condition Exists	520279	31	P151D
Throttle Body Control - Limp Home Position Check Failed	Condition Exists	520280	31	P151E
Throttle Body Control - Mechanical Stop Adaptation Failure	Condition Exists	520281	31	P152A
Throttle Body Control - Repeated Adaptation Failed	Condition Exists	520282	31	P152B
Throttle Body Control	Maximum	520283	3	P152C
	Minimum		4	P152D
	Outside of Pedal Range (Level 1)		2	P152F
Throttle Body Control - Position Deviation Fault	Condition Exists	520284	31	P152E
Brake Switch (1 or 2 Indeterminable)	Brake Switch Correlation Fault	520285	2	P153E
ECU Monitoring Error	Condition Exists	520286	31	P1540
ECU Monitoring Error (Level 3)	Condition Exists	520287	31	P1541
ECU Monitoring of Injection Cut Off (Level 1)	Condition Exists	520288	31	P1542
ECU Monitoring of Injection Cut Off (Level 2)	Condition Exists	520289	31	P1543
Controller Option Setting Not Programmed	Out of Calibration	520290	13	P1544

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## FUEL SYSTEM

COMPONENT	CONDITION	SPN	FMI	P-CODE
Throttle Body Control - Requested Throttle Angle Not Plausible	Condition Exists	520305	31	P1530
ECU Analog to Digital Converter Fault - No Load	Condition Exists	520306	31	P1531
ECU Analog to Digital Converter Fault - Voltage	Condition Exists	520307	31	P1532
Accelerator Sensor Synchronicity Fault Sensor Difference Exceeds Limit	Condition Exists	520308	31	P1533
ECU Fault - ICO	Condition Exists	520309	31	P1534
ECU Fault - Hardware Disruption	Condition Exists	520311	31	P1537
Oxygen Sensor 1	Data Erratic, Intermittent or Incorrect	3056	2	P0130
	Voltage Above Normal or Shorted to High Source		3	P0132
	Voltage Below Normal or Shorted to Low Source		4	P0131
Oxygen Sensor Heater 1	Voltage Above Normal or Shorted to High Source	520209	3	P0032
	Voltage Below Normal or Shorted to Low Source		4	P0031
	Current below Normal or Open Circuit		5	P0030

## EFI Troubleshooting

### Fuel Starvation / Lean Mixture

**Symptoms:** Hard start or no start, bog, backfire, popping through intake / exhaust, hesitation, detonation, low power, spark plug erosion, engine runs hot, surging, high idle, idle speed erratic.

- No fuel in tank
- Restricted tank vent, or routed improperly
- Fuel lines or fuel injectors restricted
- Fuel filter plugged
- Fuel pump inoperative
- Air leak in system
- Intake air leak (throttle shaft, intake ducts, air box cover)

### Rich Mixture

**Symptoms:** Fouls spark plugs, black, sooty exhaust smoke, rough idle, poor fuel economy, engine runs rough/ misses, poor performance, bog, engine loads up, backfire.

- Air intake restricted (inspect intake duct)
- Air filter dirty/plugged
- Poor fuel quality (old fuel)
- Fouled spark plug
- Injector failure

### Poor Idle

**Symptom:** Idle Too High (if > 1400 RPM when warm).

- Throttle stop screw tampering
- Throttle cable sticking, improperly adjusted, routed incorrectly
- Faulty electrical connection

**Symptom:** Idle Too Low (if < 1100 RPM when warm).

- Plugged air filter
- Leaking injector (rich condition)
- Belt dragging
- Throttle stop screw tampering

**Symptom:** Erratic Idle.

- Throttle cable incorrectly adjusted
- Air Leaks, dirty injector
- TMAP damaged (check with Digital Wrench®)
- Tight valves (low compression or high leakdown)

- Ignition timing incorrect
- Belt dragging
- Dirty air filter
- High percentage of cylinder leakdown (worn engine)
- Low compression (worn engine)
- Spark plug(s) fouled
- Spark plug wires loose or worn
- Faulty electrical connection

# FUEL SYSTEM

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## DIGITAL WRENCH

### Digital Wrench® Diagnostic Software Overview

**NOTE:** Refer to Section 2, 3 and 4 in the Instruction Manual provided in the Digital Wrench® Diagnostic Kit to install the Polaris Digital Wrench® diagnostic software on your computer.

The Digital Wrench® diagnostic software allows the technician to perform the following tests and observations:

- View or clear trouble codes
- Analyze real-time engine data
- Reflash ECU calibration files
- Perform guided diagnostic procedures
- Create customer service account records
- Perform output state control tests (some models)

### Special Tools (also refer to the beginning of this chapter)

DIGITAL WRENCH® DIAGNOSTIC SOFTWARE	PART NUMBER
Digital Wrench® Diagnostic Kit	PU-47063-B
PU-47063-B (listed above) INCLUDES:	Digital Wrench® Software: PU-48731
	Standard Interface Cable: PU-47151
	SmartLink Module Kit: PU-47471
	USB-Serial Adapter Cable: PU-50621
Fuel Pressure Gauge Kit	PU-43506-A
Fuel Pressure Gauge Adapter	PV-48656
Fluke 73 Digital Multi-Meter or Fluke 77 DMM	PV-43546 (Fluke 77: PV-43568)
Laptop or Desktop Computer	Commercially Available (refer to diagnostic software user manual or HELP section for minimum requirements)

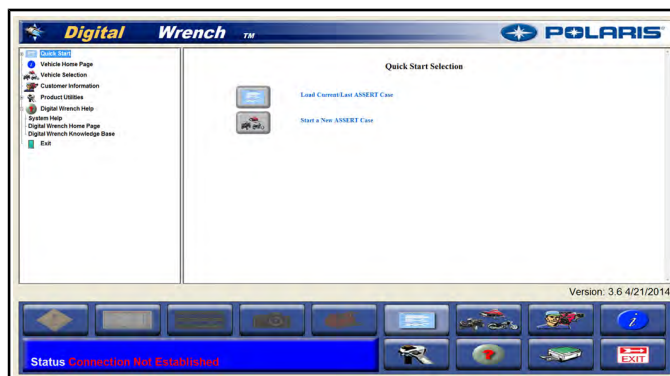
## Digital Wrench Software Version and Update ID

Always use the most current version of the Digital Wrench® software to ensure you have the latest updates or enhancements. New reprogramming files and guided diagnostic procedures are added to these updates as they become available.

Knowing what Digital Wrench® version and update is installed will help determine which updates are required.

**NOTE: Versions and updates are subject to change.**

1. Open the Digital Wrench® software. Locate the version ID shown on the lower right side of the Digital Wrench® start-up screen.



2. Proceed to <http://polaris.diagsys.com> to see if a newer update is available.



3. If a newer update is available, it should be downloaded before using Digital Wrench® (see Chapter 4 – Digital Wrench® Updates, page 4.41).

## Digital Wrench® Updates

Updates are released for Digital Wrench® via the Internet at: <http://polaris.diagsys.com>. The Digital Wrench® website can also be accessed through the dealer website at: [www.polarisdealers.com](http://www.polarisdealers.com).

**NOTE: Only authorized Polaris dealers and distributors can access the dealer website.**

1. Log on to [www.polarisdealers.com](http://www.polarisdealers.com).
2. Locate the “Service and Warranty” drop-down menu.
3. Click on “Digital Wrench Updates”.



4. The Digital Wrench® portal website should appear in a new web browser.
5. Click on “Digital Wrench Version Updates”.



**NOTE: You must already have the current version installed before adding an update. Updates will not install if you are using an older version loaded on your PC.**

6. If the update file date listed is newer than your current version and update (see Chapter 4 – Digital Wrench Software Version and Update ID, page 4.41, download the file.
7. Click on the link shown above, save the file to your hard disk and then double-click the icon to start the update process.

**NOTE: Do not "run" or "open" the file from where they are. Select "save" and download them to your PC before running the install.**

4



# FUEL SYSTEM

- When the update is complete, the version shown on the right side of the Digital Wrench® start-up screen should match the update you just downloaded.



**NOTE:** Versions and updates are subject to change.

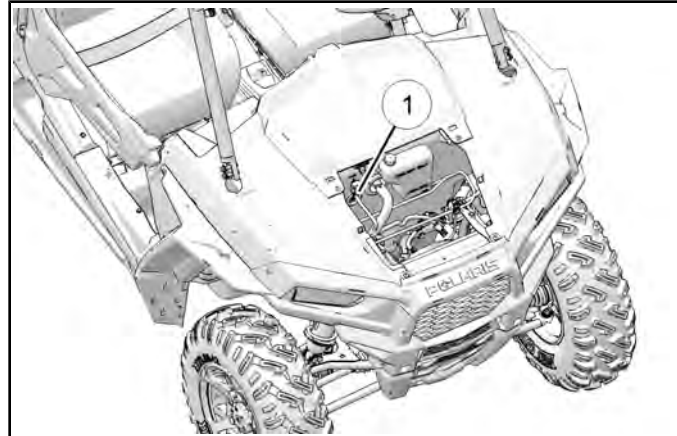
## Digital Wrench® Communication Errors

If you experience problems connecting to a vehicle or any Digital Wrench® related problem, visit the Digital Wrench® Knowledge Base for the most current troubleshooting information, FAQs, downloads and software updates at: <http://polaris.diagnostics.com/>.



## Digital Wrench® - Diagnostic Connector

Located under the hood connected to a sealed plug ①.



Follow these steps to connect the diagnostic interface cable to the vehicle to allow Digital Wrench® use:

- Assemble the SmartLink Module and attach the PC Interface Cable to your laptop.
- Remove the protective cap from the Digital Wrench® connector.
- Connect the Vehicle Interface Cable to the Digital Wrench® diagnostic connector.
- Turn the ignition key to the 'ON' position, select the appropriate vehicle and wait for the status to display 'Connected' in the lower left corner of the screen.
- Once connected, proceed with using Digital Wrench®.

## Guided Diagnostics

Guided diagnostics are available within Digital Wrench® for all supported Trouble Codes (that is, any fault that will turn on the 'Check Engine' indicator).

In addition, guided diagnostics are also available for many other electrical sub systems.

Diagnostic procedures are added to subsequent versions of Digital Wrench® as they become available. Check your release version often and upgrade when available to be sure you are using the most current software available.

### Digital Wrench® Serial Number Location













Open the configuration screen by clicking on the wrench icon. The serial number is located on the right side of the screen.



# FUEL SYSTEM

## Digital Wrench® Feature Map



	View, or clear trouble codes in the Engine Controller Memory.		Enter / Edit / Change Vehicle Information
	This is the most viewed screen. View sensor and ECU information in a grid, meter, or chart format.		Enter customer and vehicle information and view ECU Identification.
	View information from the main ECU sensors.		Load the Vehicle Home Page.
	Set up data capture and record functions.		Open the Software Configuration Screen.
	Perform specialized testing and adjustment functions service reports.		Run the Help System.
	Open the ASSERT ASK form.		Prints the current screen as a formatted printout.

## ECU Replacement

Although the need for ECU replacement is unlikely, a specific replacement procedure is required to ensure that all essential data contained within the original ECU is transferred to the replacement ECU.

Refer to procedure and carefully follow all instructions provided in Digital Wrench®.

## ECU Reprogramming (Reflash)

### Process Overview

The reprogramming feature is in the Special Tests menu on the Digital Wrench® screen. Start Digital Wrench® and click on the Special Tests menu icon (red tool box). A technician should be familiar with the process and with computer operation in general before attempting to reprogram an ECU.

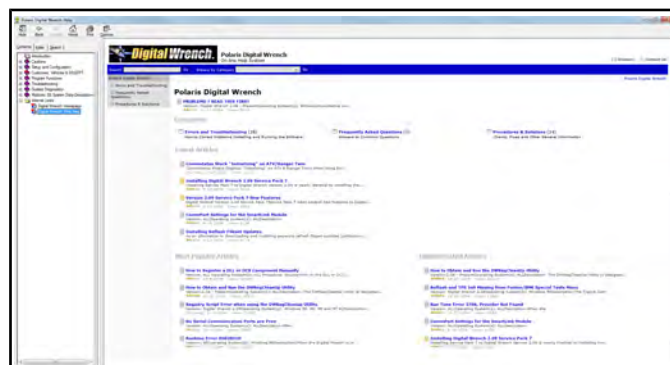
The Digital Wrench® Engine Controller Reprogramming (or “Reflash”) feature allows reprogramming of the ECU fuel and ignition map. To successfully reprogram the ECU, an Authorization Key must be obtained by entering a Request Code in the box provided on the Reflash Authorization site. The Request Code is automatically generated by Digital Wrench® during the reprogramming process. The Reflash Authorization site is located under the “**Service and Warranty**” drop down menu on the dealer website at: [www.polarisdealers.com](http://www.polarisdealers.com).

**NOTE: Failure to follow the reprogramming instructions completely and correctly can result in an engine that does not run! Replacement ECUs are programmed as “no-start” and require a reflash for them to work.**

### Reprogramming (Reflash) Tips:

- **BATTERY VOLTAGE:** The majority of problems with reprogramming can be attributed to a low battery. Be sure the battery voltage (no load) is at least 13 volts and at least 12.5 volts with the key ‘ON’. Connect a battery charger if necessary to bring voltage level above minimum. Fully charge the battery before you attempt to reprogram.
- **DEDICATED LAPTOP:** Best results are obtained using a laptop computer that is “dedicated to Digital Wrench®”. A laptop that is used by a variety of people and in several applications around the dealership is more likely to cause a reprogramming problem than one dedicated to Digital Wrench® diagnostics only.
- **OBTAINING THE LATEST UPDATE:** Reprogramming updates are provided periodically and contain the most recent calibrations (see Chapter 4 – Digital Wrench® Updates, page 4.41).

- **CLOSE NON-ESSENTIAL PROGRAMS:** Polaris recommends that you DO NOT install non-essential programs on a Service Department laptop. Camera detection software, Virus Scanners, Tool Bars, etc. may clog up memory if running in the background and make it harder for the diagnostic software to operate.
- **KNOW THE PROCESS:** If you are not familiar with the entire reprogramming process, review the HELP section of the diagnostic software before you attempt reprogramming. Click on the ? on the tool bar or press F11. The information in the on-line help is the most current and complete information available. This should be your first step until you are familiar with the process.
- **COMMUNICATION PROBLEMS:** If you have had problems communicating with a vehicle while performing diagnostic functions, do not attempt reprogramming until the cause has been identified and fixed. Check all connections, and be sure battery voltage is as specified.
- Proceed to <http://polaris.diagsys.com> for specific information and FAQs on how to troubleshoot communication problems.



- **DON'T DISTURB THE PC:** While reprogramming is in progress, don't move the mouse and don't touch the keyboard. The process only takes a few minutes, and is best left alone until complete.

### Reprogramming (Reflash) Procedure:

If you are not familiar with the reprogramming process, review the “Reprogramming (Reflash) Tips” before you begin. Follow the on-screen instructions as you progress through the steps. If you encounter a problem, always check the On-Line help for current tips and information.

1. Verify the most current update has been downloaded and loaded into Digital Wrench®. See
2. Connect SmartLink Module cables to PC and vehicle. See
3. Open the Digital Wrench® program.



# FUEL SYSTEM

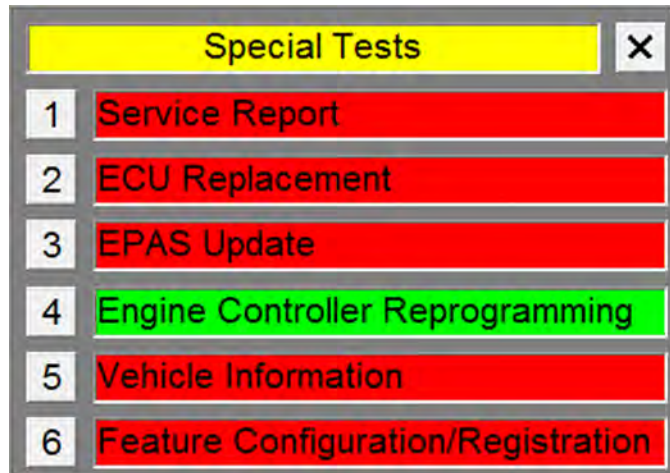
4. Select the model year, product line and vehicle description by selecting the “Change Vehicle Type” icon.



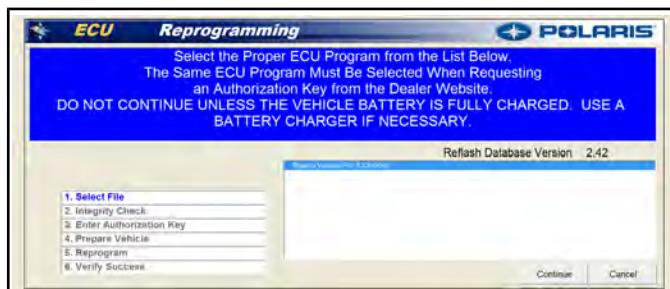
5. Select the “Special Tests” icon.



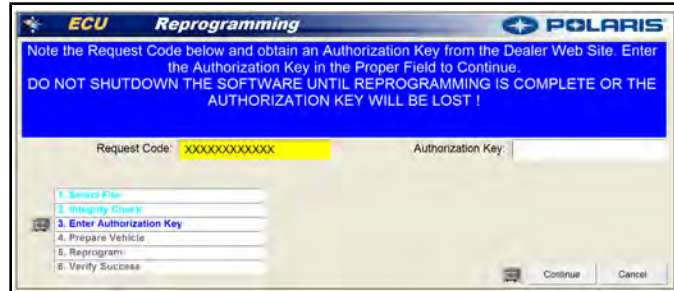
6. Select “Engine Controller Reprogramming”.



7. Select the file you want to load into the ECU then click the “Continue” icon to proceed to the Integrity Check and obtain a Request Code.



8. Copy (CTRL +C) the Request Code that will be required on the dealer website in the next step. DO NOT CLOSE Digital Wrench® or the Request Code will be invalid. **NOTE: All characters are letters; there are no numbers in a request code.**



**NOTE: Request Codes and Authorization Keys must be entered EXACTLY as they appear on the screen.**

9. Go to [www.polarisdealers.com](http://www.polarisdealers.com) and click on “ReFlash Authorization” from the “Service and Warranty” dropdown menu.

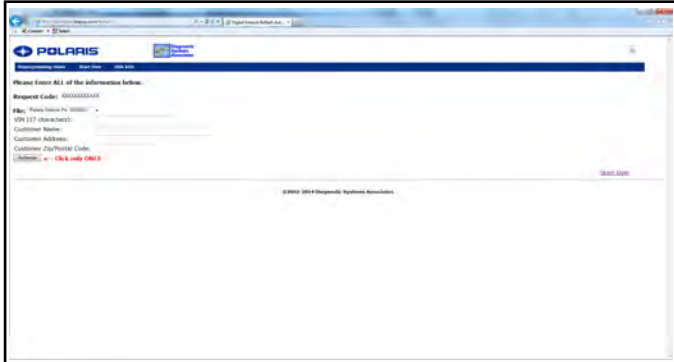


10. Enter or paste the Request Code into the box.

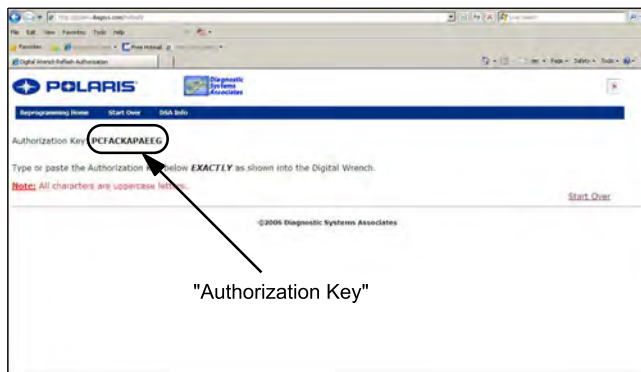


# FUEL SYSTEM

11. Select the same file type from the list that you selected previously while in Digital Wrench®. Enter the VIN along with the customer's name and address. When completed, click the Authorize button *once* to proceed.



12. An "Authorization Key" will appear in the upper left corner of the screen. Copy this key exactly as it appears.



13. Enter or paste the Authorization Key in the box located on the Digital Wrench® screen. Click the 'Continue' button and follow instructions provided on the screen to complete reprogramming procedure.



14. At this point the reflash process will begin. Do not touch the vehicle or PC during the process.



15. Once the ECU reprogramming procedure is complete, click the 'Finish' button on the screen. Verify the reflash was a success by starting the vehicle.

4



# FUEL SYSTEM

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## Polaris Mobile Digital Wrench (PMDW)

Polaris Mobile Digital Wrench (PMDW) is a diagnostic software application (app) designed specifically for Android™ devices. When paired with the Wireless Vehicle Link (WVL), part number PU-51435, PMDW provides Polaris service technicians with many of the features and functions found in Digital Wrench.

### PMDW Main Page:



### PMDW App Notes:

- PMDW will not work on Microsoft Windows 8™ or Apple IOS™ products
- Device must be set to allow the installation of non-market applications
- An electronic user's guide is provided within the app. To access the user's guide, launch the app, and then click on the "Help" button in the Settings/ Preferences menu.
- Only CAN-based vehicles are compatible with PMDW and the WVL. A complete list of compatible vehicles can be found in the user's guide.

## Wireless Vehicle Link (WVL) – Part Number PU-51435:



To download the PMDW app, navigate your Android device to [www.polarisdealers.com](http://www.polarisdealers.com). Locate the Service and Warranty drop-down menu. Select: "Mobile Digital Wrench App Download". Tap on the link to download the app.

### Android Device Minimum Specifications:

- Minimum operating system: Android 3.1 "Honeycomb" or higher (Android 4.0 or higher preferred)
- Dual core processor / 2 GB internal memory / external microSD (32 or 64 GB) slot / 500 MB RAM
- Rear facing camera with minimum 3.0 mega pixel resolution with auto/continuous focus
- Video, Microphone and Voice-to-text capable
- Internet and Bluetooth wireless technology capable

# CHAPTER 5

## PVT SYSTEM

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# PVT SYSTEM

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## GENERAL INFORMATION

### Special Tools

PART NUMBER	TOOL DESCRIPTION
2870341	Clutch Spider Removal/ Install Tool
2870386	Piston Pin Puller
2870910	Roller Pin Tool
2871056	Driven Clutch Puller
2871226	Drive Clutch Bushing Replacement Tool Kit
2871358-A	Clutch Holding Fixture
2872085	Drive Clutch Puller
2877408	Shock Spanner / Clutch Spreader
9314177	Clutch Holding Wrench
PU-50518	Driven Clutch Compression Tool
PU-50578	Spider Jam Nut Socket

### Torque Specifications

ITEM	TORQUE
Clutch Cover Retaining Screws (Outer)	<b>54 in-lb (5 Nm)</b>
Drive Clutch Cover Plate	<b>8 ft-lb (11 Nm)</b>
Drive Clutch Retaining Bolt	<b>96 ft-lb (130 Nm)</b>
Drive Clutch Spider	<b>290 ft-lb (393 Nm)</b> <b>(Apply 0.4 mL Loctite® 620™)</b>
Driven Clutch Retaining Bolt	<b>38 ft-lb (52 Nm)</b>
PVT Cover Fasteners (inner)	<b>10 ft-lb (14 Nm)</b>
PVT Cover Fasteners (outer)	<b>54 in-lb (5 Nm)</b>
Shift Weight Fasteners	<b>20 in-lb (2 Nm)</b>
Spider Jam Nut	<b>250 ft-lb (339 Nm)</b> <b>(Apply 0.1 mL Loctite® 620™)</b>

### **Bosch Automotive Service Solutions:**

1-800-345-2233 or <http://polaris.service-solutions.com/>

**Clutch Charts**

**Non-EBS Models**

ALTITUDE		SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
Meters (Feet)	0-1800 (0-6000)	26-55 (1322982)	Black / Red (7044263)	Black* (7044317)
	1800-3700 (6000 - 12000)	26-49 (1323271)	Black / Red (7044263)	Black* (7044317)

\*non-EBS Driven Spring has white letters on it that start with 210498...

**EBS Models**

ALTITUDE		SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
Meters (Feet)	0-1800 (0-6000)	26-55 (1322982)	Black / Red (7044263)	Black** (7044318)
	1800-3700 (6000 - 12000)	26-49 (1323271)	Black / Red (7044263)	Black** (7044318)

\*\*EBS Driven Spring has white letters on it that start with 210499...

# PVT SYSTEM

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## PVT SYSTEM OVERVIEW

### General Operation



#### **WARNING**

All PVT maintenance or repairs should be performed by a certified Polaris Master Service Dealer (MSD) technician who has received the proper training and understands the procedures outlined in this manual.

**Because of the critical nature and precision balance incorporated into the PVT components, it is absolutely essential that no disassembly or repair be made without factory authorized special tools and service procedures.**

The Polaris Variable Transmission (PVT) consists of three major assemblies:

- 1) The Drive Clutch
- 2) The Driven Clutch
- 3) The Drive Belt

The internal components of the drive clutch and driven clutch control engagement (initial vehicle movement), clutch upshift and backshift. During the development of the Polaris vehicle, the PVT system is matched first to the engine power curve; then to average riding conditions and the vehicle's intended usage. Therefore, modifications or variations of components at random are never recommended. Proper clutch setup and careful inspection of existing components must be the primary objective when troubleshooting and tuning.

### Drive Clutch Operation

Drive clutches primarily sense engine RPM. The two major components which control its shifting function are the shift weights and the coil spring. Whenever engine RPM is increased, centrifugal force is created, causing the shift weights to push against rollers on the moveable sheave, which is held open by coil spring preload. When this force becomes higher than the preload in the spring, the outer sheave moves inward and contacts the drive belt. This motion pinches the drive belt between the spinning sheaves and causes it to rotate, which in turn rotates the driven clutch.

At lower RPM, the drive belt rotates low in the drive clutch sheaves. As engine RPM increases, centrifugal force causes the drive belt to be forced upward on drive clutch sheaves.

## Driven Clutch Operation

Driven clutches primarily sense torque, opening and closing according to the forces applied to it from the drive belt and the transmission input shaft. If the torque resistance at the transmission input shaft is greater than the load from the drive belt, the drive belt is kept at the outer diameter of the driven clutch sheaves.

As engine RPM and horsepower increase, the load from the drive belt increases, resulting in the belt rotating up toward the outer diameter of the drive clutch sheaves and downward into the sheaves of the driven clutch. This action, which increases the driven clutch speed, is called upshifting.

Should the throttle setting remain the same and the vehicle is subjected to a heavier load, the drive belt rotates back up toward the outer diameter of the driven clutch and downward into the sheaves of the drive clutch. This action, which decreases the driven clutch speed, is called backshifting.

In situations where loads vary (such as uphill and downhill) and throttle settings are constant, the drive and driven clutches are continually shifting to maintain optimum engine RPM. At full throttle a perfectly matched PVT system should hold engine RPM at the peak of the power curve. This RPM should be maintained during clutch upshift and backshift. In this respect, the PVT system is similar to a power governor. Rather than vary throttle position, as a conventional governor does, the PVT system changes engine load requirements by either upshifting or backshifting.

## Maintenance / Inspection

Under normal use the PVT system will provide years of trouble free operation. Periodic inspection and maintenance is required to keep the system operating at peak performance. The following list of items should be inspected and maintained to ensure maximum performance and service life of PVT components. Refer to the troubleshooting checklist at the end of this chapter for more information.

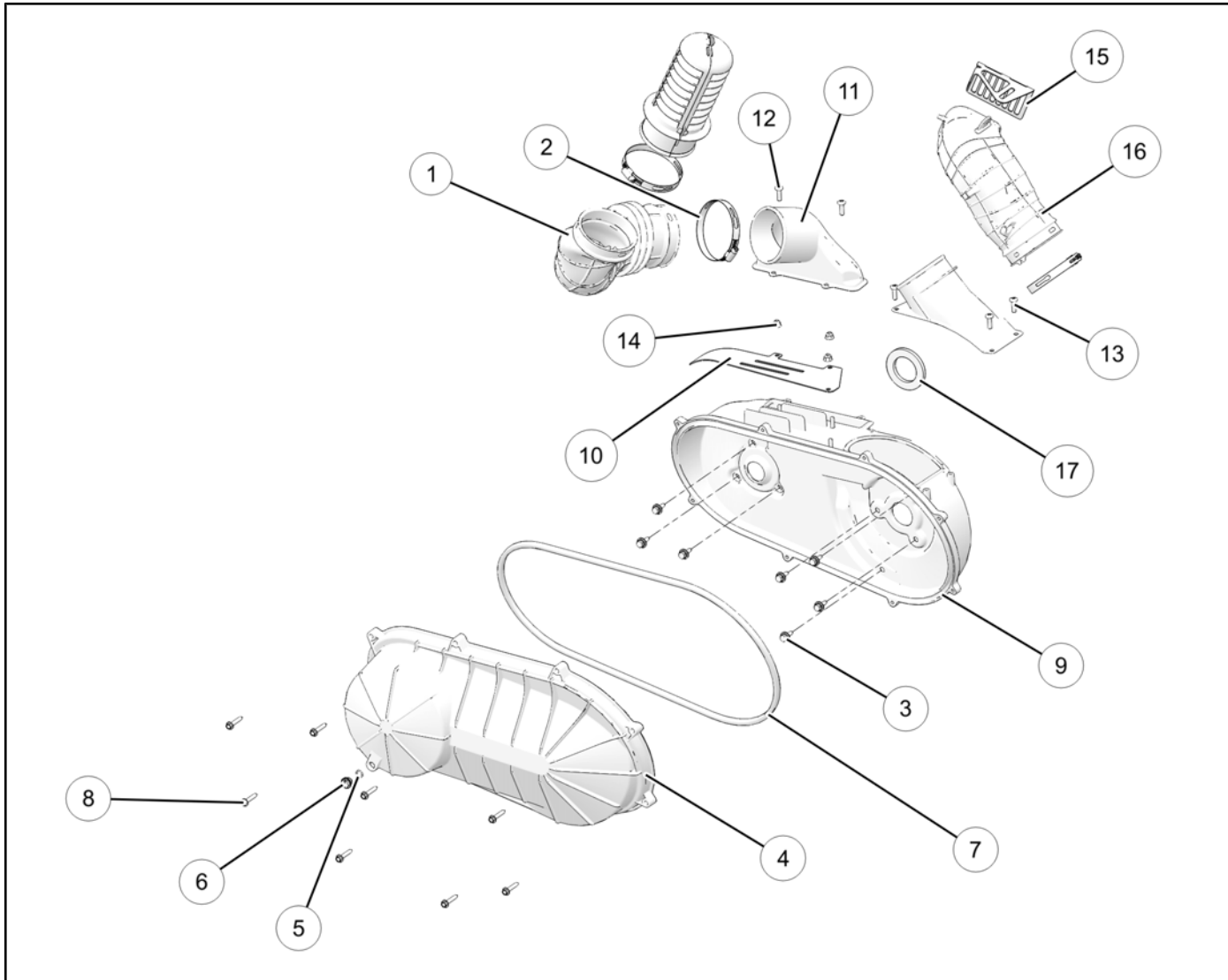
1. **Belt Inspection.**
2. **Drive and Driven Clutch Buttons and Bushings, Drive Clutch Shift Weights and Pins, Drive Clutch Spider Rollers and Roller Pins, Drive and Driven Clutch Springs.**
3. **Sheave Faces.** Clean and inspect for wear.
4. **PVT System Sealing.** Refer to the appropriate illustration (s) on the following pages. The PVT system is air cooled by fins on the drive and driven clutch stationary sheaves. The fins create a low pressure area in the crankcase casting, drawing air into the system through an intake duct. The opening for this intake duct is located at a high point on the vehicle (location varies by model). The intake duct draws fresh air through a vented cover. All connecting air ducts (as well as the inner and outer covers) must be properly sealed to ensure clean air is being used for cooling the PVT system and also to prevent water and other contaminants from entering the PVT area. This is especially critical on units subjected to frequent water forging.



# PVT SYSTEM

## PVT SYSTEM SERVICE

### PVT Covers and Ducting Components

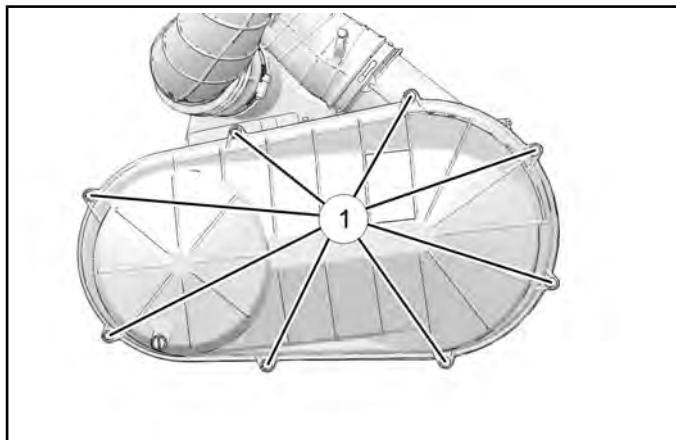


① Clutch Duct Intake Assembly	⑩ Bracket, Cover Guard
② Clamp, Worm	⑪ Air Inlet Duct
③ Bolt and Washer	⑫ Screw
④ Cover Assembly, Outer	⑬ Screw
⑤ O-Ring	⑭ Nut, Nylok
⑥ Drain Plug, Cover	⑮ Bracket, Belt Screen
⑦ Seal, Cover	⑯ Hose, Air Outlet
⑧ Screw	⑰ Seal, Cover
⑨ Cover Assembly	

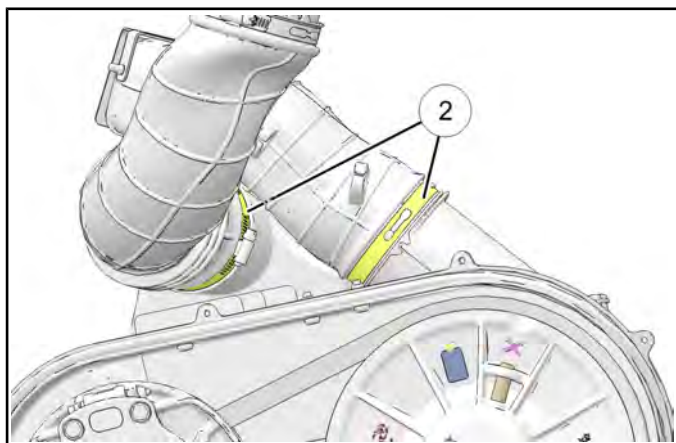
## 5.6

## PVT Disassembly

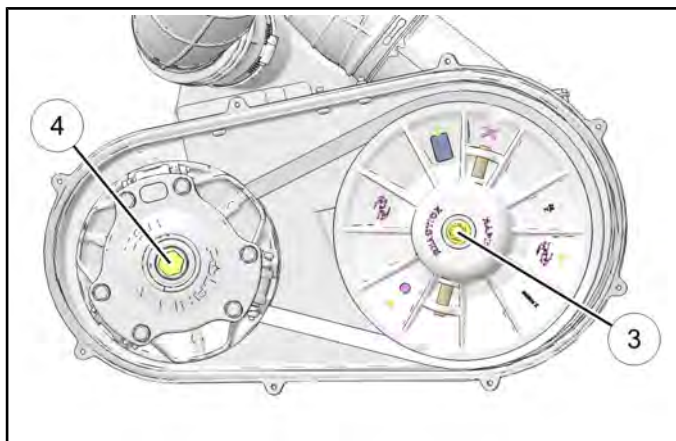
1. Remove the eight screws ① retaining the outer clutch cover.



2. Remove the PVT intake and exhaust ducts by loosening the clamps ② retaining the ducts to the inner clutch cover.



3. Remove the drive belt. (see Chapter 5 – Belt Removal, page 5.9)
4. Remove the Driven Clutch retaining bolt ③.
5. Remove the Drive Clutch retaining bolt ④.




6. Remove the seven fasteners retaining the inner clutch cover to the engine and transmission.
7. Remove the inner clutch cover from the vehicle.

# PVT SYSTEM


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## PVT Assembly


1. Install the inner clutch cover in the vehicle.
2. Install the seven fasteners retaining the inner clutch cover to the engine and transmission. Torque to specification.

 = T
Inner Clutch Cover Fasteners: <b>10 ft-lb (14 Nm)</b>


3. Install the Drive Clutch. Torque mounting bolt to specification.

 = T
Drive Clutch Bolt: <b>96 ft-lb (130 Nm)</b>


4. Install the Driven Clutch. Torque mounting bolt to specification.

 = T
Driven Clutch Bolt: <b>38 ft-lb (52 Nm)</b>

5. Install the drive belt.
6. Install the PVT intake and exhaust ducts to the inner clutch cover. Torque clamps to specification.

 = T
Duct Clamps: <b>12 ft-lb (16 Nm)</b>

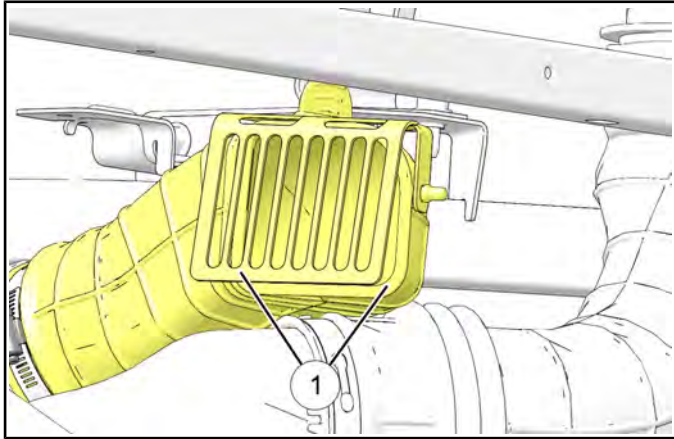
7. Install the eight screws retaining the outer clutch cover. Torque screws to specification.

 = T
Outer Clutch Cover Screws: <b>54 in-lb (5 Nm)</b>

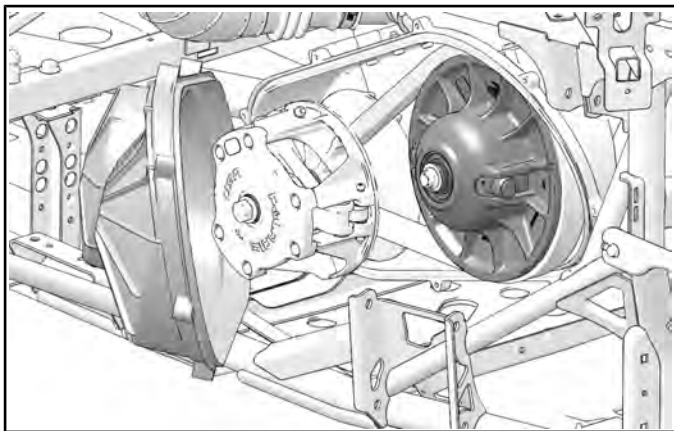
## DRIVE BELT

### Belt Removal

**NOTE:** Inspect the entire clutch outlet duct (including the outlet duct screen) when replacing a drive belt. Remove any debris found in the outlet duct or outlet duct screen ①.



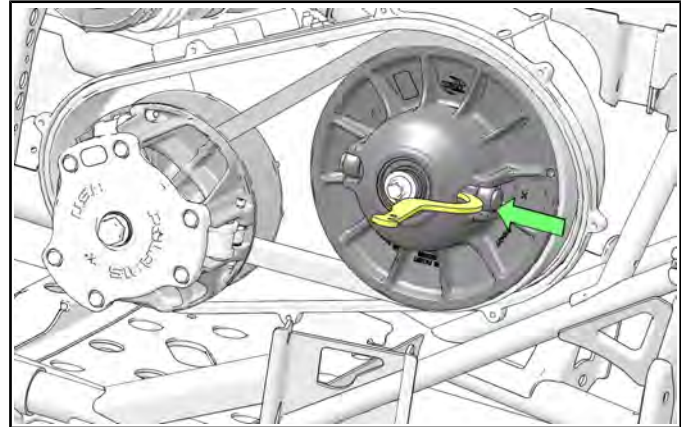
1. Remove the grease fitting on the left rear upper control arm.
2. Remove the eight screws that retain the outer clutch cover.
3. Maneuver the outer clutch cover outward as shown below to access the drive belt.



**NOTE:** Removal of left rear wheel or left rear shock is **NOT** necessary for belt replacement.

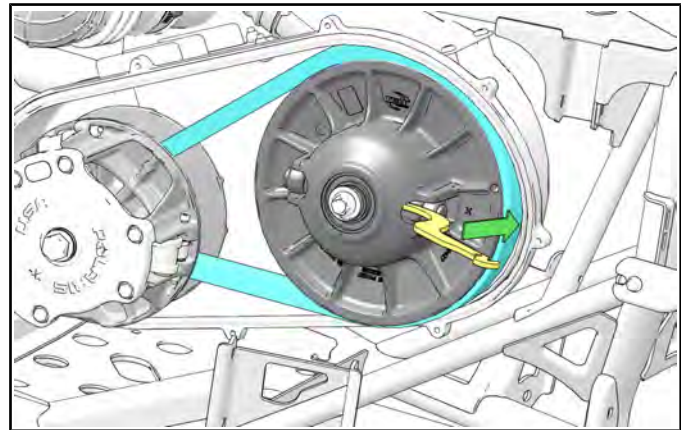
4. Mark the drive belt direction of rotation so that it can be installed in the same direction.

5. **EBS Models ONLY** Insert clutch spreader tool (2877408) ② into the driven clutch as shown (tool included with vehicle's tool kit).



**NOTE:** Make sure the tool is square with the moveable sheave surface of the driven clutch.

6. Rotate tool towards the clutch to open the sheaves.



7. Walk the belt out of the driven clutch and drive clutch. Remove the belt from the vehicle.

5

# PVT SYSTEM

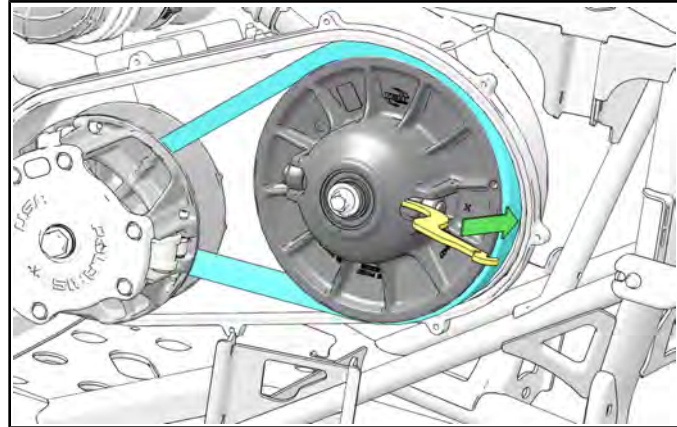
## Belt Inspection

1. Inspect belt for hour glassing (extreme circular wear in at least one spot and on both sides of the belt). Hour glassing occurs when the drive train does not move and the drive clutch engages the belt.
2. Inspect belt for loose cords, missing cogs, cracks, abrasions, thin spots, or excessive wear. Compare belt measurements with a new drive belt. Replace if necessary.
3. Belts with thin spots, burn marks, etc., should be replaced to eliminate noise, vibration, or erratic PVT operation. See the Troubleshooting Chart at the end of this chapter for possible causes.

## Belt Installation

**NOTE: Be sure to install belt in the same direction as it was removed.**

1. **EBS Models only** With the clutch spreader tool installed (**2877408**), loop the belt over the drive clutch and over the driven clutch.



2. Rotate the driven clutch and walk the belt into the clutch.
3. Remove the clutch spreader tool from driven clutch.
4. Rotate / spin the driven clutch and belt approximately 5-7 times to properly seat the belt in the driven clutch.
5. Install the outer clutch cover and eight screws. Torque screws to specification.



Outer Clutch Cover Retaining Screws:  
**54 in-lb (5 Nm)**

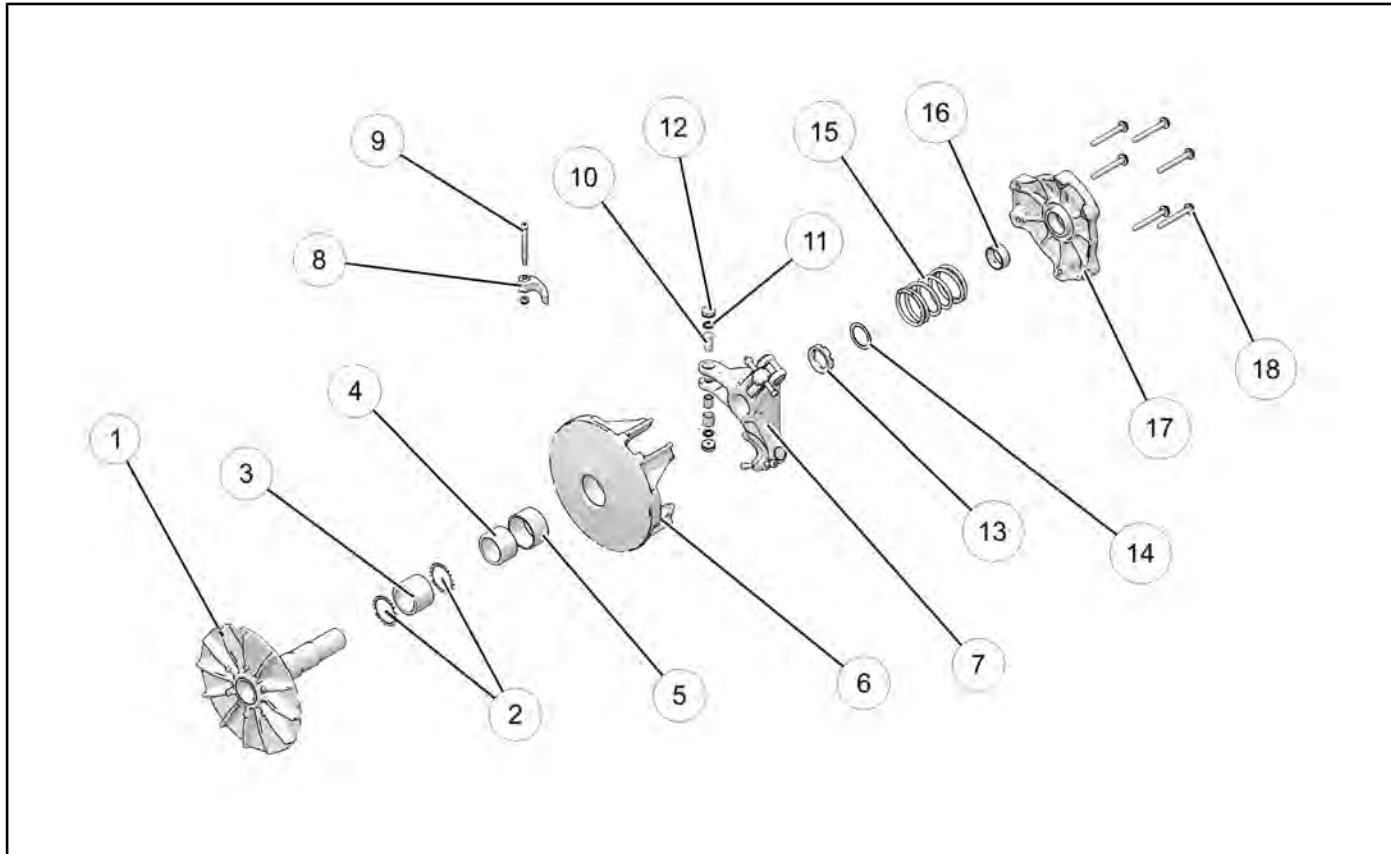
6. Install the grease fitting on the left rear upper control arm.

## PVT Break-In (Drive Belt / Clutches)

A proper break-in of the clutches and drive belt will ensure a longer life and better performance. Break in the clutches and drive belt by operating at slower speeds during the 10 hour break-in period as recommended (see Chapter 3 Engine Break-In Period, page for break-in example). Pull only light loads. Avoid aggressive acceleration and high speed operation during the break-in period.

**DRIVE CLUTCH SERVICE**

**Drive Clutch Assembly View**



**5**

① Stationary Sheave	⑩ Pin
② Washers	⑪ Washer
③ Needle Bearing (non-EBS models) One Way Clutch (EBS models)	⑫ Button
④ Spacer	⑬ Jam Nut <b>250 ft-lb (339 Nm)</b> <b>(Apply 0.1 mL Loctite® 620™)</b>
⑤ Bushing	⑭ Limiter Spacer
⑥ Moveable Sheave	⑮ Clutch Spring
⑦ Spider <b>290 ft-lb (393 Nm)</b> <b>(Apply 0.4 mL Loctite® 620™)</b>	⑯ Cover Bushing
⑧ Shift Weight	⑰ Cover
⑨ Bolt <b>20 in-lb (2 Nm)</b>	⑱ Cover Bolt <b>8 ft-lb (11 Nm)</b>



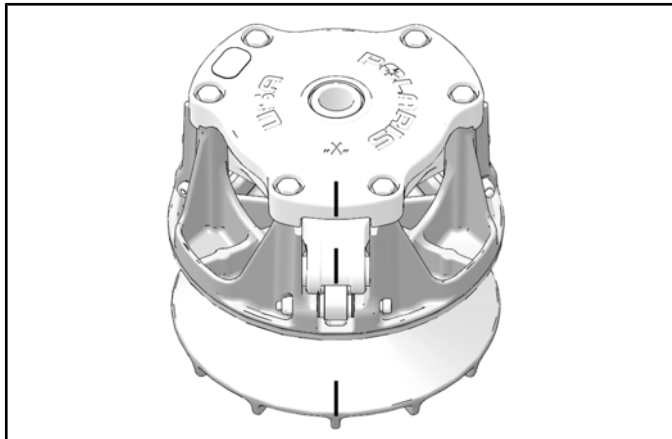
# PVT SYSTEM

## Drive Clutch Disassembly

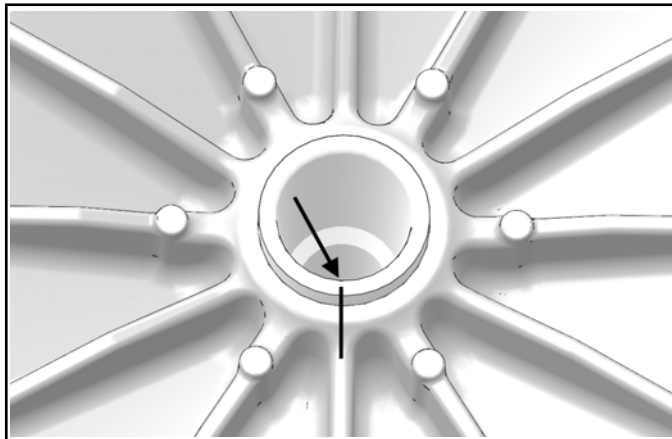
### CAUTION

The clutch assembly is a precisely balanced unit. Never replace parts with used parts from another clutch assembly!

1. Using a permanent marker, mark the cover, spider, moveable and stationary sheaves for reference, as the cast in X's may not have been in alignment before disassembly.



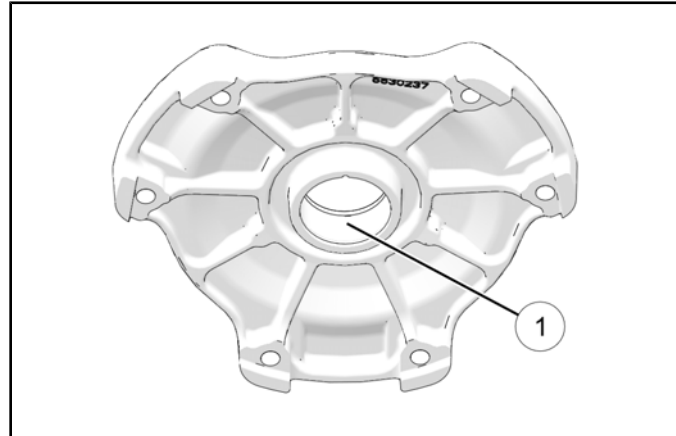
2. Mark the stationary sheave and clutch shaft to verify the shaft has not rotated in the sheave after tightening the spider during clutch assembly.



**NOTE:** Upon reassembly, if the reference marks created in step 2 are not in alignment, the clutch will not be in balance and the assembly **MUST** be replaced.

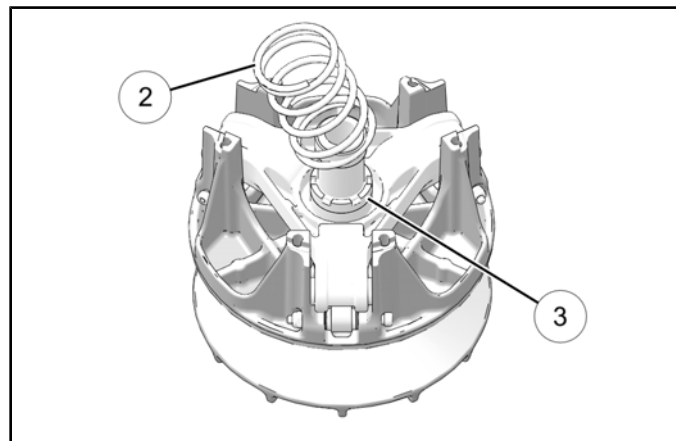
3. Remove cover bolts evenly in a cross pattern and remove cover plate.

4. Inspect cover bushing ①. The outer cover bushing is manufactured with a Teflon™ coating. Wear is determined by the amount of Teflon™ remaining on the bushing.



**Cover Bushing Inspection:**  
Replace the cover bushing if more brass than Teflon™ is visible on the bushing. Refer to bushing replacement in this chapter.

5. Inspect area on shaft where bushing rides for wear, galling, nicks, or scratches. Replace clutch assembly if worn or damaged.
6. Remove and inspect the clutch spring ②. Refer to "Drive Clutch Spring Inspection".



7. Remove and inspect limiter spacer(s) ③. Replace if necessary.

### CAUTION

DO NOT reassemble the drive clutch without the limiter spacer. Belt life will be greatly reduced.

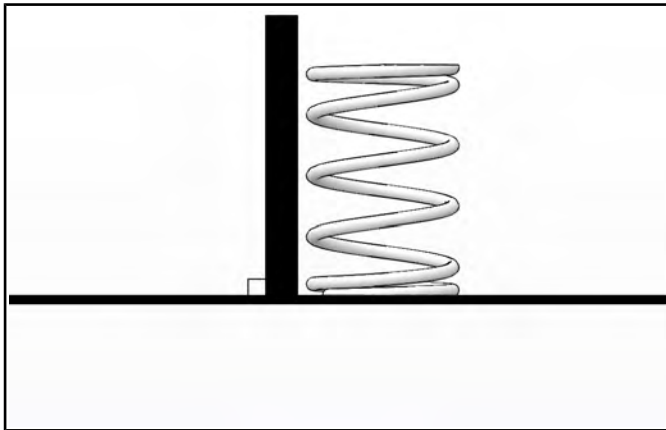
## Drive Clutch Spring Inspection

### CAUTION

Never shim a drive clutch spring to increase its compression rate. This may result in complete stacking of the coils and subsequent clutch cover failure.

The drive clutch spring is one of the most critical components of the PVT system. It is also one of the easiest to service. Due to the severe relaxation the spring is subject to during operation, it should always be inspected for tolerance limits during any clutch operation diagnosis or repair.

Check to see that spring coils are parallel to one another using a straight-edge. Distortion of the spring indicates stress fatigue, requiring replacement.



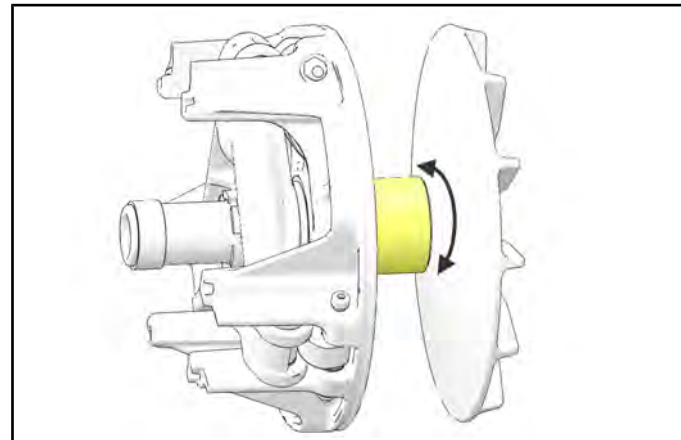
## Drive Clutch Spring Specifications

Part Number	7044263
Color	Black / Red
Free Length	3.219" (81.76 mm)
Spring Wire Diameter	0.177" (4.50 mm)

## Bearing Inspection

### Needle Bearing Inspection (non-EBS clutch)

1. Rotate the clutch bearing in both clockwise and counter-clockwise directions. The non-braking needle bearing should rotate in both directions on the shaft with only a slight amount of drag.
2. Verify there is no binding or rough spots. If problems are noted continue with disassembly.



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### One Way Bearing Inspection (EBS clutch)

1. Rotate the clutch bearing in both clockwise and counter-clockwise directions. The one way bearing should rotate smoothly in one direction and lock up in the opposite direction.
2. Verify there is no binding or rough spots when rotating the bearing in the unlocked direction. If problems are noted continue with disassembly.

**NOTE:** Excessive drag in the bearing may cause difficult shifting or vehicle creep at idle.

# PVT SYSTEM

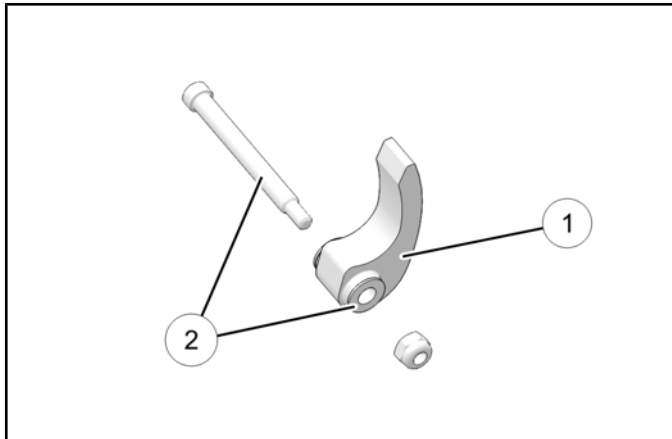
## Shift Weight Inspection

Remove shift weight bolts and weights. Inspect the contact surface of each weight. The surface ① should be smooth and free of dents or gall marks. Inspect the weight pivot bore and bolts ② for wear or galling. If weights or bolts are worn or broken, replace in sets of three with new bolts and nuts.

### CAUTION

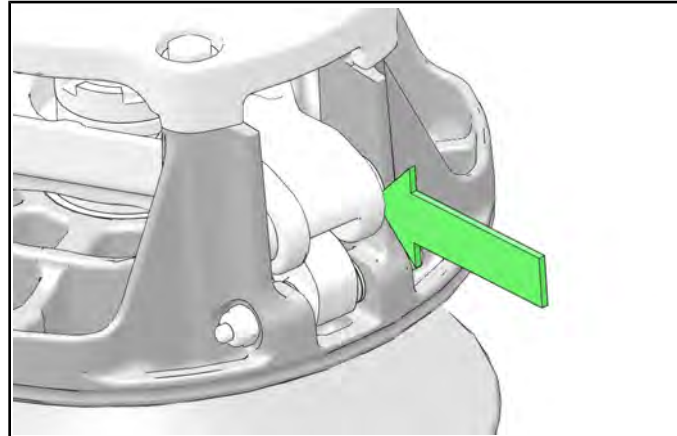
The clutch assembly is a precisely balanced unit. Never replace parts with used parts from another clutch assembly!

**NOTE:** A damaged shift weight is usually caused by a damaged or stuck roller in the spider assembly. See "Drive Clutch Roller Pin and Button Service".



## Button to Tower Clearance

1. Inspect the button to tower clearance as shown. Replace the spider buttons if clearance is beyond specification.

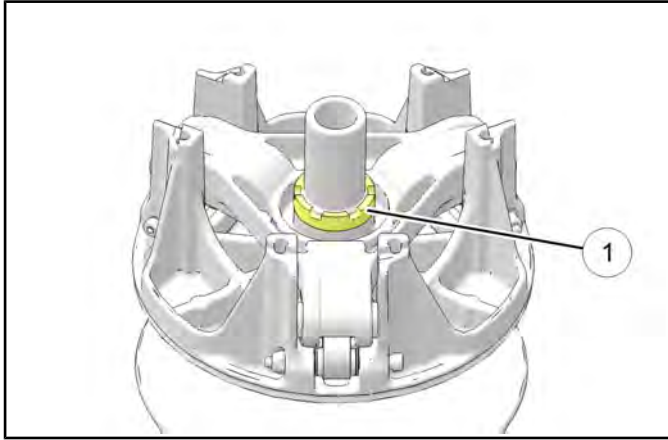


**Button to Tower Clearance:  
0.000-.012" (.000-.304 mm)**

2. Inspect the tower sheave surfaces that the buttons slide on. Replace the drive clutch if worn, damaged or cracked.

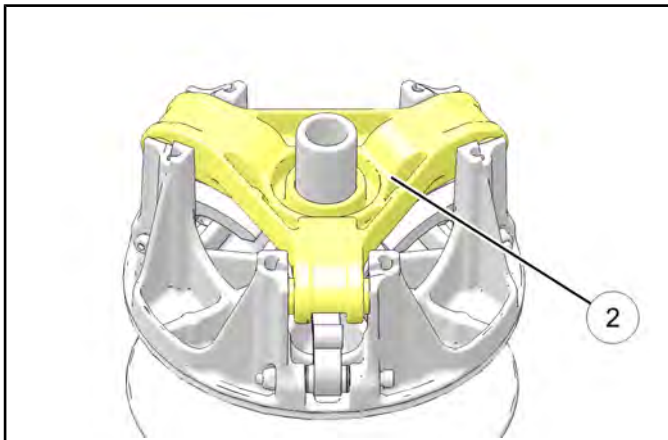
## Spider Removal

1. Install clutch onto holding fixture (2871358-A) and secure in bench vice. Loosen and remove the spider jam nut ① (counterclockwise) using the Clutch Spider Nut Socket (PU-50578).



**Clutch Spider Nut Socket: PU-50578**  
**Clutch Holding Fixture: PN 2871358-A**

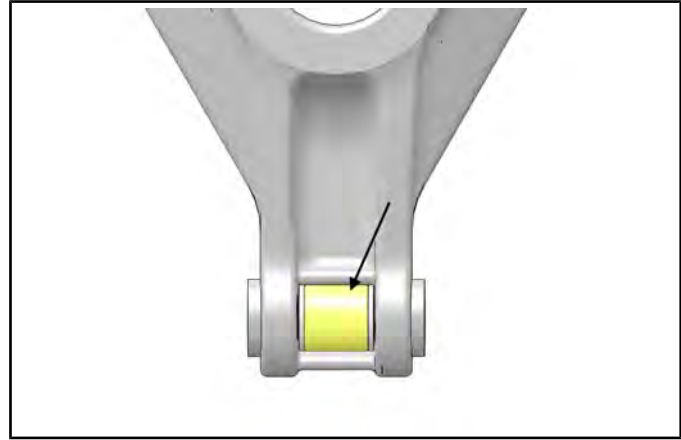
2. Loosen and remove the spider ② (counterclockwise) using Clutch Spider Removal / Installation Tool (PN 2870341).



**Spider Removal / Installation Tool: 2870341**  
**Clutch Holding Fixture: 2871358-A**

## Roller, Pin and Thrust Washer Inspection

1. Inspect all rollers, roller bushings and roller pins by pulling a flat metal rod across the roller.
2. Turn roller with your finger. If you notice resistance, galling, or flat spots, replace the drive clutch.



**NOTE: Rollers, pins, thrust washers and buttons are not serviceable at the time of this publication.**

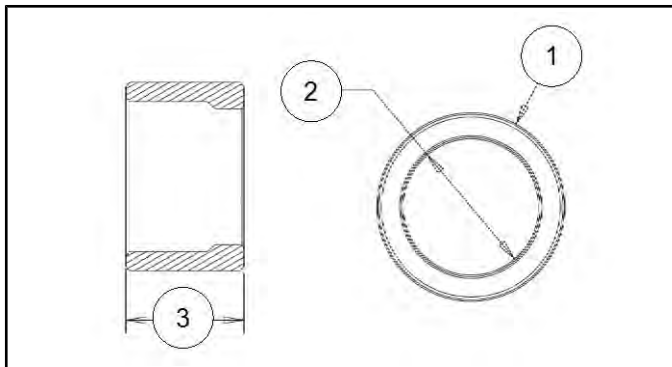
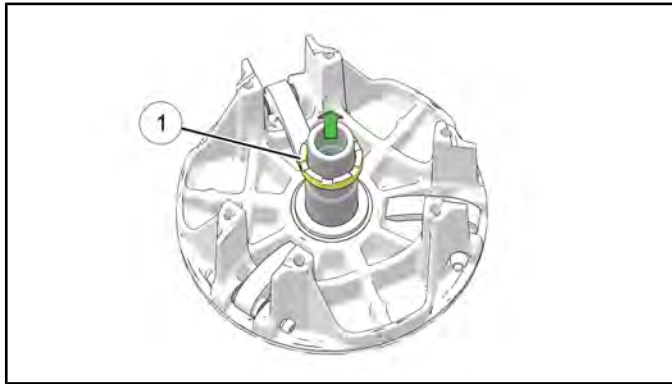
**5**

# PVT SYSTEM

## Drive Clutch Inspection

**NOTE:** Remove cover, spring, limiter spacer and spider following the instructions for drive clutch disassembly, then proceed as follows:

1. Remove and inspect the moveable sheave spacer ①. Visually inspect the spacer for damage and replace if necessary.

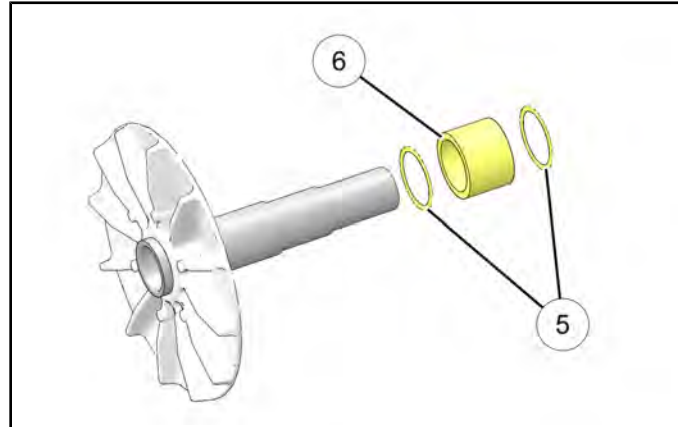


### Moveable Sheave Spacer Measurements

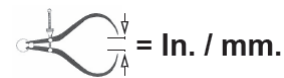
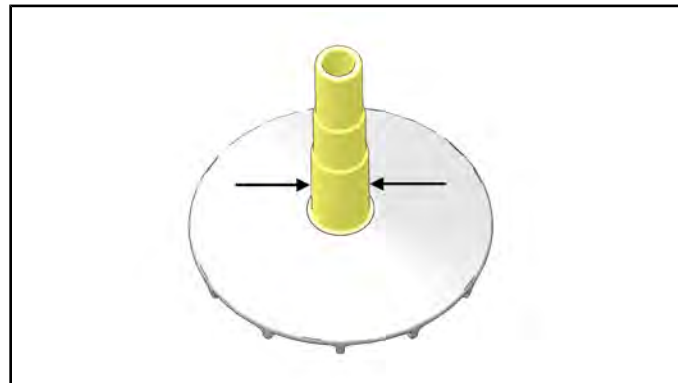
② 27.94 ± .152 mm	④ 44.399 ± .025 mm
③ 32.004 ± .076 mm	

2. Remove the moveable clutch sheave.

3. Lift thrust washers ⑤ and bearing ⑥ off the shaft. Replace as an assembly if worn, damaged, or if operational problems were noted prior to disassembly.

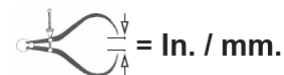


4. Inspect surface of shaft for pitting, grooves or damage. Measure the outside diameter and compare to specifications. Replace the drive clutch assembly if shaft is worn or damaged.



Shaft Diameter:  
 Standard: 1.3725 - 1.3712"  
 (34.8615 - 34.8488 mm)  
**Service Limit: 1.3704" (34.8088 mm)**

5. Visually inspect the thrust washers for damage. Measure the thickness and compare to specification. Replace if worn or damaged.

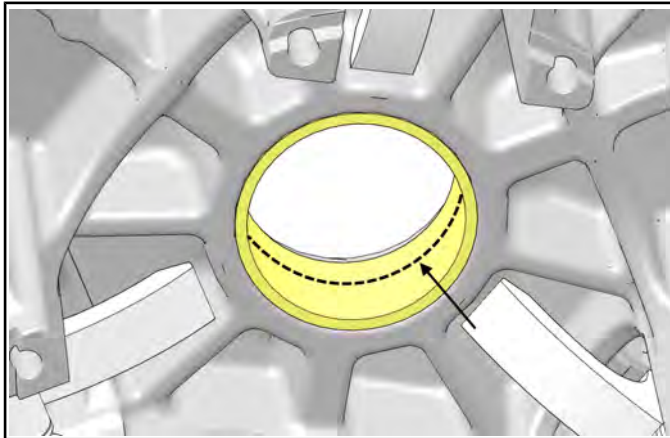


Thrust Washer Thickness:  
 Standard: .030" (.76 mm)  
**Service Limit: .025" (.64 mm)**

**Moveable Sheave Bushing Inspection**

Inspect the Teflon™ coating (arrow) on the moveable sheave bushing. Inspect both sheaves for signs of wear, grooving or cracking. De-glaze sheave surfaces with a 3M™ Scotch-Brite Pad if needed.

**Moveable Sheave Bushing Inspection:**  
 Replace the cover bushing if more brass than Teflon™ is visible on the bushing. Refer to bushing replacement in this chapter.



**Bushing Service**

**NOTE: Special Tools Required**

**EBS Clutch Bushing Tool Kit - 2201379**

ITEM	QTY.	PART #	TOOL DESCRIPTION
A, B	1	5132027	EBS Puller Tool
C	1	5132501	EBS Puller Nut
D	1	5132029	EBS Main Adapter
E	1	5132028	EBS Bushing Removal Tool Instructions
-	1	9915111	Instructions

**Additional Special Tools**

QTY.	PART #	TOOL DESCRIPTION
1	2871226	Clutch Bushing Replacement Tool Kit
1	2870386	Piston Pin Puller

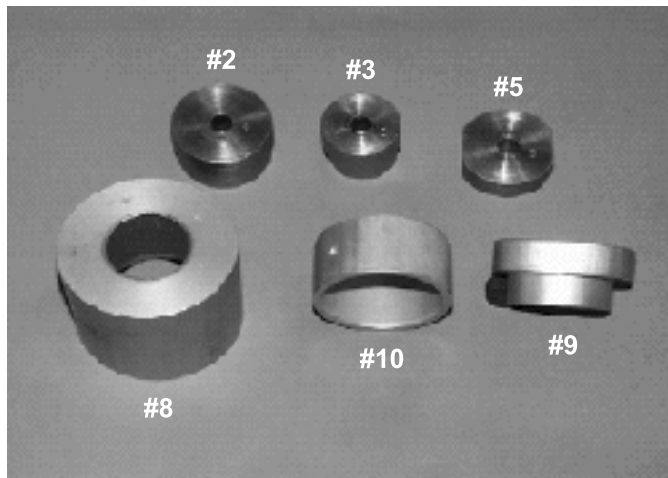
**\*Clutch Bushing Replacement Tool Kit (PN 2871226)**

ITEM	QTY.	PART #	TOOL DESCRIPTION
#2	1	5020628	P-90 Drive/Driven Clutch Bushing Install Tool
#3	1	5020629	Drive Clutch Cover Bushing Removal /Installation Tool
#5	1	5020631	P-90 Driven Clutch Cover Bushing Removal Tool
#8	1	5020632	Main Puller Adapter
#9	1	5010279	Adapter Reducer
#10	1	5020633	Number Two Puller Adapter

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# PVT SYSTEM



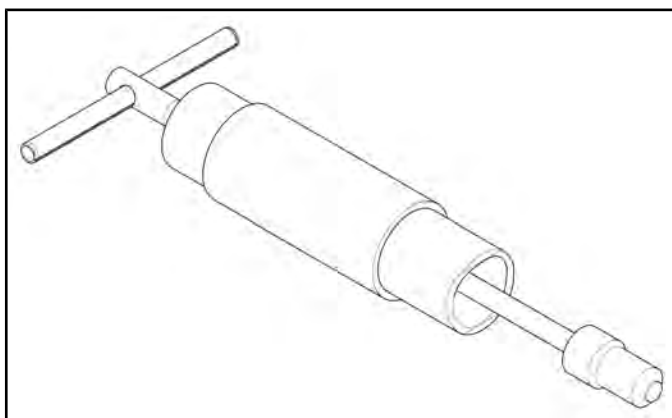
**NOTE:** Bushings are installed at the factory using Loctite® 648. In order to remove bushings it will be necessary to apply heat evenly to the area around each bushing. Clean all residual Loctite® from bushing bore prior to installing new bushing.

## CAUTION

Clutch components will be hot! In order to avoid serious burns, wear insulated gloves during the removal process.

### Moveable Sheave - Bushing Removal

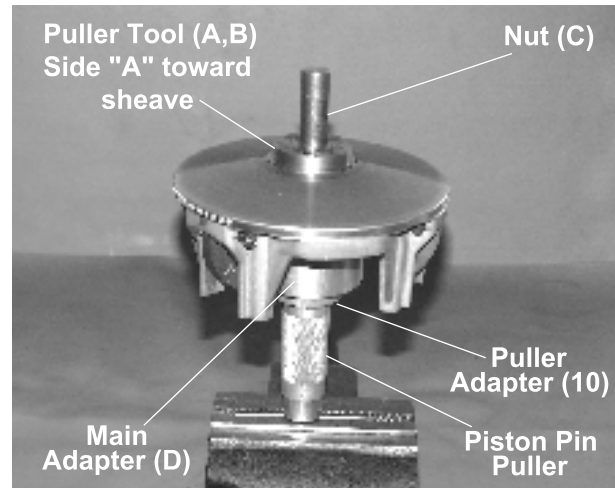
1. Remove clutch as outlined previously in this chapter.
2. Install handle end of the Piston Pin Puller (PN 2870386) securely into bench vise and lightly grease puller threads.



**Piston Pin Puller: PN 2870386**

3. Remove nut from puller rod and set aside.

4. Install puller adapter ⑩ from kit PN 2871226.
5. Install main adapter (Item D) onto puller.



6. With towers pointing toward the vise, slide sheave onto puller rod.
7. Install removal tool (Item A, B) into center of sheave with "A side" toward sheave.

**NOTE:** Use Bushing Tool PA-47336.

8. Install nut (C) onto end of puller rod and hand tighten. Turn puller barrel to increase tension on sheave if needed. Using a hand held propane torch, apply heat around outside of bushing until tiny smoke tailings appear.
9. Turn sheave counterclockwise on puller rod until it comes free. Lift sheave off puller.
10. Remove nut from puller rod and set aside.
11. Pull bushing removal tool and adapter from puller rod. Remove bushing from tool and discard.

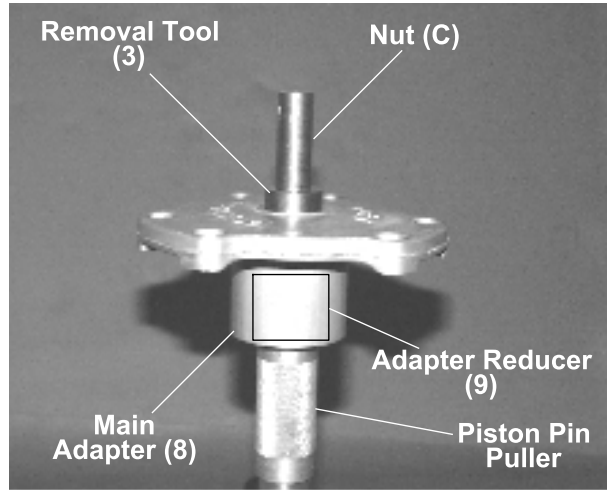
### Moveable Sheave - Bushing Installation

12. Apply Loctite® 648 evenly to bushing bore inside moveable sheave.
13. Set bushing in place on sheave.
14. Insert installation puller tool (Item A/B) with "A" side down, into center of bushing.
15. With towers pointing upward, slide sheave, bushing and tool onto puller rod.
16. Install nut on puller rod and hand tighten. Turn barrel to apply additional tension if needed.
17. Turn sheave counterclockwise, making sure bushing is drawn straight into bore. Continue until bushing is seated.
18. Remove nut from puller rod and set aside.
19. Remove sheave from puller.

20. Remove installation tool.

### Cover Bushing Removal

21. Install main adapter ⑧ on puller.



22. Install adapter reducer ⑨.

23. From outside of clutch cover, insert removal tool ③ into cover bushing.

24. With inside of cover toward vise, slide cover onto puller.

25. Install nut onto puller rod and hand tighten. Turn puller barrel to increase tension as needed.

26. Turn clutch cover counterclockwise on puller rod until bushing is removed and cover comes free.

27. Remove nut from puller rod and set aside.

28. Remove bushing and bushing removal tool from puller. Discard bushing.

### Cover Bushing Installation

29. Apply Loctite® 648 evenly to bushing bore in the cover.

30. Working from inside of cover, insert new bushing and bushing installation tool into center of clutch cover.

31. With main adapter on puller, insert cover onto puller rod, placing outside of cover toward vise.

32. Install nut on rod and hand tighten. Turn puller barrel to apply more tension if needed.

33. Turn clutch cover counterclockwise on puller rod until bushing is seated.

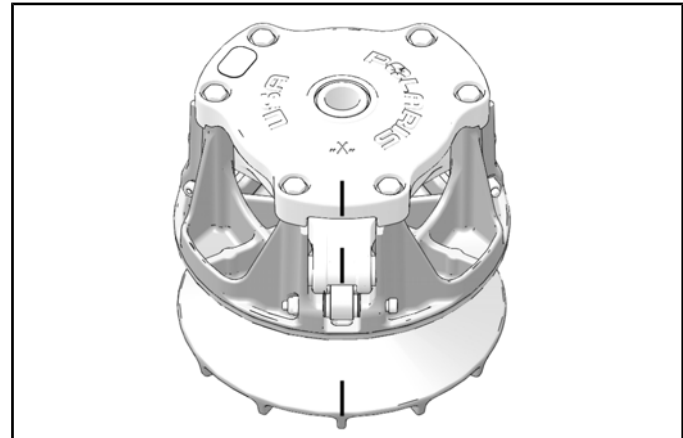
34. Remove nut from puller rod. Take installation tool and clutch cover off rod.

## Drive Clutch Assembly

### CAUTION

Do not apply oil or grease to the bushings.

Reassemble the drive clutch in the following sequence. Be sure marks that were made during disassembly are aligned during each phase of assembly.

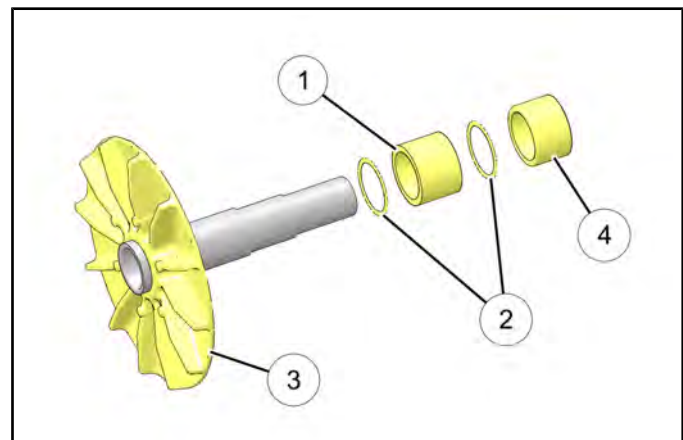


1. Install the shift weights, bolts and nuts onto the moveable sheave. Torque shift weight bolts to specification.



Shift Weight Fasteners:  
20 in-lb (2 Nm)

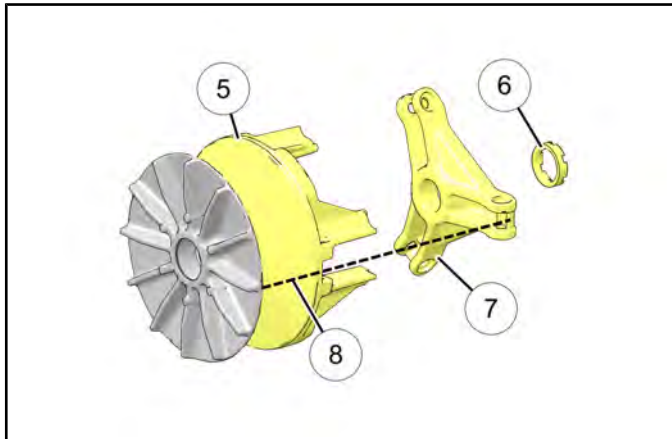
2. Install the non-braking needle bearing ①, the two washers ② and the spacer ④ onto the stationary sheave ③.



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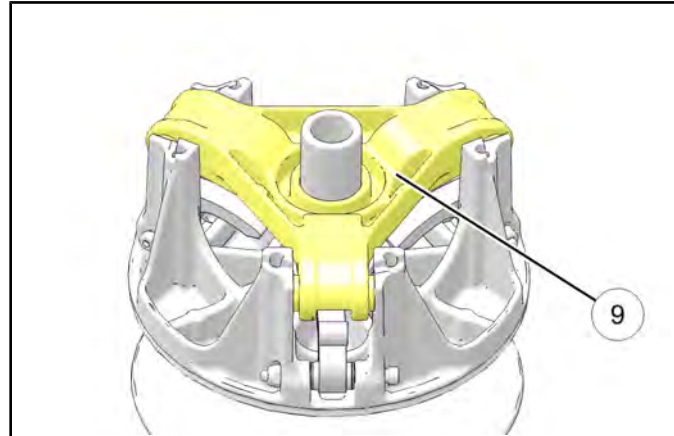
# PVT SYSTEM

3. Install moveable sheave onto stationary sheave shaft. Be sure the moveable sheave slides freely on the spacer.
4. Apply 0.4 mL of Loctite® 620™ and 0.4 mL of Loctite® 7088™ Primer in 90° apart in vertical stripes to the shaft threads.
5. Install the spider assembly onto the shaft threads. Be sure all of the alignment marks ⑨ are in alignment.



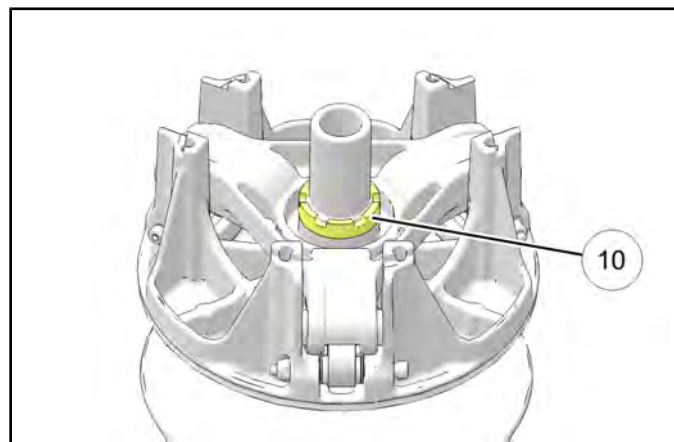
⑤ Moveable Sheave Asm
⑥ Jam Nut
⑦ Spider

6. Install clutch onto holding fixture (PN 2871358-A) and secure in a bench vice. Tighten the spider ⑨ using Clutch Spider Tool (PN 2870341). Torque spider to specification.



Spider Assembly:  
**290 ft-lb (393 Nm)**  
 (Apply 0.4 mL Loctite® 620™)

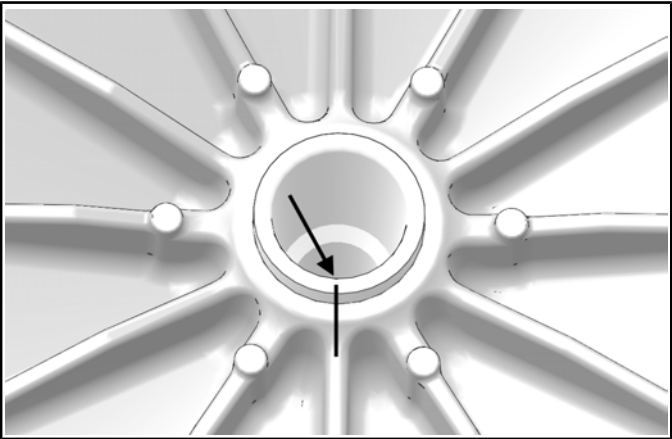
7. Apply 0.1mL of Loctite® 620™ and 0.1mL of Loctite® 7088™ Primer in 90° apart to the threads of the spider jamb nut. Install spider jamb nut onto stationary shaft threads.
8. Tighten the spider jam 10 nut using Clutch Spider Nut Socket (PU-50578). Torque jam nut to specification.



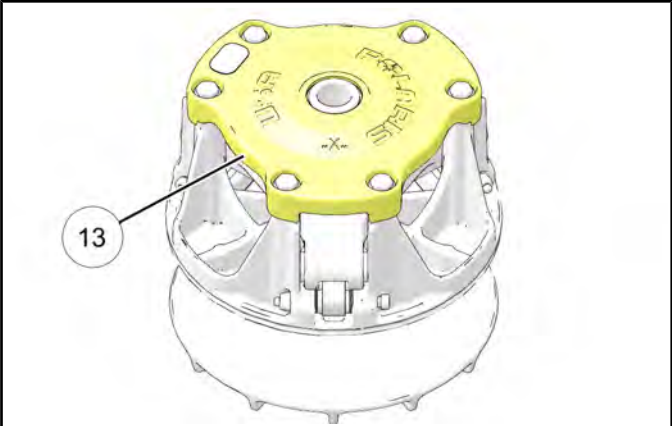
Spider Jamb Nut:  
**250 ft-lb (339 Nm)**  
 (Apply 0.1 mL Loctite® 620™) in 90° apart to the threads of the spider jamb nut.

9. After the spider and jamb nut have been torqued, remove the clutch assembly from the holding fixture and inspect the alignment marks made during disassembly.


**NOTE:** If the marks illustrated below are not in alignment upon assembly, the clutch will not be in balance and the drive clutch assembly must be replaced.



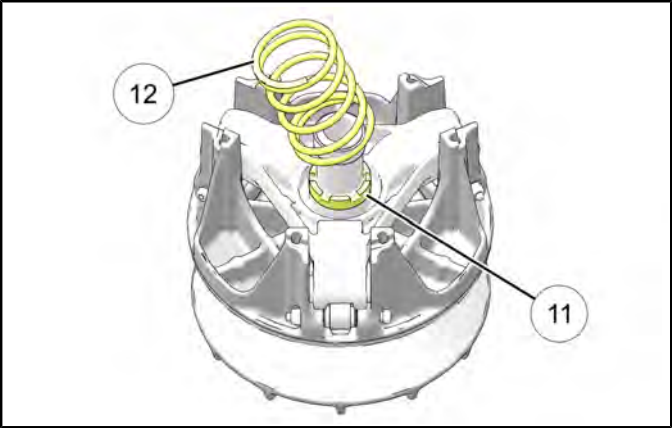
11. Install the drive clutch cover (13). Be sure all alignment marks are in alignment.



12. Install cover bolts and torque in a cross pattern evenly to specification.

 = T
Drive Clutch Cover Bolts: <b>8 ft-lb (11 Nm)</b>

10. Install the limiter spacer (11) and the clutch spring (12).



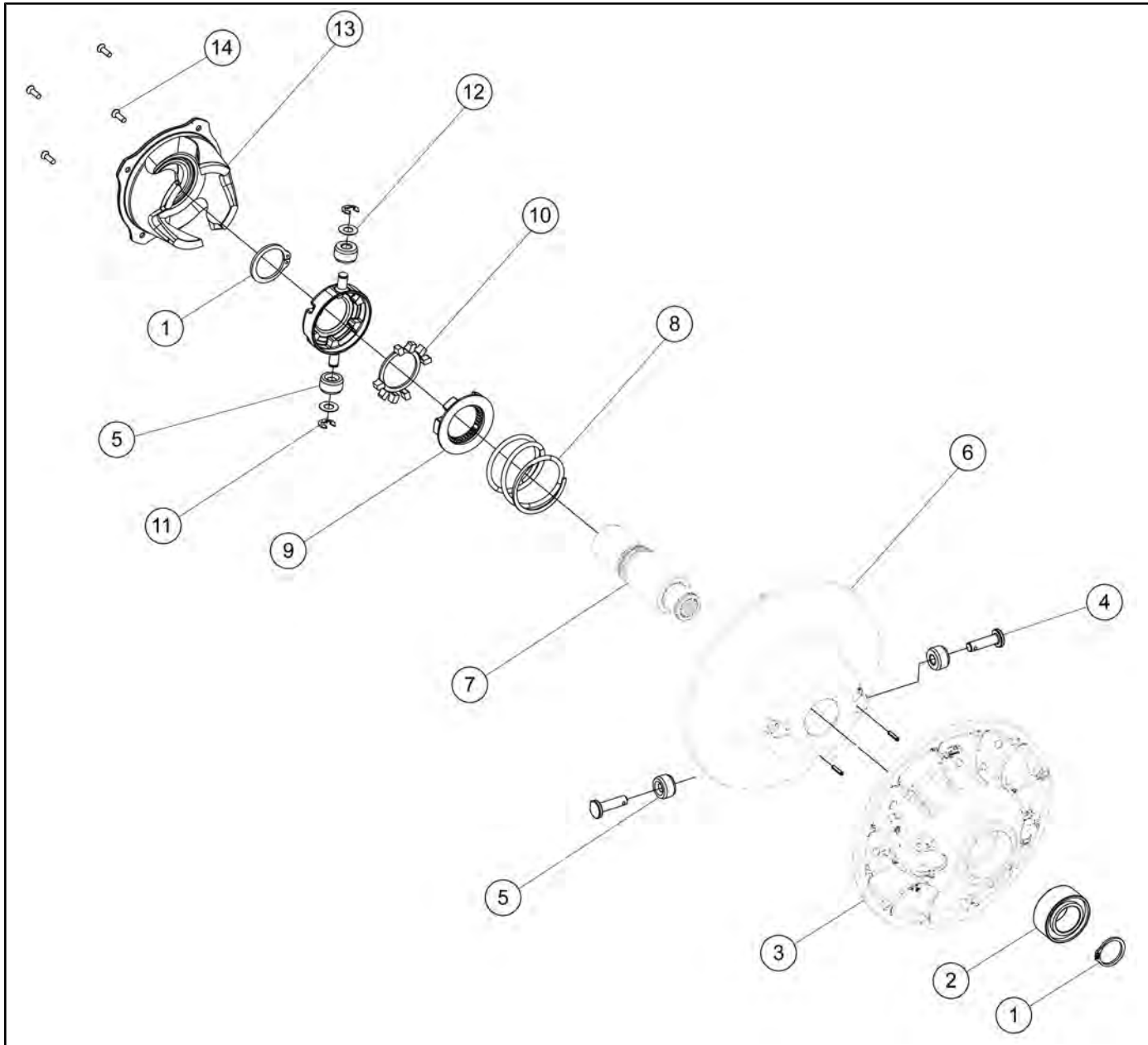
<b>CAUTION</b>
DO NOT reassemble the drive clutch without the limiter spacer. Belt life will be greatly reduced.

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# PVT SYSTEM

## DRIVEN CLUTCH SERVICE (EBS)

### Assembly View



① Snap Ring	⑧ Spring
② Bearing	⑨ Spider Insert
③ Stationary Sheave	⑩ Spider Dampener
④ Pin	⑪ E-Clip
⑤ Roller	⑫ Washer
⑥ Moveable Sheave	⑬ Helix (Cam)
⑦ Clutch Shaft	⑭ Helix Screws <b>48 in-lb (5 Nm)</b>

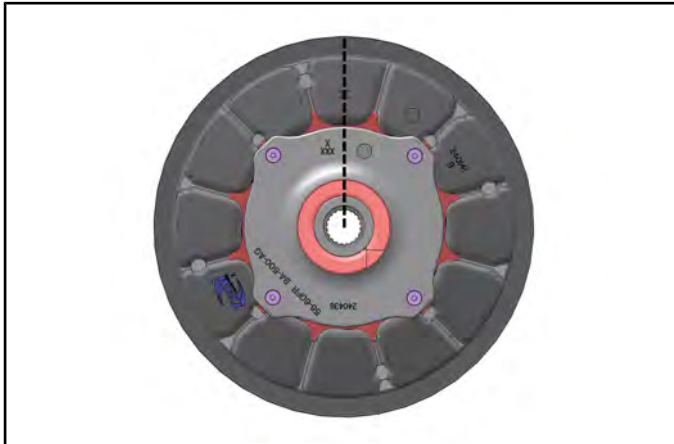
## 5.22

## Clutch Disassembly

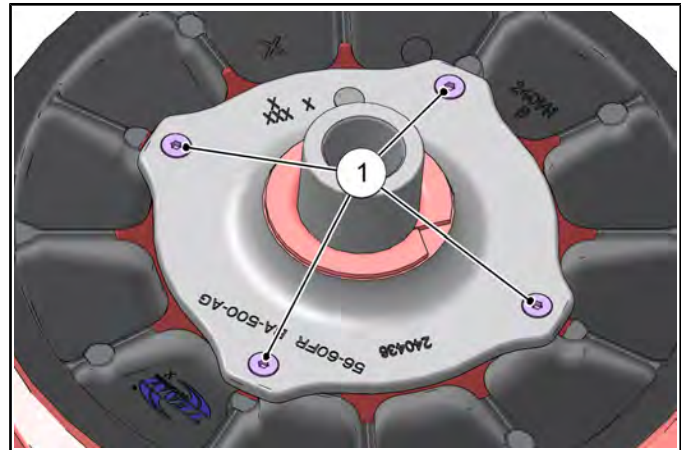
1. Remove driven clutch from the transmission input shaft. NOTE: If driven clutch is difficult to remove, use 2871056 Driven clutch puller to remove driven clutch. Do not attempt disassembly of the driven clutch from the outside snap ring. The driven clutch must be disassembled from the helix side.



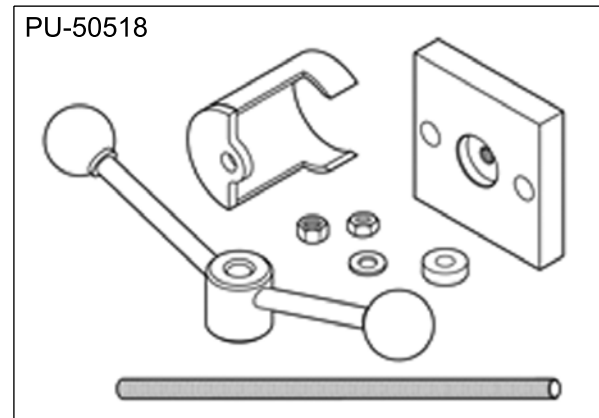
2. It is important to mark the position of the shaft, cam cover and sheave before disassembly or use the X's on the components for reference. This will aid in assembly and maintains clutch balance.



3. Remove the four screws ① that secure the cam (helix) assembly using a T25 Torx driver.



4. Place the driven clutch into the Universal Clutch Compressor **PU-50518**.

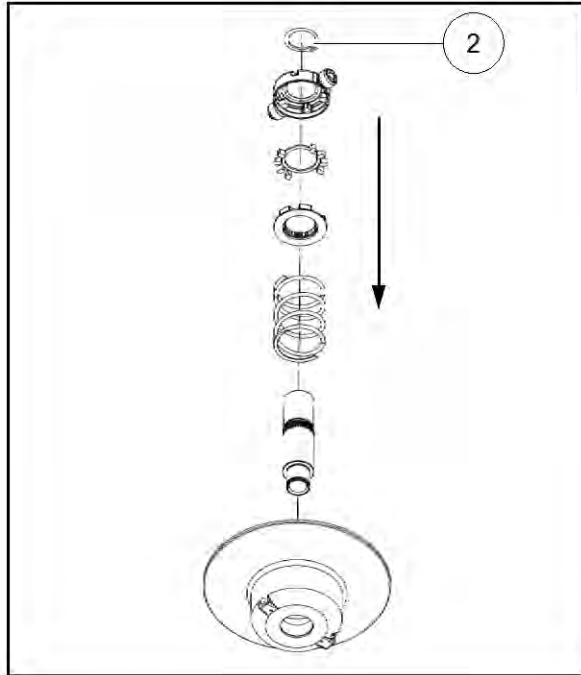


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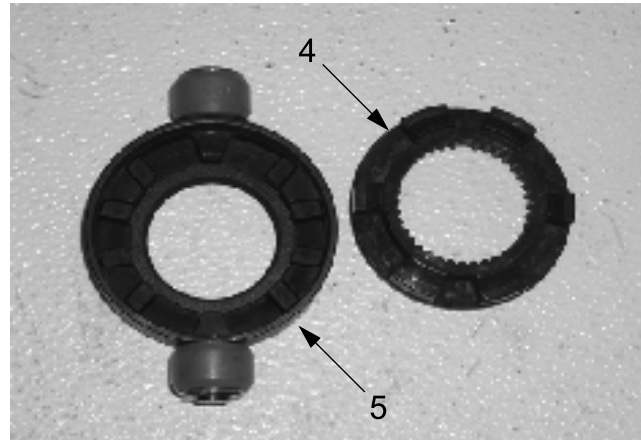


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5. Press down on the top of the spider assembly, pushing the spider onto the shaft. Remove snap ring ② and slowly release the assembly.



7. Remove the inside spider plate ④ and spider dampener ⑤. Inspect the spider dampener for wear and replace if needed.

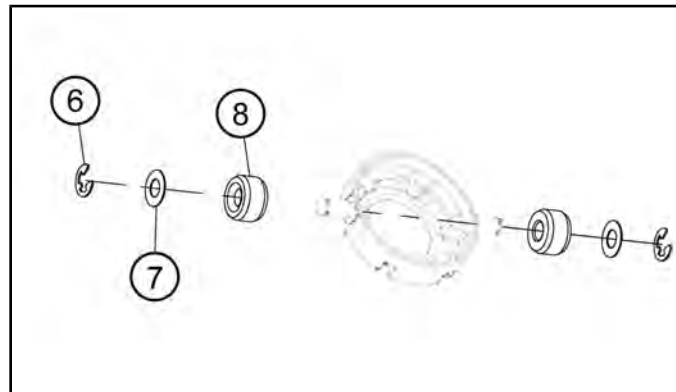


6. Remove the spider assembly and spring ③.

**NOTE: Spring is compression only and has no torsional wind.**

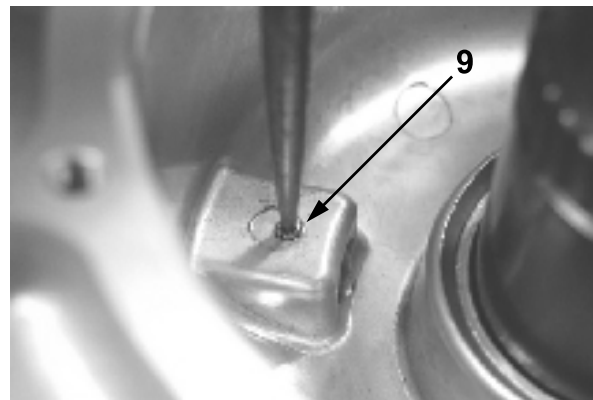


8. Remove the E-clips ⑥, washers ⑦, and the clutch rollers ⑧. Inspect the rollers for wear; replace if worn.

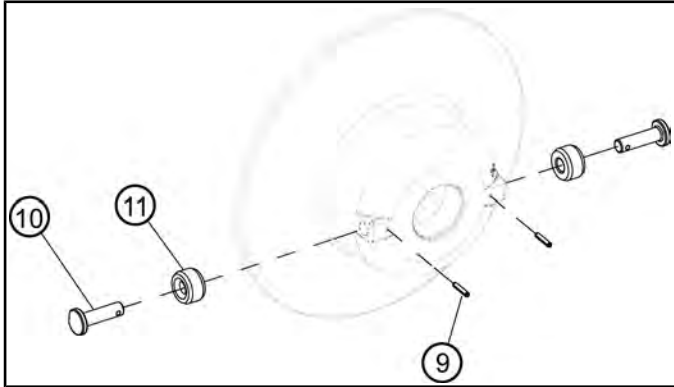


9. Remove the clutch assembly from the holding tool.

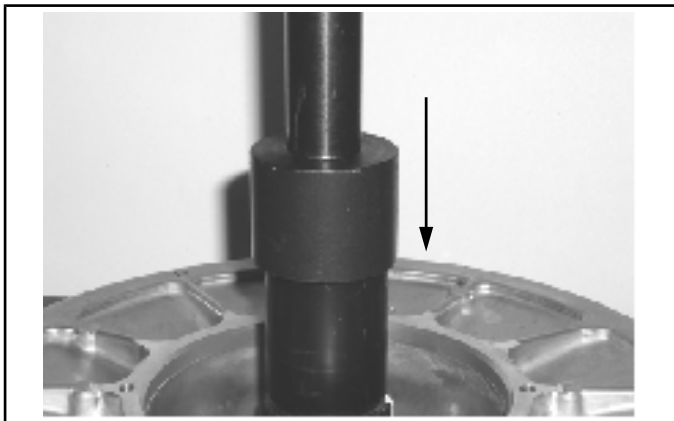
10. Press out the spring pins ⑨ in the inner sheave.



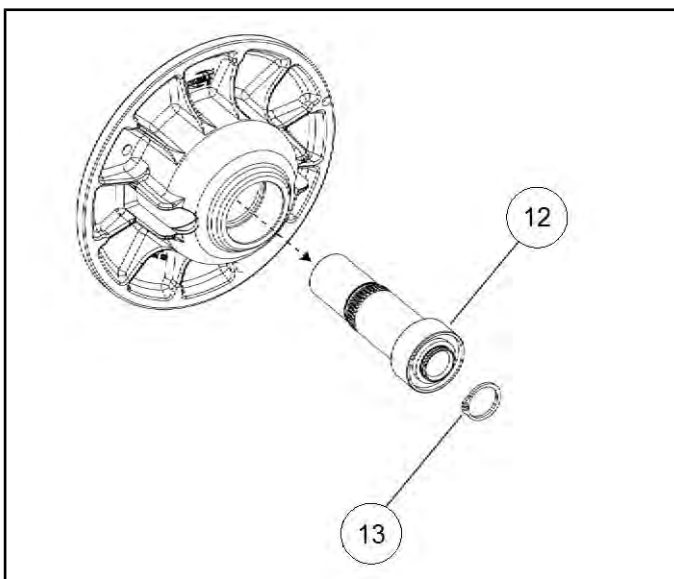
11. Pull out the clutch roller pins <sup>⑩</sup> and rollers <sup>⑪</sup>.



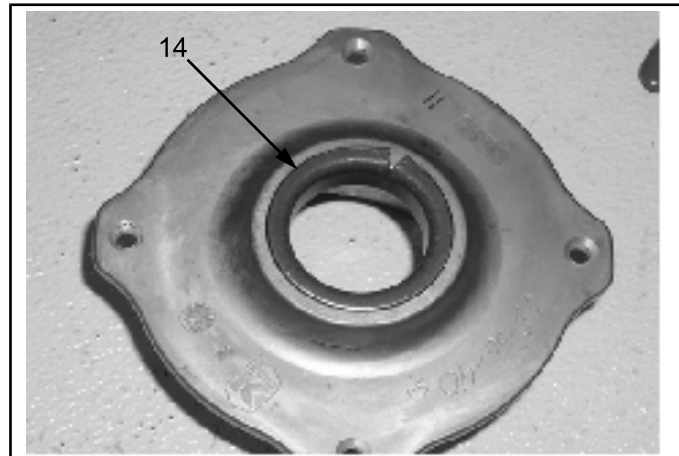
12. Press the shaft and bearing out of the outer sheave using an arbor press.



13. Inspect the bearing <sup>⑫</sup> for wear. Spin the bearing, if the bearing does not spin smoothly, replace it. To replace the bearing, remove the snap ring <sup>⑬</sup> from the end of the shaft and press the bearing off the shaft.



14. Inspect the cam (helix) assembly bushing <sup>⑭</sup> for wear. If the bushing is worn or the shaft does not fit snug into the bushing, replace the cam (helix) assembly.



15. Inspect the sheaves for excessive wear or damage.

5

# PVT SYSTEM

## Bushing Service

**NOTE: Special Tools Required**

### EBS Clutch Bushing Tool Kit - 2201379

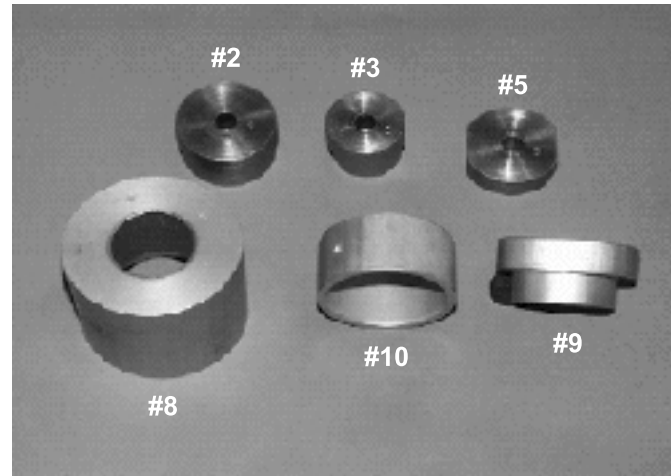
ITEM	QTY.	PART #	TOOL DESCRIPTION
A, B	1	5132027	EBS Puller Tool
C	1	5132501	EBS Puller Nut
D	1	5132029	EBS Main Adapter
E	1	5132028	EBS Bushing Removal Tool Instructions
-	1	9915111	Instructions

### Additional Special Tools

QTY.	PART #	TOOL DESCRIPTION
1	2871226	Clutch Bushing Replacement Tool Kit
1	2870386	Piston Pin Puller

### \*Clutch Bushing Replacement Tool Kit (PN 2871226)

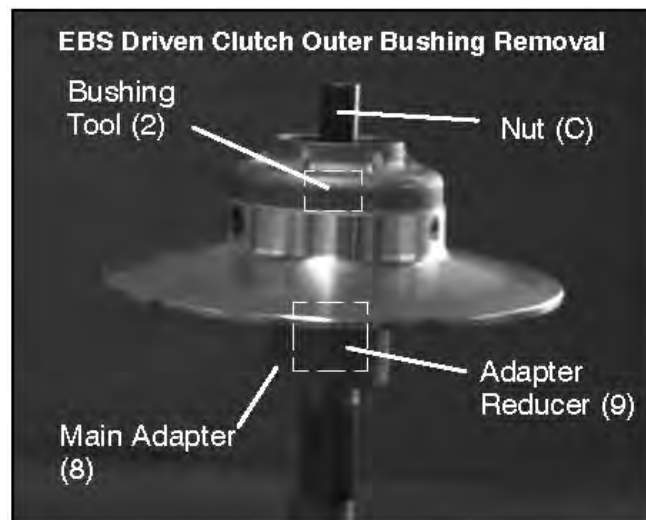
ITEM	QTY.	PART #	TOOL DESCRIPTION
#2	1	5020628	P-90 Drive/Driven Clutch Bushing Install Tool
#3	1	5020629	Drive Clutch Cover Bushing Removal/ Installation Tool
#5	1	5020631	P-90 Driven Clutch Cover Bushing Removal Tool
#8	1	5020632	Main Puller Adapter
#9	1	5010279	Adapter Reducer
#10	1	5020633	Number Two Puller Adapter



**NOTE: Bushings are installed at the factory using Loctite® 648. In order to remove bushings it will be necessary to apply heat evenly to the area around each bushing. Clean all residual Loctite® from bushing bore prior to installing new bushing.**

### Clutch Bushing Removal

1. Install main puller adapter (8) onto puller.
2. Install adapter reducer (9).
3. Using a hand held propane torch, apply heat around outside of bushing until tiny smoke tailings appear.
4. Flip sheave over so bushing faces downward and install onto puller.
5. Install bushing tool (2).

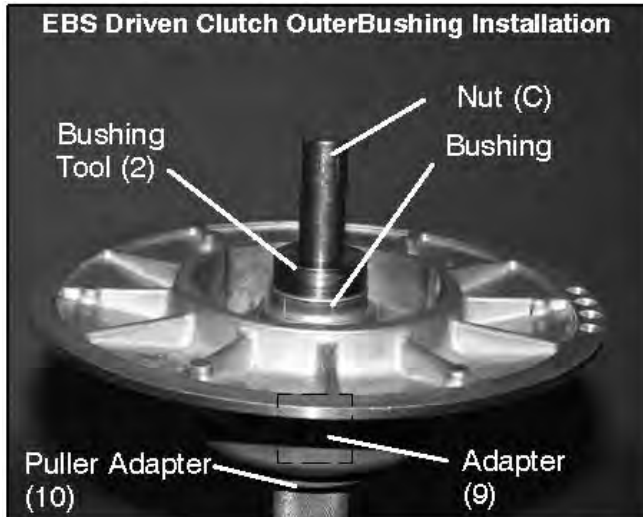


6. Install left hand nut (C) and spacer onto puller rod and tighten by hand. Turn puller barrel for further tension if needed.
7. Turn clutch sheave counterclockwise until bushing is removed and sheave comes free.

8. Remove nut (C) (left hand thread) from puller rod and set aside.
9. Remove adapters from puller.
10. Remove bushing and removal tool from adapters. Discard bushing.

### Clutch Bushing Installation

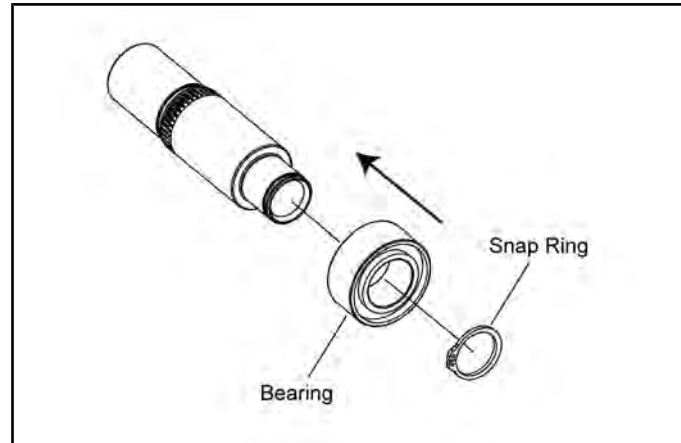
11. Install puller adapter ⑩ onto puller.
12. Install adapter ⑨ onto puller.



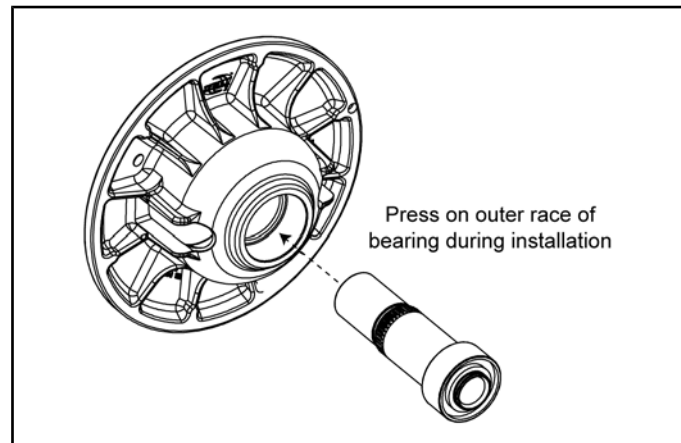
13. Apply Loctite® 648 evenly to bushing bore inside moveable sheave.
14. Install sheave face down on puller.
15. Install new bushing on installation tool ② and install assembly into sheave.
16. Install left hand thread nut (C) onto puller rod and hand tighten against installation tool.
17. Turn clutch sheave counterclockwise, making sure bushing is drawn straight into bore. Continue until bushing is seated.
18. Remove nut (C) from puller rod and set aside.
19. Remove installation tool and clutch sheave from puller.

### Clutch Assembly

1. Install a new bearing onto the clutch shaft using an arbor press. Once bearing is fully seated, install a new snap ring.



2. Install the shaft and bearing assembly into the outer sheave.

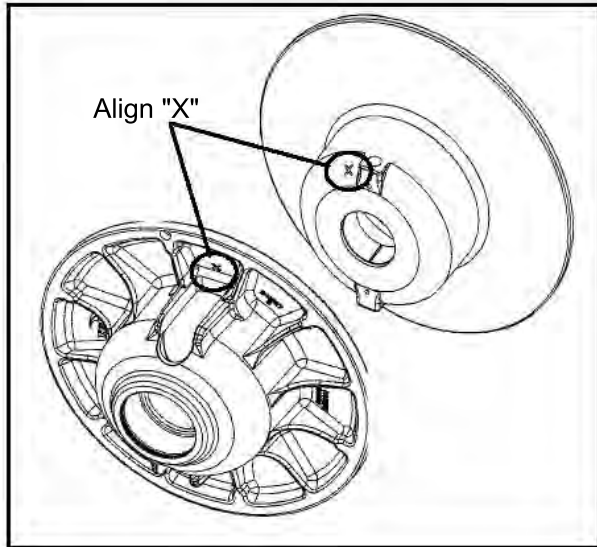


**NOTE:** Press only on the outer race of the bearing during installation to prevent damaging the bearing.

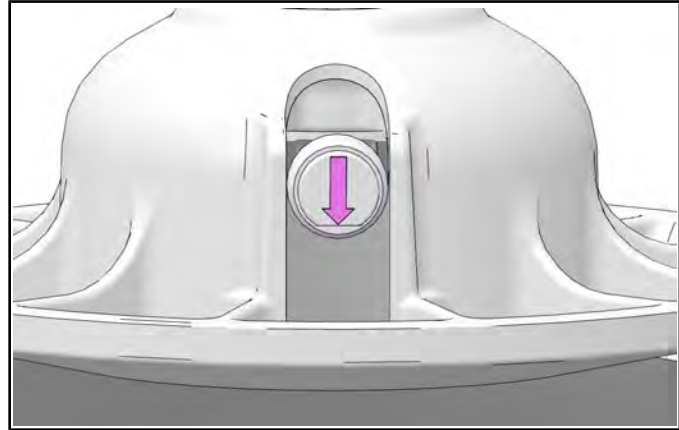
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## PVT SYSTEM

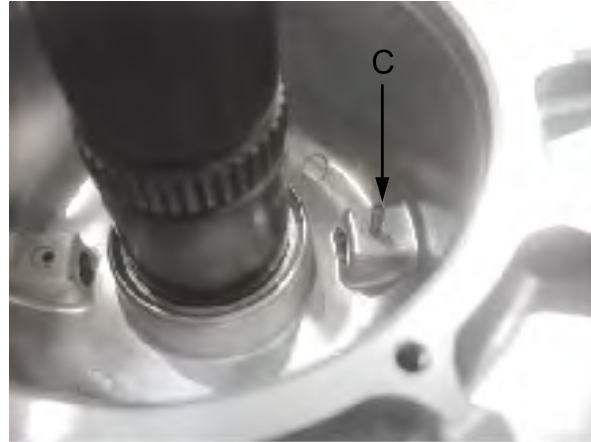
- Line up the "X" on the moveable sheave with the "X" on the stationary sheave or use the marks previously used. Put the sheaves together.



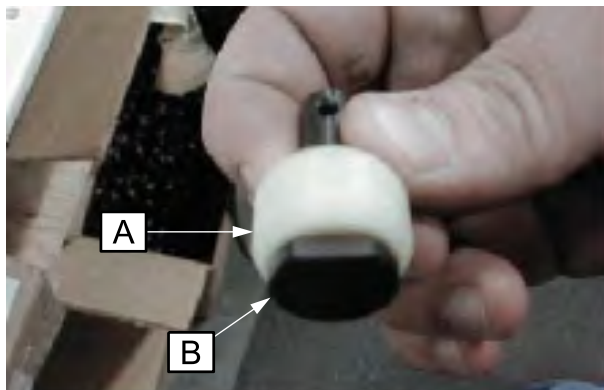
- Install the roller pin into the sheave assembly on both sides. The flat side of the roller pin faces downward when the shaft side is laying flat on the bench.



- Install the spring pins (C) to secure the roller pins. Install until flush with sheave surface.



- Install the roller (A) onto the roller pin (B) on both sides.



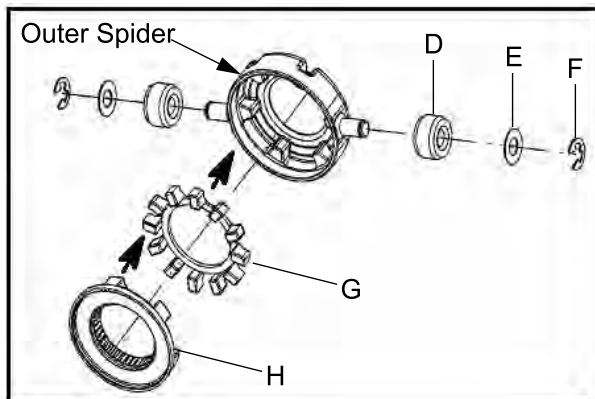
- Install the spring over the shaft.



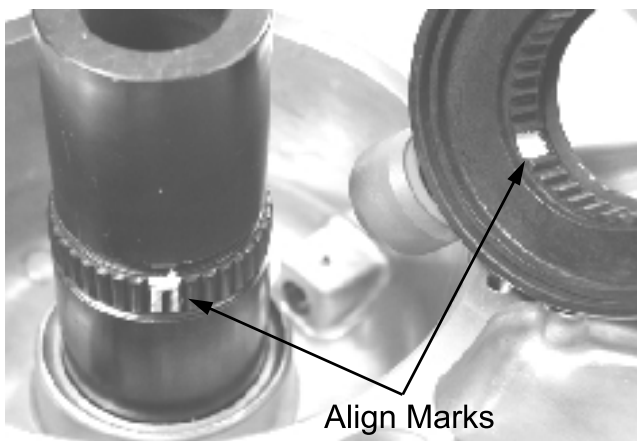
- Install the clutch rollers (D) onto each side of the outside spider. Install the washers (E) and E-clips (F) to secure the rollers. The rollers should spin freely.



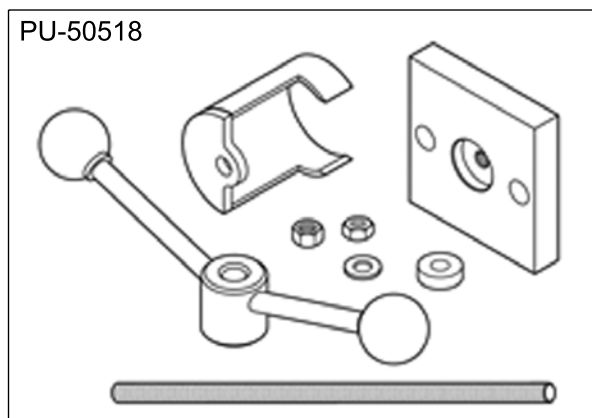
9. Install the spider dampener (G) inside the outer spider and install the inside spider plate (H).



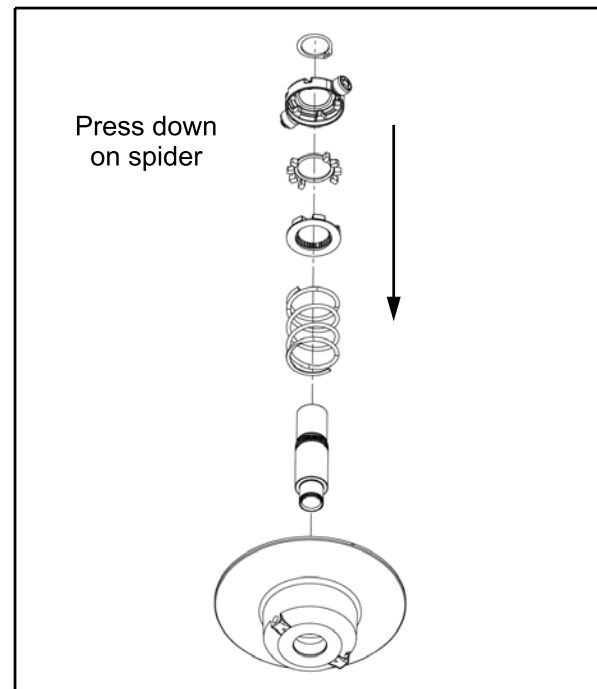
10. Install the spider assembly onto the shaft with the retaining ring on top of the spider. **NOTE:** Use the marks previously made to align the skip tooth spider, or use the "X" on top of the spider and align it with the skip tooth on the shaft.



11. Place the driven clutch into the Universal Clutch Compressor **PU-50518**.



12. Press down on the top of the spider assembly, pushing the spider onto the shaft.



13. Slowly compress the spider into place. If the spider appears to bind while compressing, stop and make sure the skip-tooth on the shaft and the spider are aligned. Once the spider passes the retaining ring notch on the shaft, install the retaining ring.



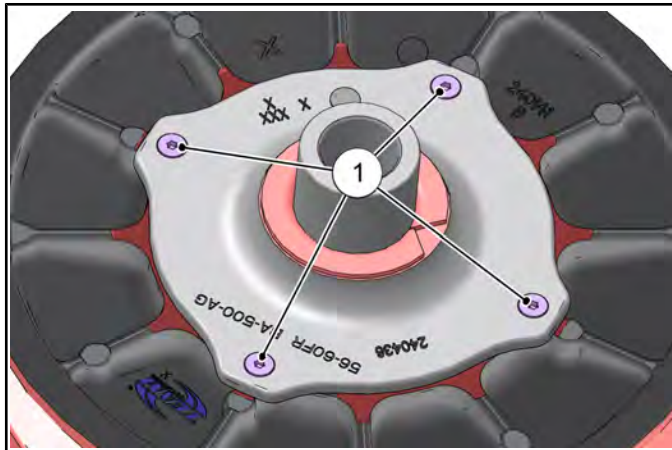
14. Install the cam (helix) assembly over the shaft. Line up the "X" on the cam, "X" on spider, and "X" on the stationary sheave or use the marks previously made before disassembly. **NOTE:** If the cam assembly (helix) is difficult to install, be sure the sheaves are aligned. To align the sheaves place the clutch assembly on a flat surface with the cam assembly (helix) side down. Press down on the moveable sheave belt face with both hands and the helix will release.



## PVT SYSTEM

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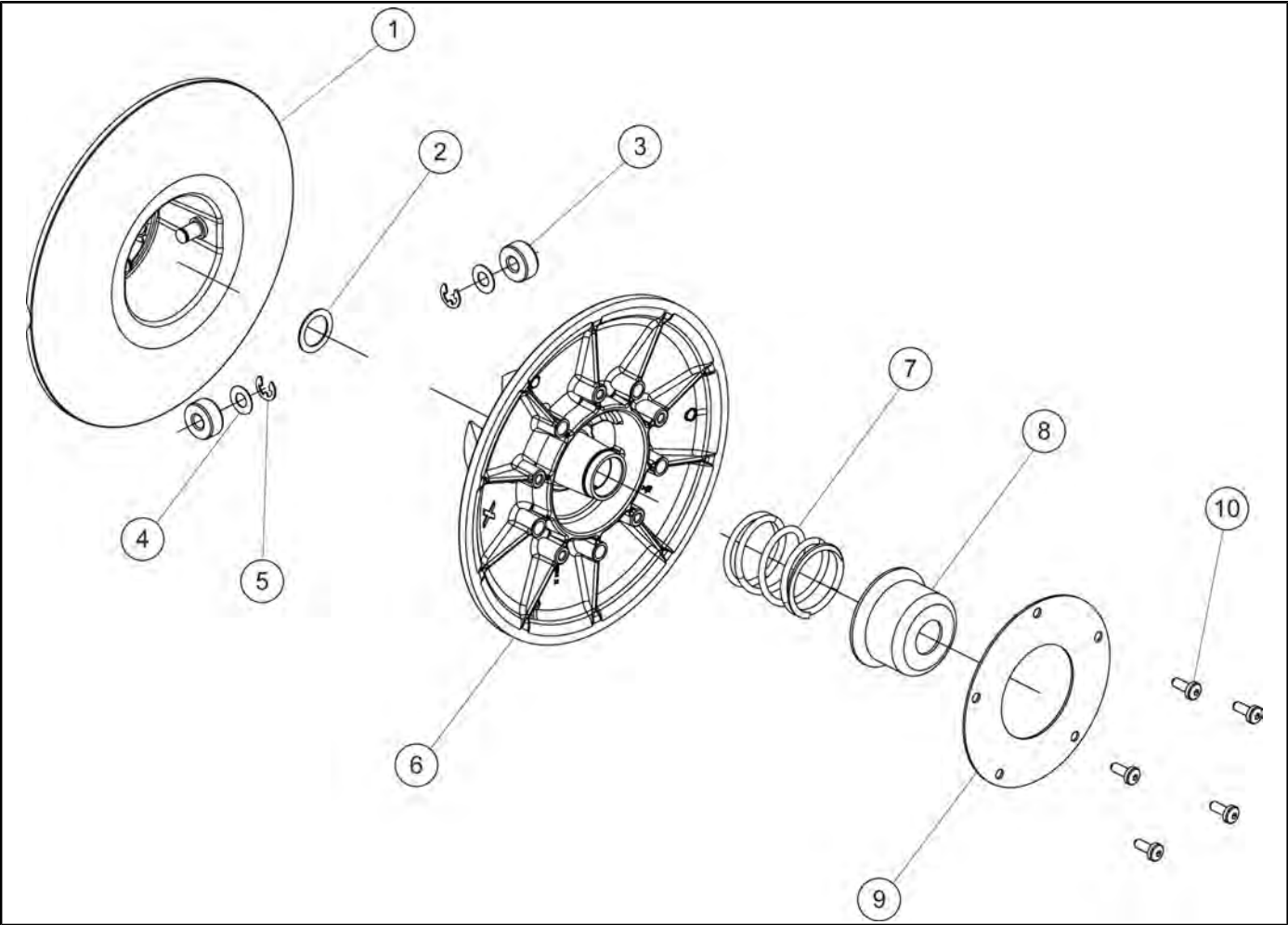
15. Use a T25 Torx driver to install the four helix retaining screws ① and torque to specification.



Helix Retaining Screws:  
**48 in-lb (5 Nm)**

**DRIVEN CLUTCH SERVICE (NON-EBS)**

**Driven Clutch Assembly View (non-EBS)**



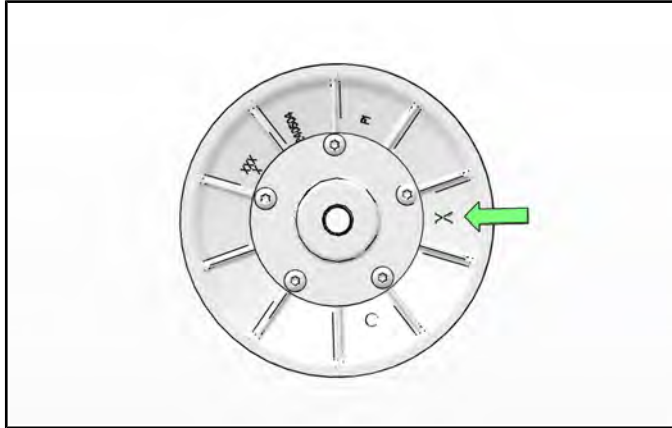
**5**

① Stationary Sheave	⑥ Moveable Sheave
② Thrust Washer	⑦ Spring
③ Roller	⑧ Spring Cup
④ Washer	⑨ Retaining Ring
⑤ E-clip	⑩ Torx Screw <b>12 ft-lb (16 Nm)</b>

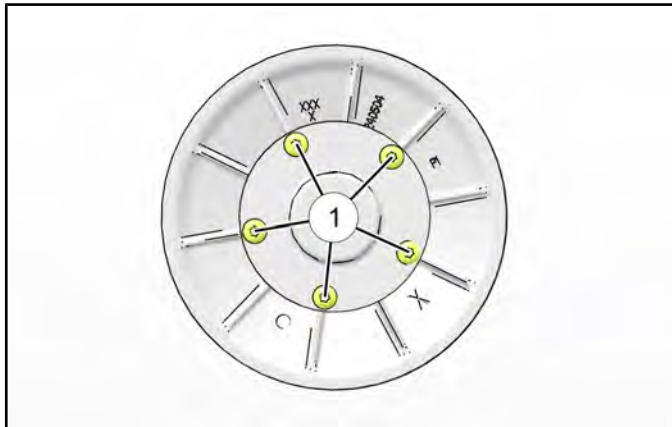
# PVT SYSTEM

## Driven Clutch Disassembly

1. Mark the position of the clutch sheaves before clutch removal or use the X's on the sheaves for reference. This aids in reassembly and maintains clutch balance after reassembly.

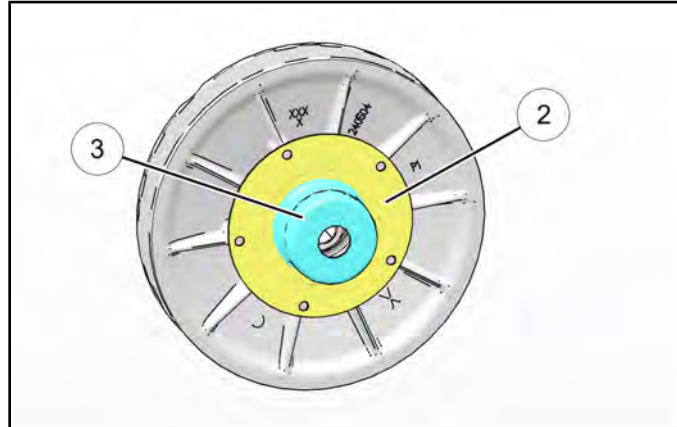


2. Remove the drive belt (see Belt Removal, page 5.9).
3. Remove the driven clutch retaining bolt and washer.
4. Remove driven clutch from the transmission input shaft and install it on a universal clutch compressor (PU-50518). Spin the tool down until it touches the spring cup.
5. Remove the five Torx screws (1) that secure the spring cover to the inner clutch sheave.

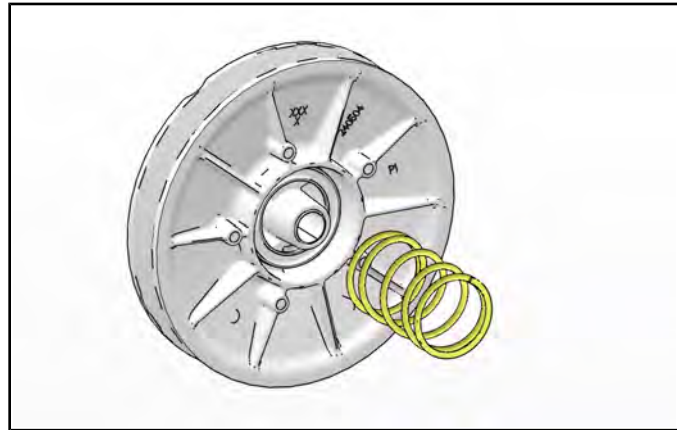


6. Turn the compression tool handle counter-clockwise to relieve spring pressure and remove the compressor tool from the clutch assembly.

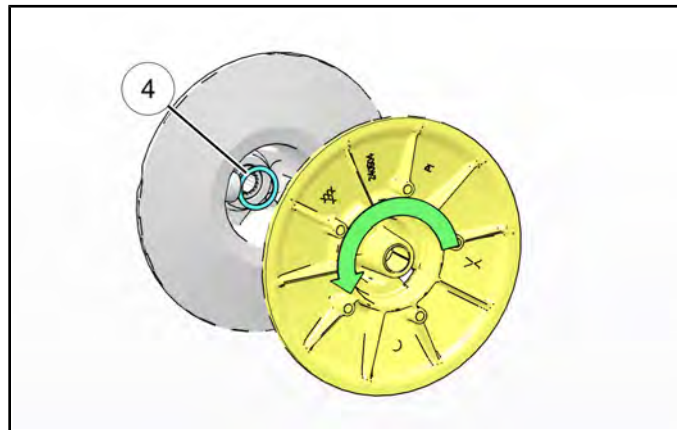
7. Remove the spring cover (2) and spring cup (3).



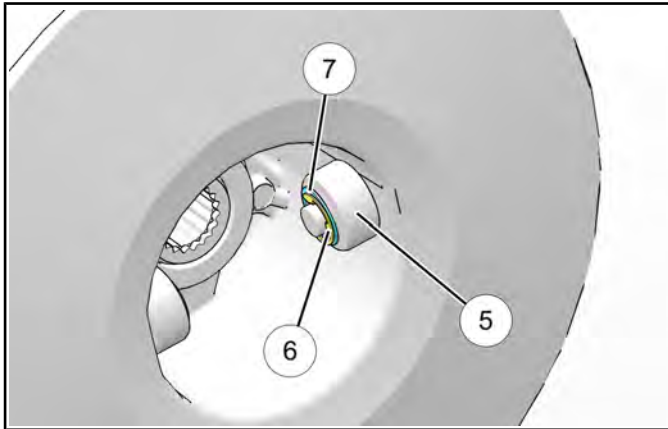
8. Remove the spring.



9. Rotate the moveable sheave counter-clockwise to release it from the rollers on the stationary sheave. Note if there is a thrust washer (4) between the sheaves.



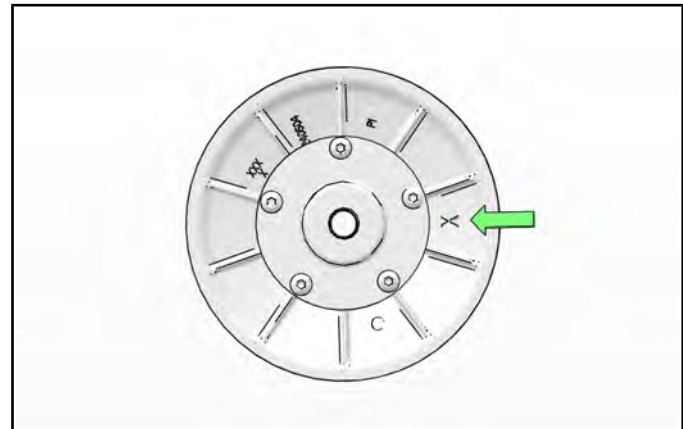
10. Check the rollers ⑤ for wear. If rollers are worn, a new driven clutch assembly may be needed if there is damage to the helix.



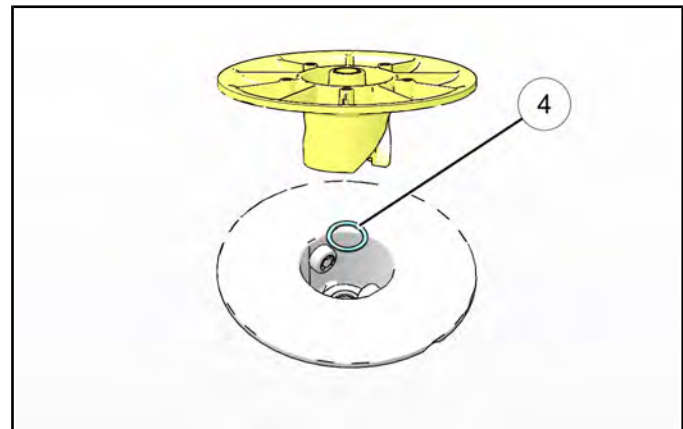
11. If roller need replacement, remove the E-clip ⑥ and washer ⑦ retaining each roller.
12. Inspect driven clutch sheave faces for wear or damage.
13. Clean and inspect the helix and transmission input shaft splines.
14. Lube splines with a light film of grease. **Do not lubricate the bearings!**

## Driven Clutch Assembly

1. Align the "X" marks on each of the sheaves during reassembly.



2. Assemble the clutch sheaves.



3. Position the spring, spring cup and retaining ring into moveable sheave. Do not apply oil or grease to the bearings.
4. Place the clutch into the universal clutch compressor. Apply and hold downward pressure on the spring cup. Torque the retaining ring bolts to specification.



Clutch Spring Retaining Ring Bolts:  
**12 ft-lb (16 Nm)**

5. Install driven clutch assembly and drive belt.

5

# PVT SYSTEM

## TROUBLESHOOTING

### PVT Troubleshooting

SITUATION	PROBABLE CAUSE	REMEDY
Engine RPM below specified operating range, although engine is properly tuned.	Wrong or broken drive clutch spring.	Replace with recommended spring.
	Drive clutch shift weight too heavy.	Install correct shift weight kit to match engine application.
	Driven clutch spring broken or installed in wrong helix location.	Replace spring; refer to proper installation location.
Erratic engine operating RPM during acceleration or load variations.	Drive clutch binding.	Disassemble drive clutch; inspect shift weights for wear and free operation.
		Clean and polish stationary shaft hub; reassemble clutch without spring to determine problem area.
	Belt worn unevenly - thin / burnt spots.	Replace belt.
	Driven clutch malfunction.	Replace ramp buttons.
		Inspect movable sheave for excessive bushing clearance.
Sheave face grooved.	Replace the clutch.	
Engine RPM above specified operating range.	Incorrect drive clutch spring (too high of rate).	Install correct recommended spring.
	Drive clutch shift weights incorrect for application (too light).	Install correct recommended shift weights.
	Drive clutch binding.	Disassemble and clean clutch, inspecting shift weights and rollers. Reassemble without the spring and move sheaves through entire range to further determine probable cause.
	Driven clutch binding.	Disassemble, clean, and inspect driven clutch, noting worn sheave bushing and ramp buttons and helix spring location.
	Converter sheaves greasy; belt slippage.	Clean sheaves with denatured alcohol or brake cleaner, install new belt.
Harsh drive clutch engagement.	Drive belt worn too narrow.	Replace belt.
	Excessive belt / sheave clearance with new belt.	Perform belt / sheave clearance adjustment with shim washers beneath spider.
Drive belt turns over	Wrong belt for application.	Replace with correct belt.
Belt burnt, thin spots	Abuse (continued throttle application when vehicle is stationary, excess load)	Caution operator to operate machine within guidelines.
	Dragging brake	Inspect brake system.
	Slow, easy clutch engagement	Fast, effective use of throttle for efficient engagement.

## PVT SYSTEM

SITUATION	PROBABLE CAUSE	REMEDY
PVT cover overheating (melting)	Plugged air intake or outlet.	Clear obstruction
	Belt slippage due to water, oil, grease, etc., rubbing on cover.	Inspect system. Clean , repair or replace as necessary. Seal PVT system ducts.
	Clutches or weight being applied to cover while in operation.	Remove weight. Inform operator.
	High vs. low range.	Instruct operator on guidelines for operation in proper driving range for different terrain as outlined in Owner's Safety and Maintenance Manual.
Water ingestion	Cover seals or ducts leaking	Find leak and repair as necessary.
	Operator error	Instruct operator on guidelines for operation in wet terrain as outlined in Owner's Safety and Maintenance Manual.
Belt slippage	Belt worn out	Replace belt.
	Water ingestion	Inspect and seal PVT system.
	Belt contaminated with oil or grease	Inspect and clean.
PVT noise	Belt worn or separated, thin spots, loose belt	Replace belt.
	Broken or worn clutch components, cover hitting clutches	Inspect and repair as necessary.
Engagement erratic or stabby	Thin spots on belt, worn belt	Replace belt. Refer to belt burnt troubleshooting and instruct operator.
	Drive clutch bushings stick	Inspect and repair clutches.

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## PVT SYSTEM

### Overheating / Diagnosis

During routine maintenance, or whenever PVT system overheating is evident, it's important to check the inlet *and* outlet duct for obstructions. Obstructions to air flow through the ducts will significantly increase PVT system operating temperatures. The vehicle should be operated in Low when extended low vehicle speed operation is anticipated.

CLUTCH DRIVE BELT & COVER RELATED ISSUES: DIAGNOSIS	
POSSIBLE CAUSES	SOLUTIONS / WHAT TO DO
Loading the vehicle into a tall trailer when in high range.	Shift transmission to Low during loading of the vehicle to prevent belt burning.
Starting out going up a steep incline from a stopped position.	When starting out on an incline, use Low gear. Shift transmission to Low during loading of the vehicle to prevent belt burning.
Driving at low RPM or low ground speed (at approximately 3-7 MPH).	Drive at higher speed or use Low. The use of Low is highly recommended for cooler PVT operating temperatures and longer component life.
Insufficient engine warm-up when exposed to low ambient temperatures.	Warm engine at least 5 min., then with transmission in neutral, advance throttle to approx. 1/8 throttle in short bursts, 5 to 7 times. The belt will become more flexible and prevent belt burning.
Slow and easy clutch engagement.	Fast, effective use of the throttle for efficient engagement.
Stuck in mud or snow.	Shift the transmission to Low, carefully use fast, aggressive throttle application to engage clutch. <b>WARNING:</b> Excessive throttle may cause loss of control and vehicle overturn.
Climbing over large objects from a stopped position.	Shift the transmission to Low, carefully use fast, aggressive, brief throttle application to engage clutch. <b>WARNING:</b> Excessive throttle may cause loss of control and vehicle overturn.
Belt slippage from water or snow ingestion into the PVT system.	Remove the PVT drain plug. Shift the transmission to neutral. Using the throttle, vary the engine rpm from idle to full throttle. Repeat several times as required. During this procedure, the throttle should not be held at the full position for more than 10 seconds. Clutch seals should be inspected for damage if repeated leaking occurs.
Clutch malfunction.	Clutch component inspection should be performed by a Polaris MSD certified technician.
Poor engine performance.	Fouled spark plugs, foreign material in fuel tank, restricted fuel lines, or faulty fuel pump may cause symptoms similar to clutching malfunction.
GENERAL RANGE OPERATION GUIDELINES:	<b>Low:</b> Basic operational speeds less than 7 MPH, riding through rough terrain (swamps, mountains, ect.), or low ground speeds and when continuously operating at speeds less than 30 mph in sand/dune environments.
	<b>High:</b> High ground speeds, or speeds above 7 MPH.

### Operating in Low Gear

Low gear should be used when riding through rough terrain or when basic operational ground speeds are less than 7 MPH. Use High gear when basic operational ground speeds are more than 7 MPH.

### General Sand / Dune Driving

The use of Low gear when continuously operating at speeds less than 30 mph will greatly increase belt life in sand/dune environments. Note: Do not shift from Low to High without coming to a complete stop.

**NOTE: Using High gear for heavy loads, hilly terrain, sand/dune environments, or in wet, muddy conditions will increase the chance of drive belt burning.**

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# TRANSMISSION

## GENERAL INFORMATION

### Torque Specifications

ITEM	TORQUE VALUE
Bell Crank Nut	<b>18 ft-lb (24 Nm)</b>
Differential Cover Screw	<b>22 ft-lb (30 Nm)</b>
Engine / Transmission Mounting Bolts	<b>Step 1-2: 64 ft-lb (87 Nm) Step 3: 5 ft-lb (7 Nm) Step 4-7: 44 ft-lb (60 Nm)</b>
Gear Sector Cover	<b>12 ft-lb (16 Nm)</b>
Park Flange Screws	<b>10 ft-lb (14 Nm)</b>
Snorkel Tube	Refer to Transmission Assembly / Snorkel Gear Backlash Procedure, page 6.25
Shift Cable Bracket Bolts	<b>17 ft-lb (23 Nm)</b>
Shift Fork Screws	<b>10 ft-lb (14 Nm)</b>
Snorkel Tube Locking Screw	<b>10 ft-lb (14 Nm)</b>
Speed Sensor Screw	<b>12 ft-lb (16 Nm)</b>
Stabilizer Bar Linkage (Rear)	<b>40 ft-lbs (54 Nm)</b>
Transmission Case Screws	<b>20 ft-lbs (27 Nm)</b>
Transmission Fill / Drain Plugs	<b>14 ft-lbs (19 Nm)</b>
Transmission Mount Bracket Fasteners (rear)	<b>22 ft-lb (30 Nm)</b>
Transmission Mount Isolator Bolt (rear)	<b>33 ft-lb (45 Nm)</b>
Transmission Snorkel Tube Locking Screw	<b>10 ft-lb (14 Nm)</b>

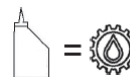
### Special Tools

PART NUMBER	TOOL DESCRIPTION
PA-50231	Snorkel Tool
2871698 (Part of 2871702 Kit)	Rear Output Seal Driver
2871699 (Part of 2871702 Kit)	Rear Driveshaft Seal Guide
2871282	Bearing Seal Driver (50 mm)
PU-50566	Transmission Nut Socket
PU-50658	Clutch Center Distance Tool

### Bosch Automotive Service Solutions:

1-800-345-2233 or <http://polaris.service-solutions.com/>

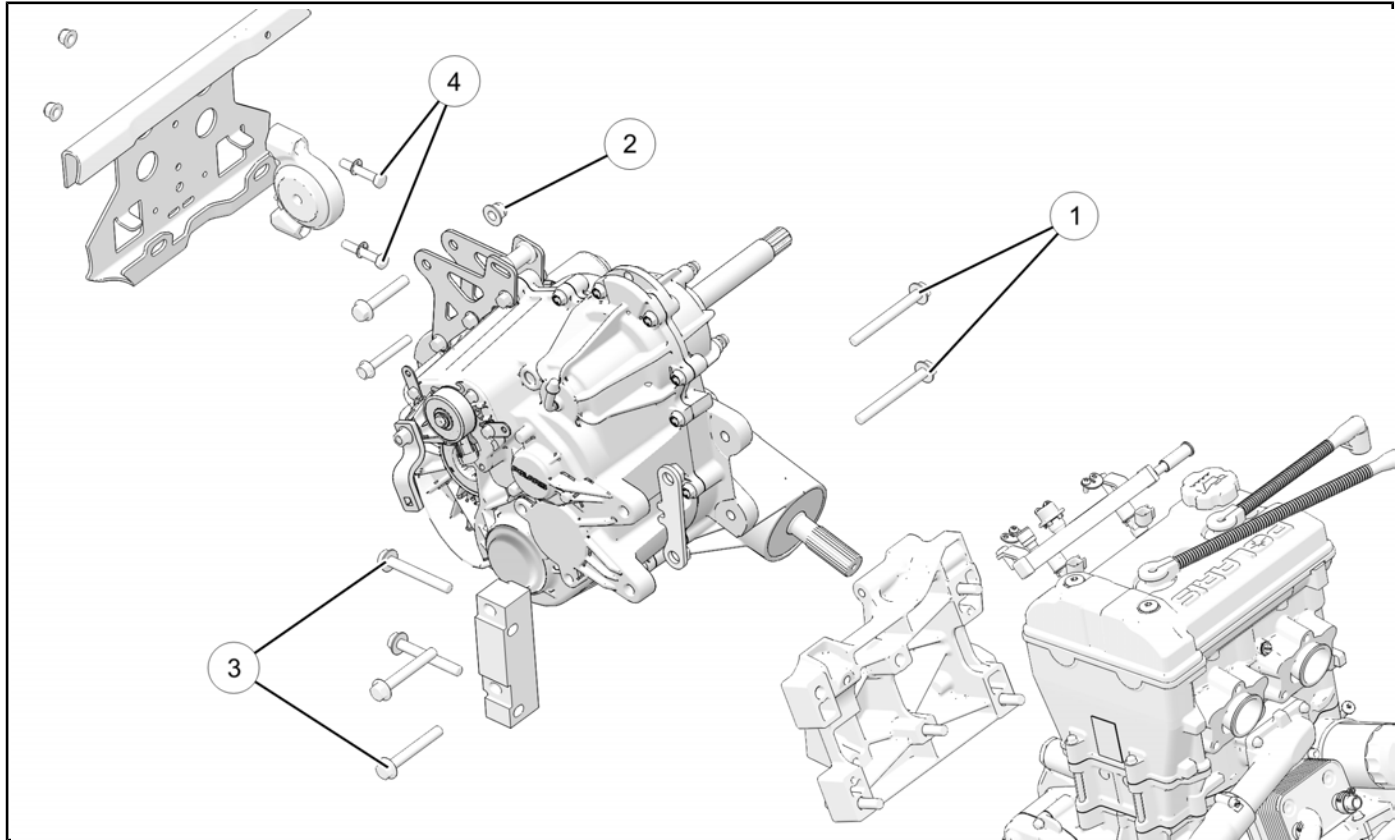
### Lubrication Specifications



**Recommended Transmission Lubricant:**  
AGL (PN 2878068) (Quart)

**Capacity (Standard):** 44 oz. (1300 ml)  
**Capacity (INT'L):** 40.5 oz. (1200 ml)

## Transmission Mounting View



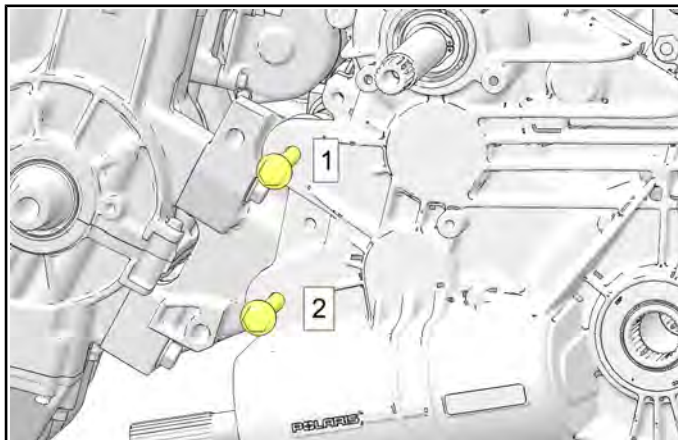
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① Engine to Trans Bolts  
**Step 1-2: 64 ft-lb (87 Nm)**  
**Step 3: 5 ft-lb (7 Nm)**  
**Step 4-7: 44 ft-lb (60 Nm)**  
 \*See sequence in illustrations below

③ Transmission Bracket Bolts  
**Step 1-2: 64 ft-lb (87 Nm)**  
**Step 3: 5 ft-lb (7 Nm)**  
**Step 4-7: 44 ft-lb (60 Nm)**  
 \*See sequence in illustrations below

② Transmission Isolator Fasteners  
**33 ft-lb (45 Nm)**

④ Transmission Mount Bracket Fasteners  
**22 ft-lb (30 Nm)**



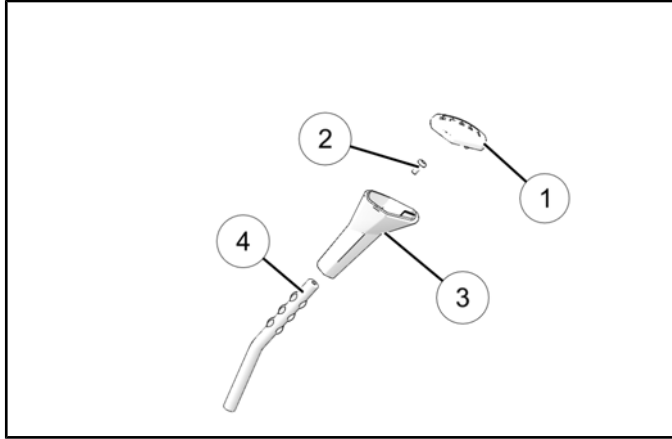
# TRANSMISSION

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## SHIFT LEVER / CABLE

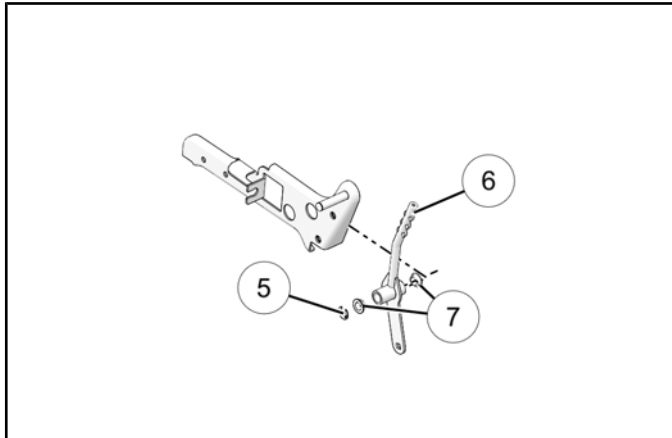
### Shift Lever Removal

1. Remove the shift knob cover ①, retaining screw ② and shift knob ③ from the shift lever ④.



Remove the screws retaining the center console using a T27 and T30 Torx driver. Remove the console from the vehicle.

2. Remove the clip and washer retaining the shift cable to the shift lever and disconnect the cable end from the lever.
3. Remove the retaining ring ⑤ and slide the shift lever ⑥ off the mounting bracket and out from the frame.



4. Remove both bushings ⑦ from the shift lever and service as needed.

### Shift Lever Installation

Perform the removal steps in reverse order to install the gear shift lever (lever, cable, console, shift knob).

## Shift Cable Inspection

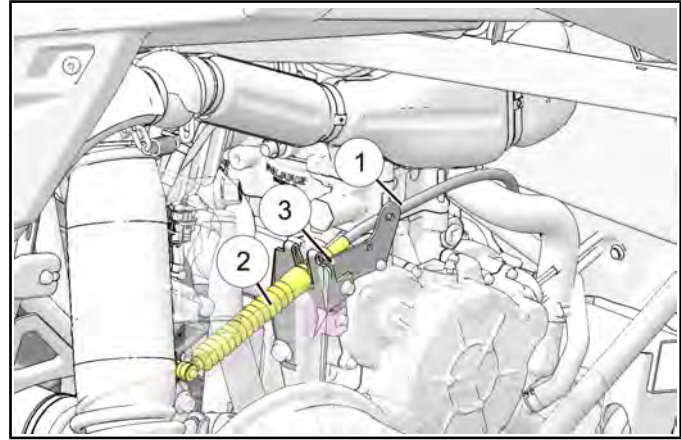
Shift cable adjustment may be necessary if symptoms include:

- No gear position or AWD display on instrument cluster
- Ratcheting noise on deceleration
- Inability to engage into a gear
- Excessive gear lash (noise)
- Gear selector moving out of desired range

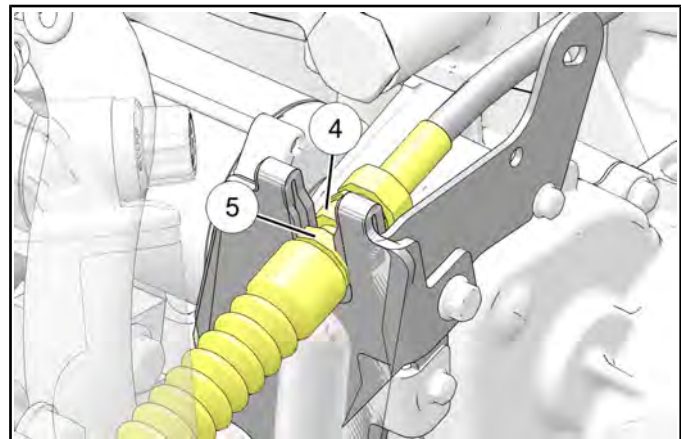
Inspect shift cable, clevis pins, and pivot bushings and replace if worn or damaged.

## Shift Cable Adjustment

1. Locate the shift cable attached to the transmission case in the right rear wheel well area.
2. Inspect shift cable ①, clevis pin, pivot bushings, and dust boot ②. Replace if worn or damaged.



3. If adjustment is required, loosen the lower jam nut ④ and pull the cable out of the mount ③ to move the upper jam nut ⑤.



4. Adjust the shift cable so there is the same amount of cable travel when shifting slightly past HIGH gear and PARK.
5. Thread the upper or lower jam nut as required to obtain proper cable adjustment.

**NOTE: This procedure may require a few attempts to obtain the proper adjustment.**

6. Once the proper adjustment is obtained, place the shift cable and upper jam nut into the mount. Tighten the lower jam nut against the mount.
7. Start engine and shift through all gears to ensure the shift cable is properly adjusted. If transmission still ratchets after cable adjustment, the transmission will require service.



# TRANSMISSION

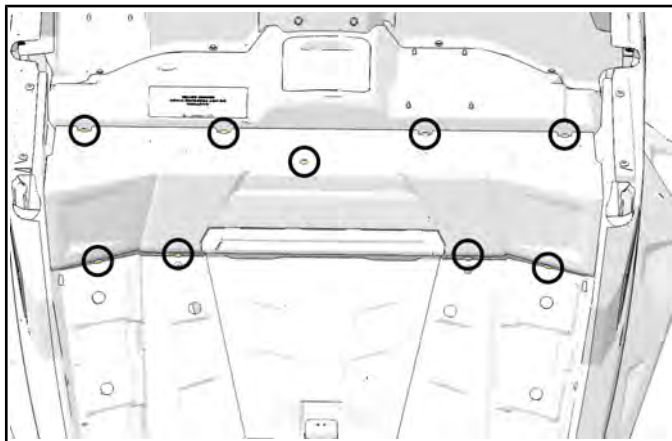
## TRANSMISSION SERVICE

### Transmission Removal

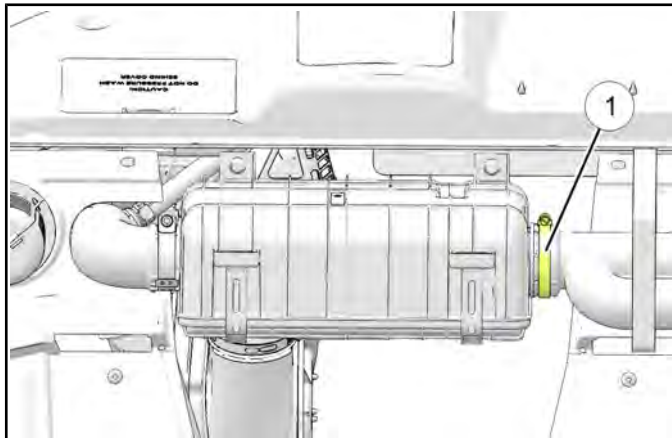
 **WARNING**

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

1. Disconnect the (-) negative battery cable from the battery.
2. Remove the nine screw for the dog house cover over the air box.

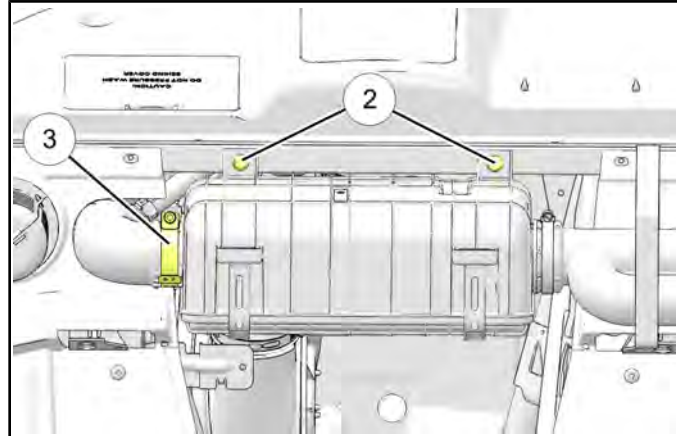


3. Loosen the clamp ① for the PVT intake.

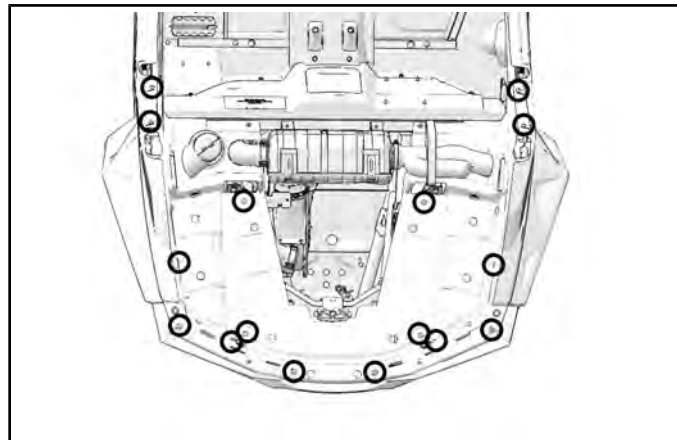


4. Remove the four screws mounting the engine and PVT intake vents.

5. Remove the two bolts ② retaining the air box to the frame support and loosen the clamp 3 from the air box to the intake.



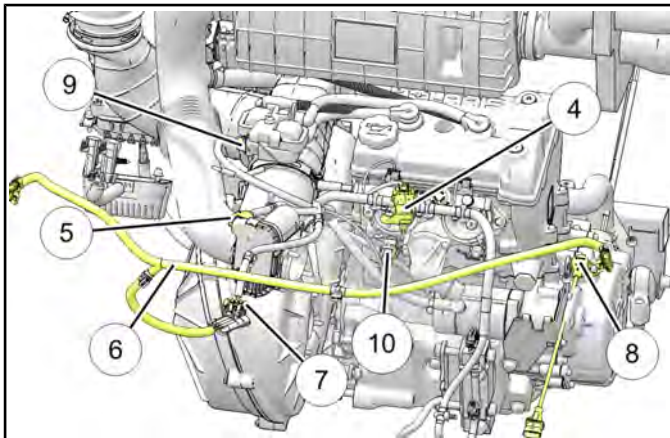
6. Remove the 22 cargo box mounting screws.



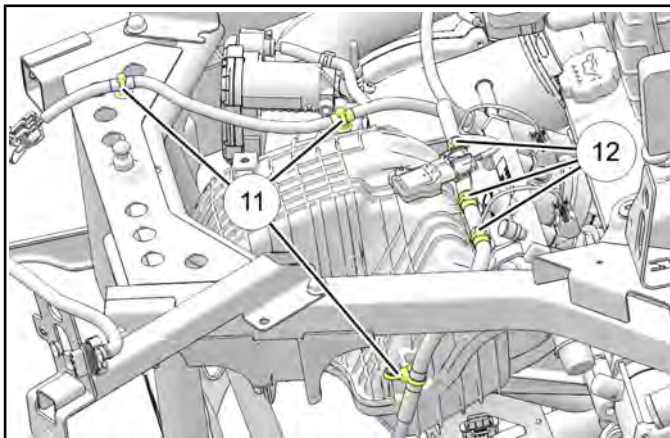
# TRANSMISSION

7. Disconnect the following electrical components:

- TMAP ④
- ETC ⑤
- taillight harness ⑥
- speed sensor ⑦
- CPS ⑧
- transmission switch ⑨
- engine temperature sensor ⑩
- diff relay (if equipped)



8. Remove the three fasteners ⑪ retaining the harness to the intake manifold and two fasteners retaining the harness by the transmission switch.



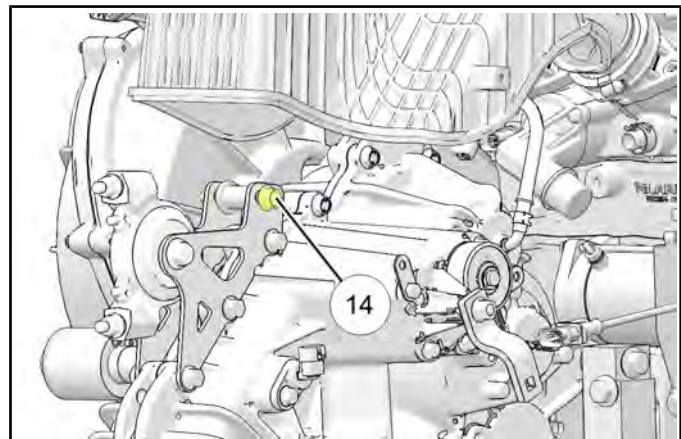
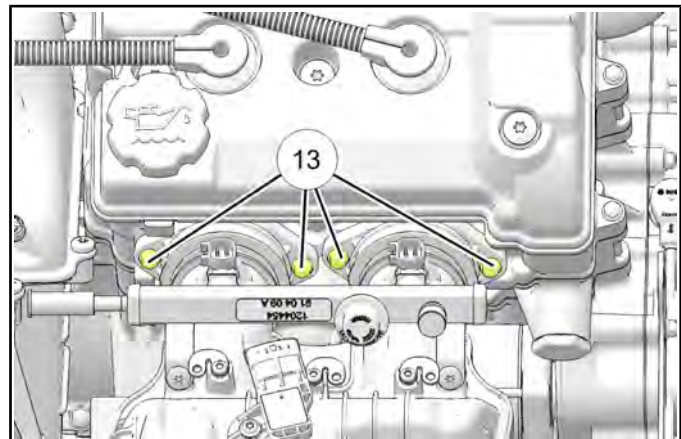
9. Remove the three harness clamps ⑫ on the intake manifold. Move the main harness out of the way towards the driver's seat.

10. Disconnect the two fuel rail mounting bolts and move the fuel rail off to the driver's side.

## CAUTION

Be careful not to pinch or kink the fuel rail

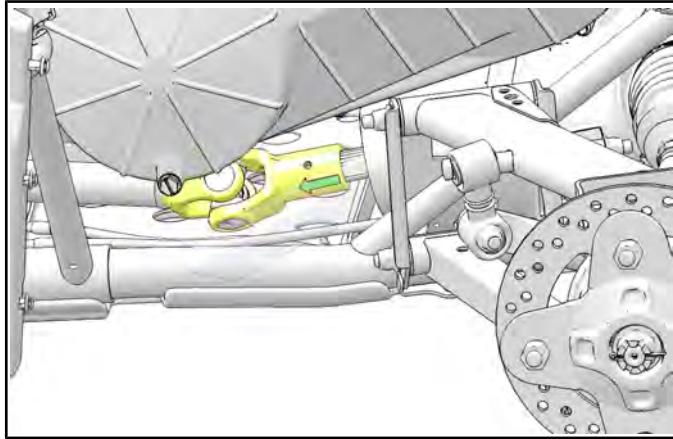
11. Remove the four fasteners ⑬ retaining the intake manifold to the engine and the one ⑭ retaining the bottom of the intake manifold to the transmission bracket.



6

# TRANSMISSION

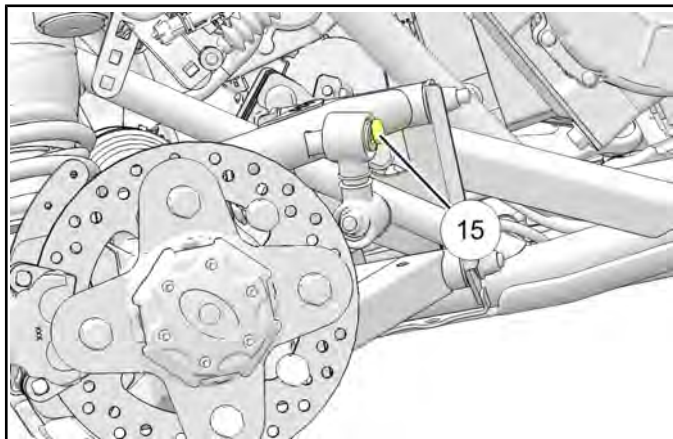
12. Remove the prop shaft 15 from the transmission output shaft (see Chapter 7 – Prop Shaft Removal, page 7.20 ).



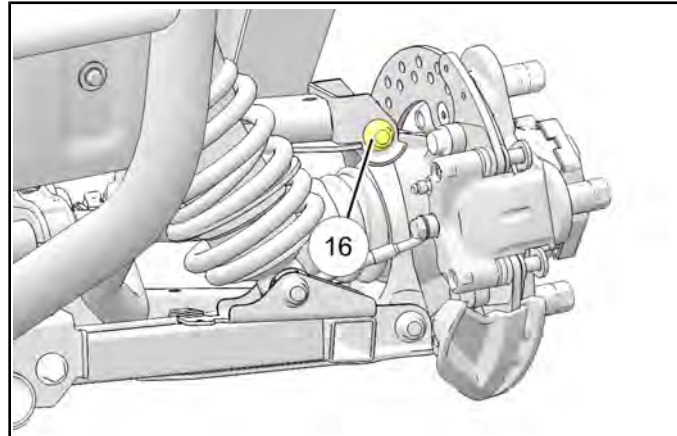
13. Remove rear wheels from the vehicle.

14. If internal transmission repair is required, drain the transmission lubricant (see Chapter 2 – Transmission Lubrication, page 2.19).

15. Remove the stabilizer bar mounting bolt and nut ⑮ from both sides. Discard nuts and replace with new upon assembly.



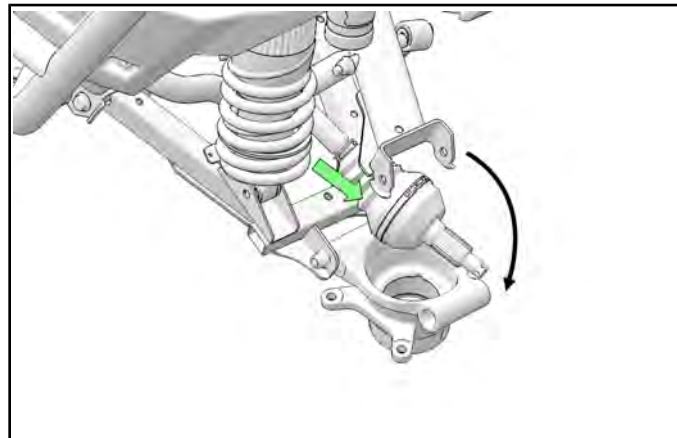
16. Remove the fasteners ⑯ attaching the upper control arms to the bearing carriers (left and right side). Discard nuts and replace with new upon assembly. Allow the radius rods swing downward.



17. Pivot the control arms downward and maneuver the drive shafts out of the vehicle frame.

## CAUTION

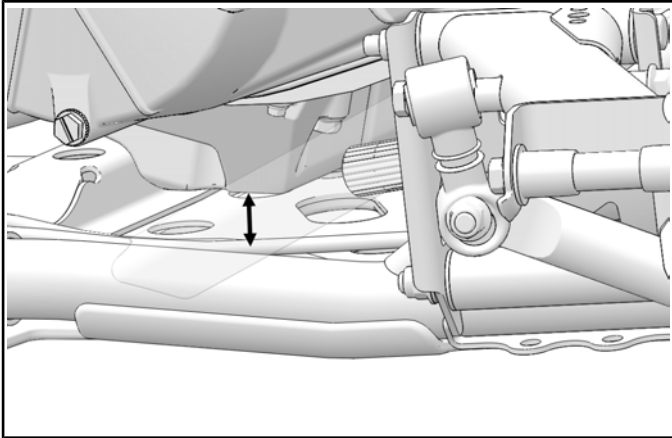
Be careful not to stretch the brake line when pivoting the bearing carrier downward.





# TRANSMISSION

18. Place a spacer or support between the vehicle frame and engine to hold the engine up in position.

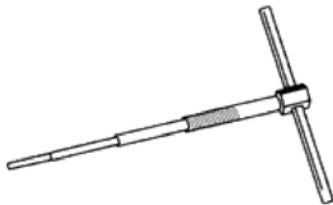


19. Remove the PVT outer cover.  
20. Remove the belt and driven clutch.  
21. Remove the drive clutch from the vehicle using the correct drive clutch puller (PN 2872085).

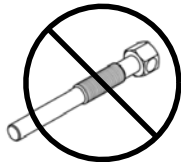
## CAUTION

Use the correct puller to prevent damage to the end of the crankshaft.

2872085 - Correct Drive Clutch Puller For RZR XP 900

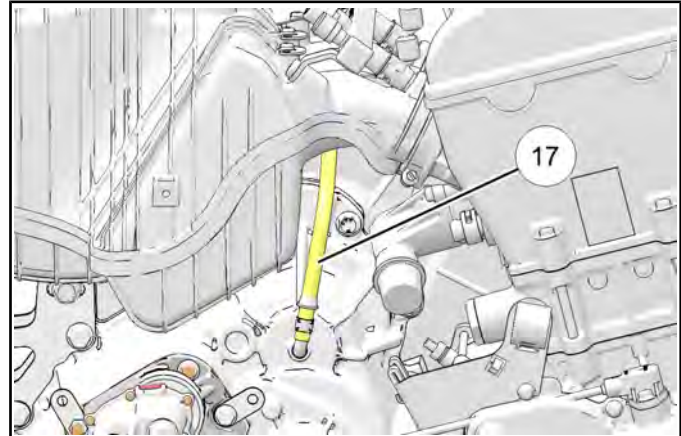


PA-48595 - Incorrect Drive Clutch Puller

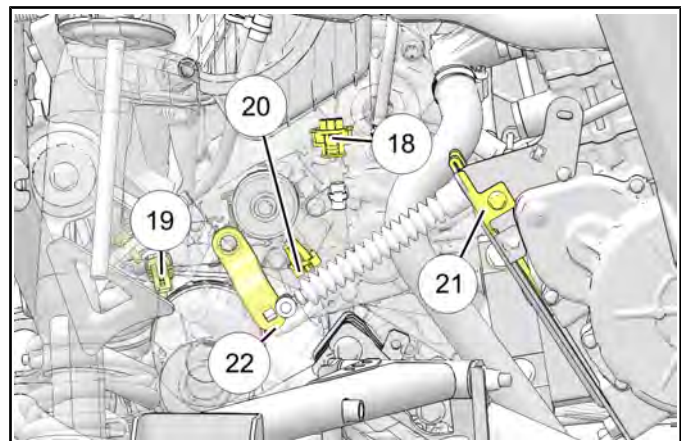


22. Remove seven bolts retaining the inner clutch cover.

23. Remove vent hose 17 from transmission.



24. Remove the gear position switch connector ⑱, speed sensor connector ⑲, crankshaft position sensor connector ⑳, shift bracket bolts and shift bracket ㉑, shift cable clevis pin and washer ㉒ from the transmission.

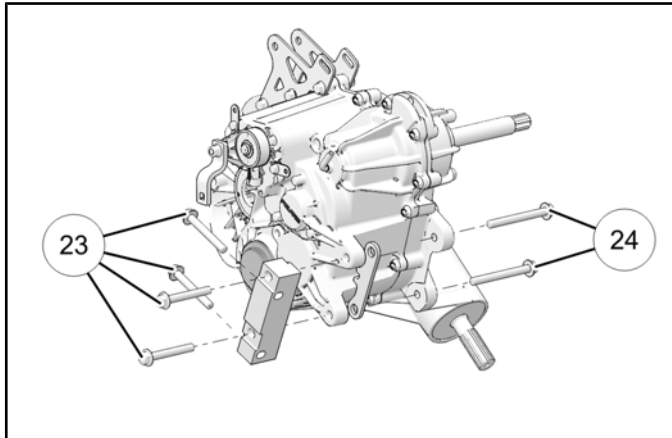


25. Remove the wire ties retaining harness to transmission and mounts.  
26. Remove the six engine-to-transmission mounting bolts.

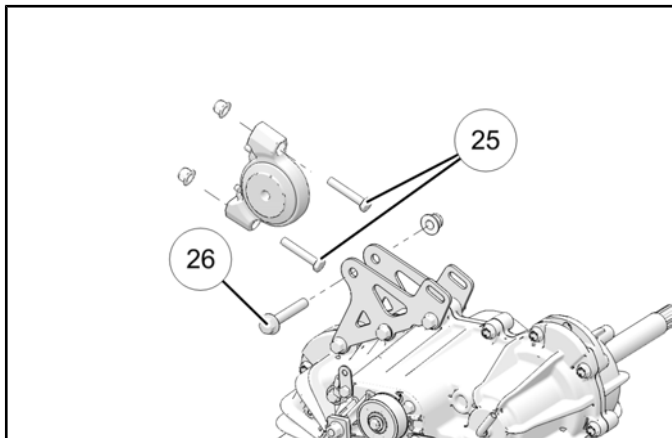
6

## TRANSMISSION

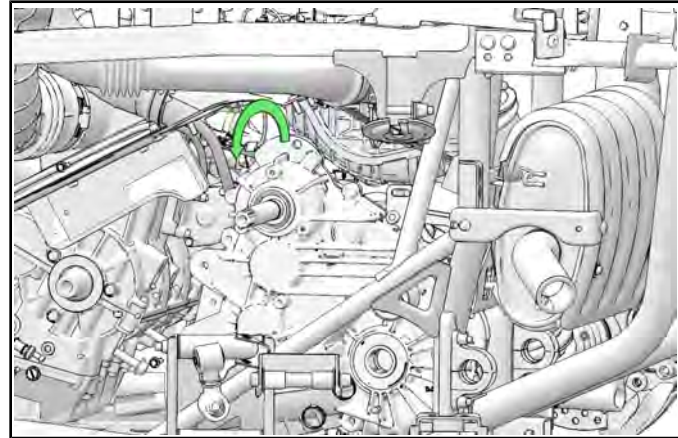
27. Using a 15mm socket, remove the four bolts from the left side ⑳ and two from the right side ㉑, securing the transmission to the engine.



28. Remove the two fasteners ㉒ attaching the rear transmission mount bracket assembly to the frame. Remove the fasteners ㉓ that attach the rear mount to the transmission. Remove the mount assembly from the vehicle.



29. Slide transmission towards the rear of the vehicle. Lift and rotate the top of the transmission towards the left side of the vehicle. With the help of an assistant, remove transmission from the left rear wheel well area.

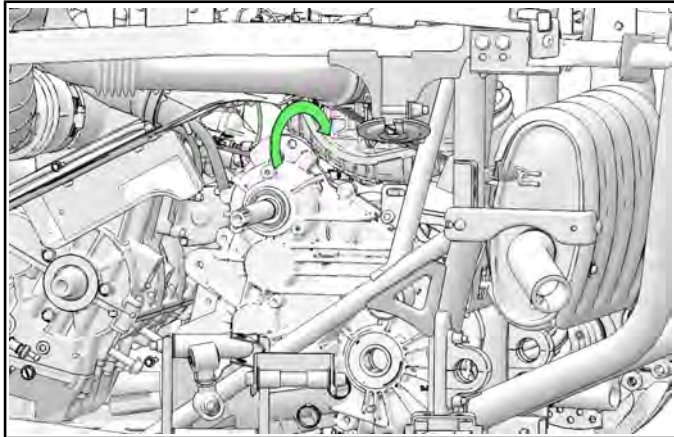


**NOTE:** Remove the grease zerk from the left rear upper control arm and the differential solenoid (if equipped) if there is trouble removing the transmission.

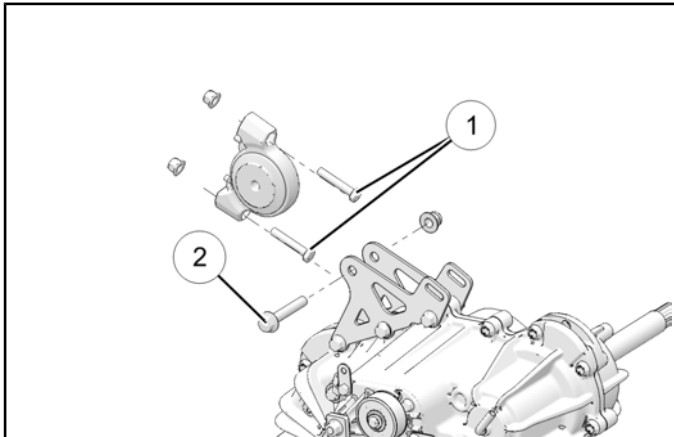
# TRANSMISSION

## Transmission Installation

1. With the help of an assistant, position the transmission into the vehicle frame through the left rear wheel well area.
2. Slide transmission towards rear of the vehicle and rotate the top of the transmission toward the right side of the vehicle.



3. Install the rear transmission mount to the frame and secure with M8 bolts ① and nuts. Torque nuts to specification.



Rear Transmission Mount Bracket Fasteners:  
**22 ft-lb (30 Nm)**

4. Install M10 bolt ② and nut securing the transmission bracket to the rear mount. Torque fasteners to specification.

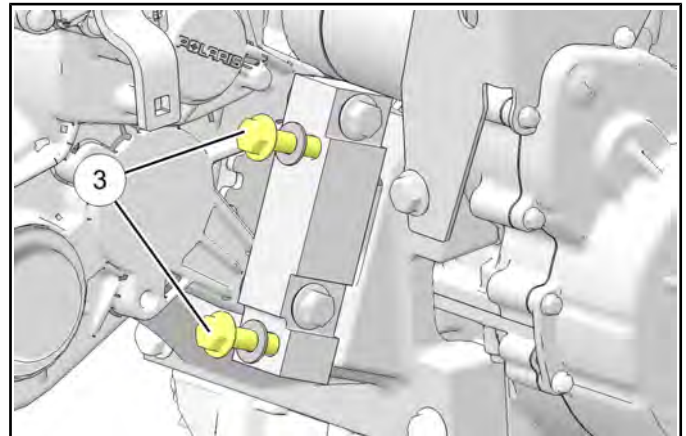


Rear Transmission Isolator Fasteners:  
**33 ft-lb (45 Nm)**

5. Install the two rear exhaust springs securing the muffler to the rear transmission mounting bracket.
6. Install the Clutch Center Distance Tool (PU-50658) onto the crankshaft and transmission input shaft to properly position the clutch center distance.

**IMPORTANT:** Tool should bottom out on the transmission input shaft and lay flush on the crankshaft.

7. Loosen the two bolts ③ retaining the transmission coupler bracket to the engine on the right side.

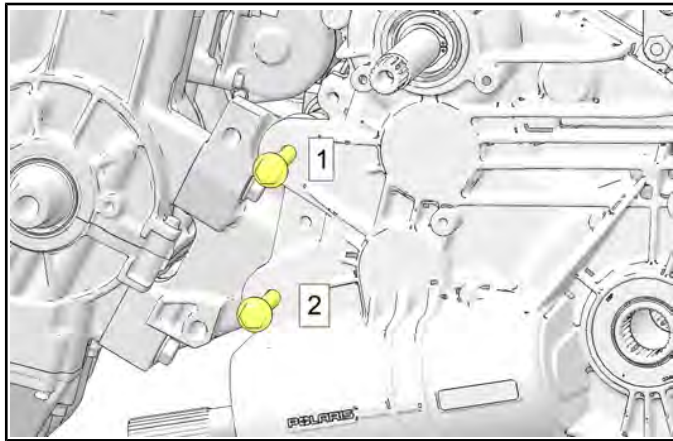


8. Align front transmission mounting holes with transmission joint bracket mounting holes on engine.
9. Loosely install the two longer bolts into left side mounting holes and two shorter bolts with washers into right side mounting holes.




# TRANSMISSION

10. Torque left side mounting bolts to specification in sequence.



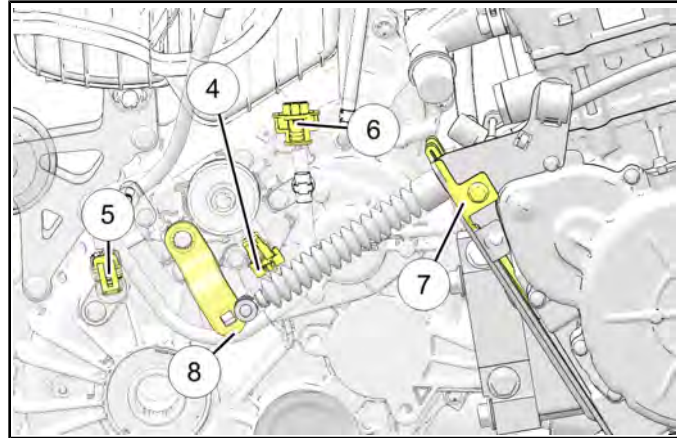
11. Torque right side mounting bolts to specification using the numbered sequence shown.




 = T
<b>Engine / Transmission Mounting Bolts:</b> <b>Step 1-2: 64 ft-lb (87 Nm)</b> <b>Step 3: 5 ft-lb (7 Nm)</b> <b>Step 4-7: 44 ft-lb (60 Nm)</b>

12. Remove the clutch center distance tool.  
 13. Remove the spacer or support between the vehicle frame and engine.

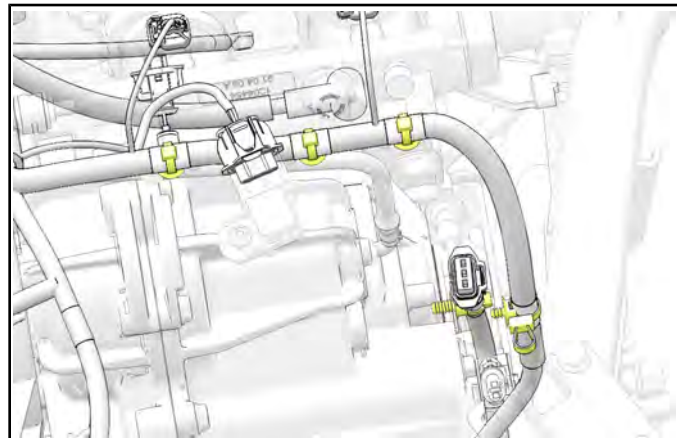
14. Install and properly route the gear position switch connector ④, speed sensor connector ⑤, crankshaft position sensor connector ⑥, shift bracket and shift bracket bolts ⑦, shift cable clevis pin and washer ⑧ onto the transmission.



15. Torque the two shift cable bracket bolts to specification.

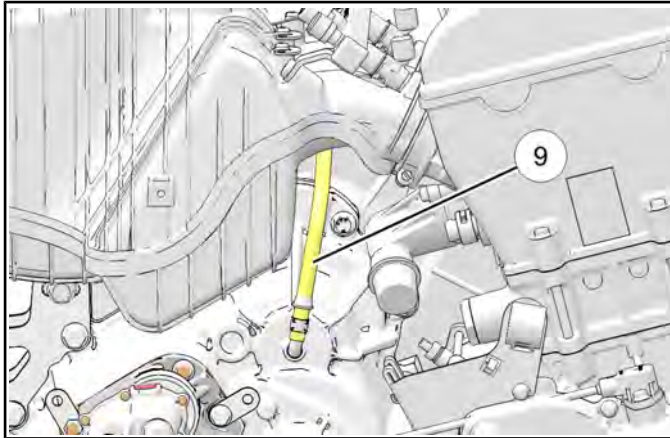
 = T
<b>Shift Cable Bracket Bolts:</b> <b>17 ft-lb (23 Nm)</b>

16. Install three wire ties to retain wire harness to transmission and mounts.



# TRANSMISSION

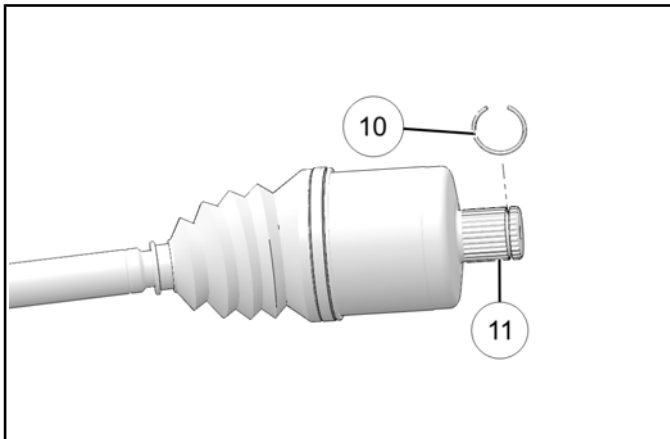
17. Install and properly route the vent hose ⑨.



18. Lubricate the transmission splines and mid prop shaft joint splines with Polaris All Purpose Grease. Install the propshaft onto the transmission output shaft (see Chapter 7 – Prop Shaft Installation, page 7.21).

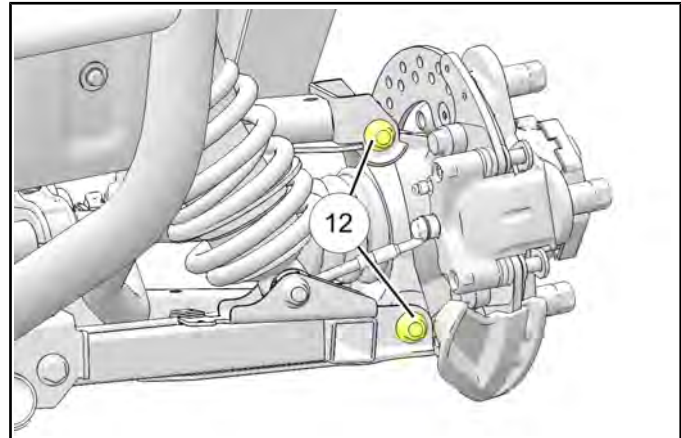
19. Install inner clutch cover, outlet duct, drive clutch, driven clutch, belt and outer clutch cover (see Chapter 5 – PVT Assembly, page 5.8).

20. Install new spring ring ⑩ on rear drive shafts. Apply an anti-seize compound to the splines ⑪.

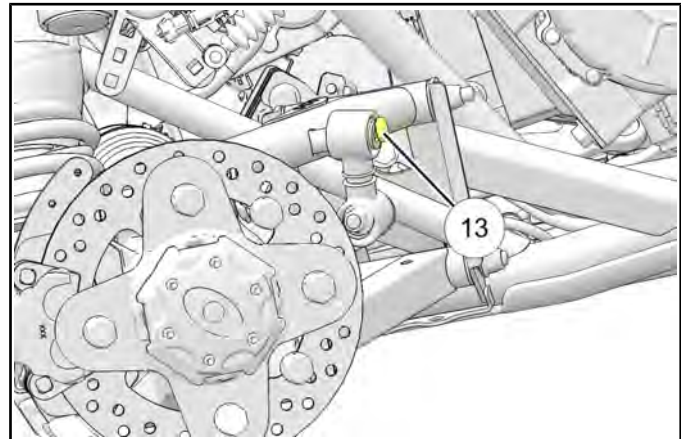


21. Align the splines of the drive shaft with the transmission splines. Push inward on the control arm assembly until the rear drive shafts lock into the transmission splines.


22. Install new fasteners ⑫ retaining the upper control arms to the bearing carriers on each side. Torque to specification.



23. Install the stabilizer bar link mounting bolts and new nuts ⑬. Torque to specification.



24. Install rear wheels and wheel nuts. Torque to specification.

 = T
<b>Stabilizer Bar Linkage:</b> <b>40 ft-lbs (54 Nm)</b>
<b>Wheel Nuts:</b> <b>Aluminum: 120 ft-lbs (163 Nm)</b> <b>Steel: 60 ft-lb (81 Nm)</b>

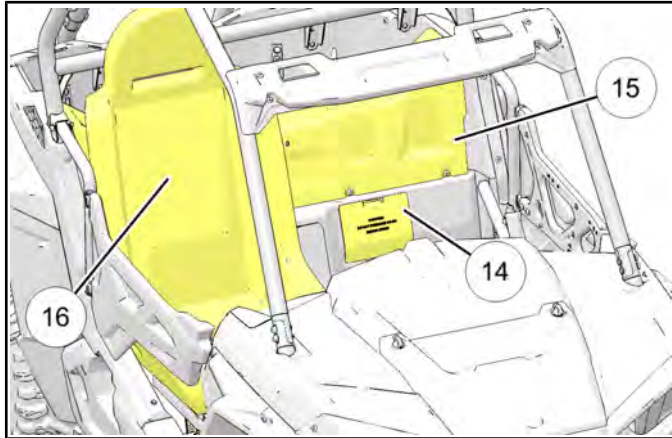
25. Properly lower the vehicle.

26. Install the air box assembly as outlined in the EFI Chapter (see Chapter 4 – ETC Replacement, page 4.28).

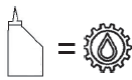
27. Install the rear bumper and cargo box as an assembly (see Chapter 5 – Rear Cargo Box / Fenders, page 10.10).

# TRANSMISSION

28. Connect the (-) negative battery cable.
29. Install the engine service panel (14), console cover 15 and seats (16).



30. If transmission lubricant was drained, fill the transmission with the specified amount of **Polaris AGL** (see Chapter 2 – Transmission Lubrication, page 2.19).



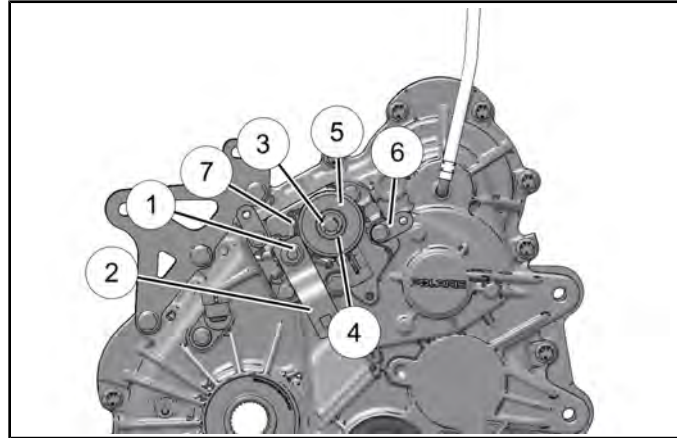
Recommended Transmission Lubricant:  
**AGL (PN 2878068) (Quart)**

Capacity: **44 oz. (1300 ml)**

## Transmission Disassembly

**NOTE:** Refer to the exploded view at the end of this chapter as a reference.

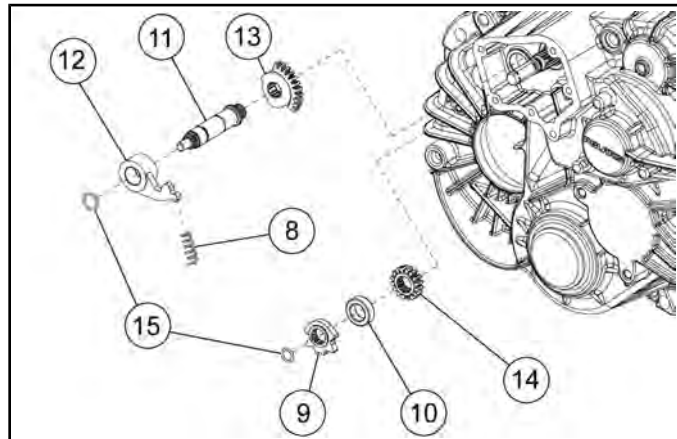
1. Place transmission in High gear before disassembly.
2. Drain and properly dispose of the transmission lubricant (see Chapter 2 – Transmission Lubrication, page 2.19).
3. Remove the bell crank nut (1) and bell crank (2).



4. Remove E-clip (3) that retains spring and flat washers (4) and gear switch (5). Remove the switch.
5. Remove the sector cover bolts (6) and remove the sector cover (7).

**NOTE:** Removal can be aided by using your thumbs to press in on the shafts while pulling out the cover with your fingers.

6. Remove the compression spring (8).



7. Remove the detent star (9). Note how the detent star fits onto the splined shaft with the raised edge facing outward for reassembly.
8. Remove the spacer (10).

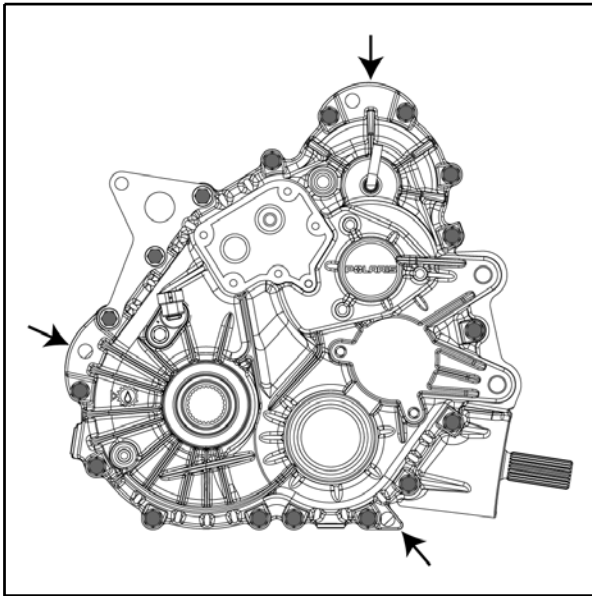


## TRANSMISSION

9. Remove the shift shaft <sup>⑪</sup>, detent pawl <sup>⑫</sup> and the shift sector gears <sup>⑬</sup> & <sup>⑭</sup>.

**NOTE:** Note the timing marks on the shift gears for reassembly purposes.

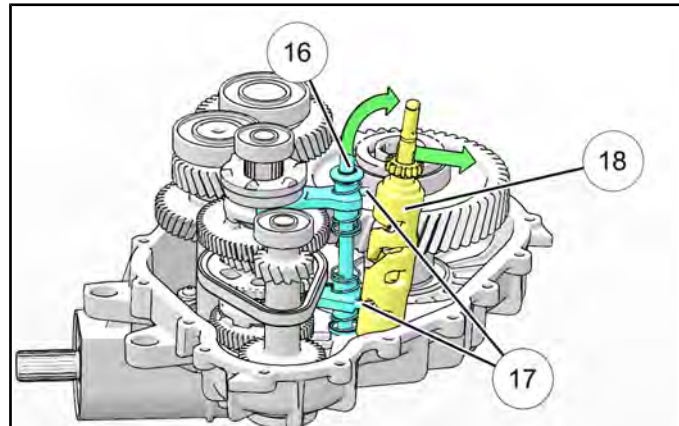
10. Remove the O-rings <sup>⑮</sup> from each shaft and discard. Use new O-rings upon assembly.
11. Remove all the transmission case bolts. Using suitable pry bars, remove the cover using the designated pry points (indicated by the black arrows in the illustration below).



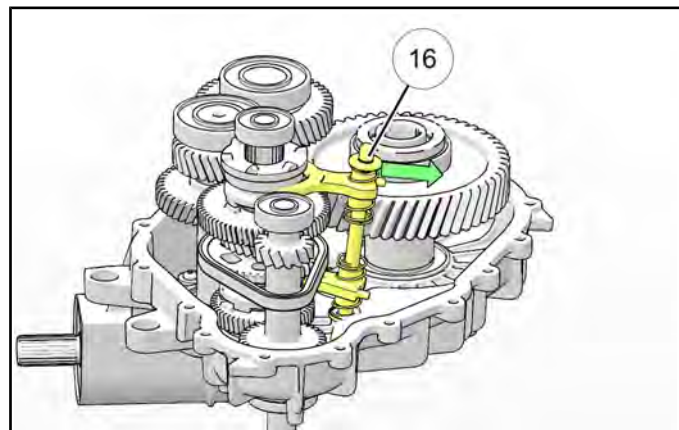
### CAUTION

Do not pry on case sealing surfaces.  
Use only the designated pry points on the transmission.

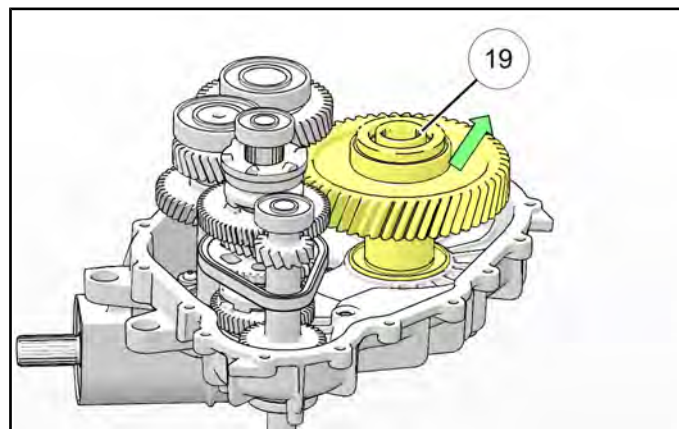
12. Lift up on the shift shaft rail <sup>⑯</sup> and move the rail assembly rearward to allow the shift fork pins <sup>⑰</sup> to be removed from the shift drum <sup>⑱</sup>. Remove the shift drum from the transmission housing.



13. Remove the shift shaft rail <sup>⑯</sup> and shift forks from the transmission housing as an assembly.



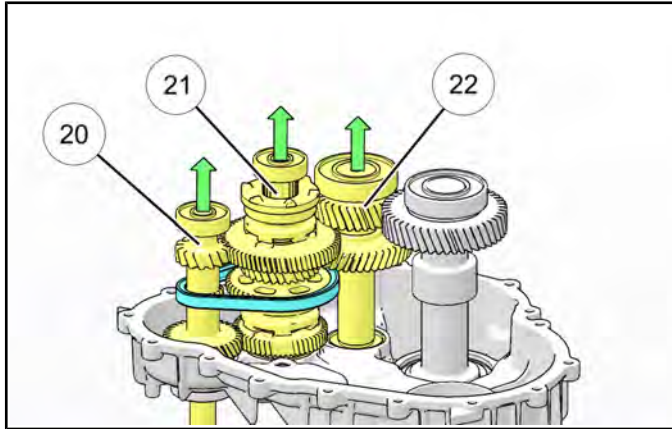
14. Remove the rear output shaft assembly <sup>⑲</sup> by lifting underneath the gear or by tapping the shaft from the opposite side.



6

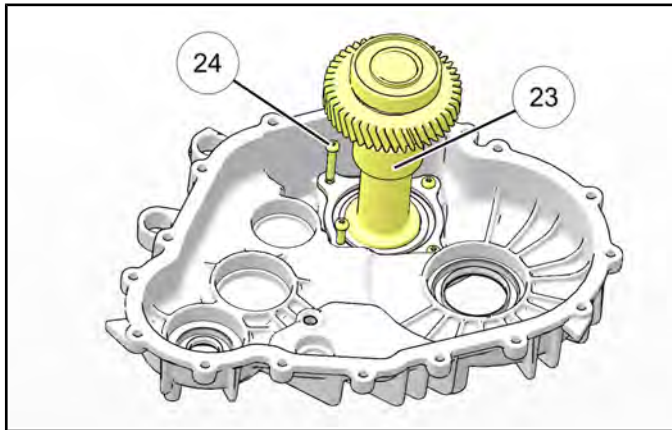
# TRANSMISSION

15. Remove the input shaft ⑳, gear cluster assembly ㉑ and idler gear shaft assembly ㉒ from the transmission housing by pulling both assemblies straight up.



16. Place the gear cluster assembly on a clean surface for inspection. If disassembly is required, refer to “Gear Cluster Disassembly”.

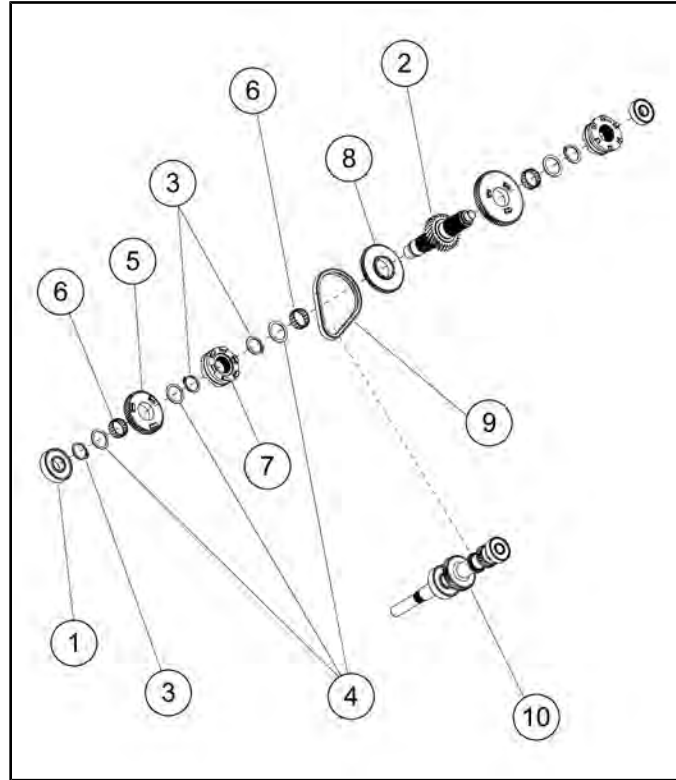
17. Using a 5 mm Allen wrench, remove the screws that secure the pinion shaft assembly ㉓. Lift the pinion shaft assembly straight up to remove it from the housing. Note the longer screw ㉔ that locks the snorkel tube.



18. Remove all seals from the gearcase halves and clean the cases in preparation for assembly.

## Gear Cluster Disassembly

19. Remove the bearing from the reverse shaft using a bearing puller. Remove the retaining ring and slide the washers, high gear and needle bearing off the reverse shaft.



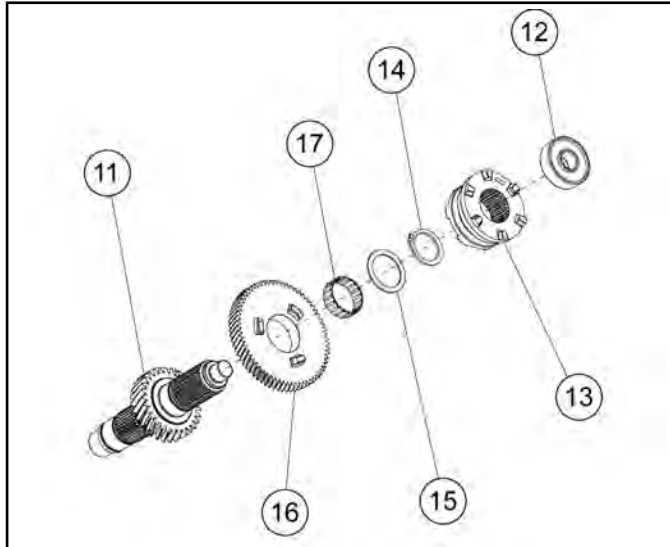
① Bearing	⑥ Needle Bearing
② Reverse Shaft	⑦ Engagement Dog
③ Retaining Ring	⑧ Sprocket
④ Washers	⑨ Silent Chain
⑤ High Gear	⑩ Input Shaft

20. Remove the retaining ring and engagement dog from the reverse shaft.

21. Remove the retaining ring, washer, needle bearing, and sprocket from the reverse shaft.

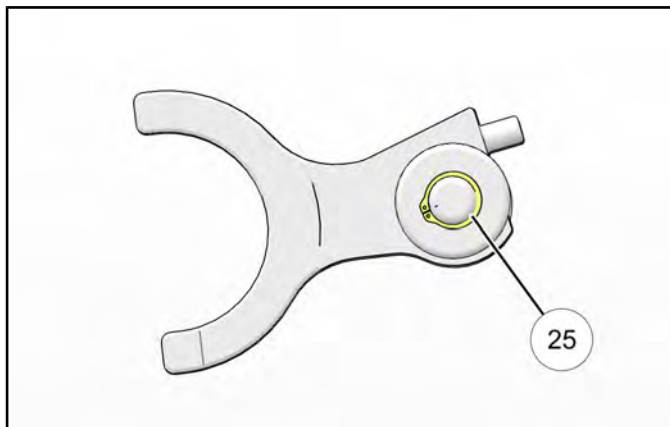
22. Tilt the two shafts towards each other and remove the silent chain from the two shafts.

23. If necessary, disassemble the other end of the reverse shaft. Remove the bearing, engagement dog, retaining ring, washer, low gear and needle bearing from the reverse shaft.



① Reverse Shaft	⑤ Washer
② Bearing	⑥ Low Gear
③ Engagement Dog	⑦ Needle Bearing
④ Snap Ring	

24. To disassemble the shift shaft rail remove the snap ring (25) from the end of the shift rail on either side.



## CAUTION

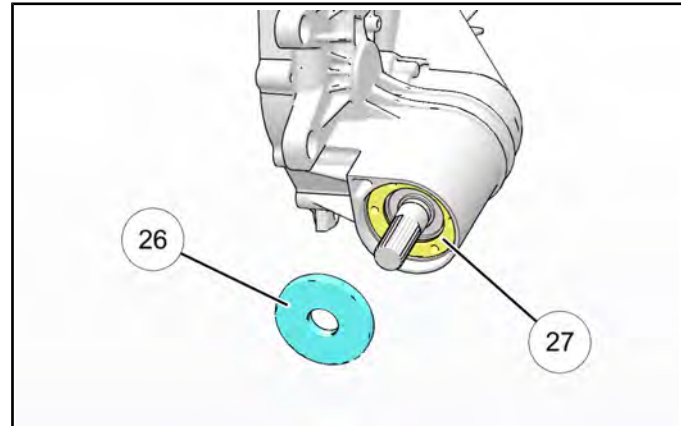
Use caution when disassembling the shift rail. The compressed springs on the shift rail may pop off causing eye or face injury.

## Snorkel Shaft Removal / Disassembly

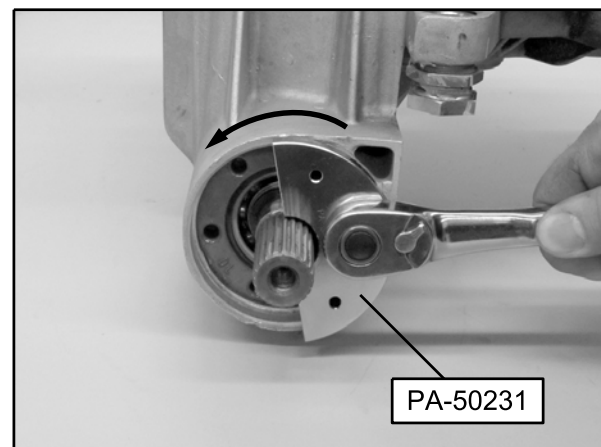
### CAUTION

The pinion shaft must be removed prior to removing the snorkel shaft assembly. Failure to remove pinion shaft, will result in damage to the snorkel shaft.

25. Extract the seal (26) from the snorkel shaft to access the snorkel tube (27) for removal.



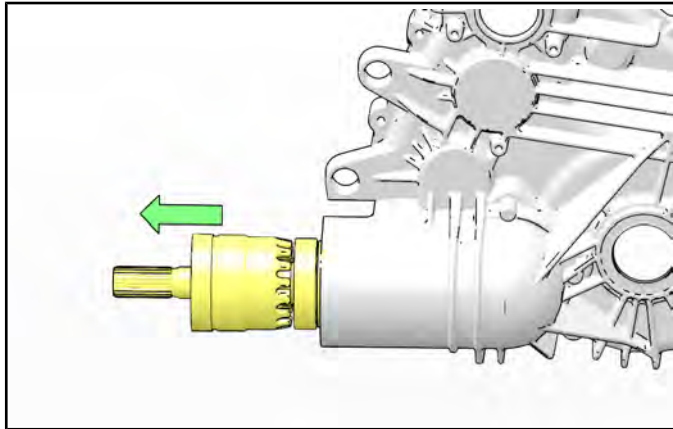
26. Using the Snorkel Tool (PA-50231), fully loosen the snorkel tube.



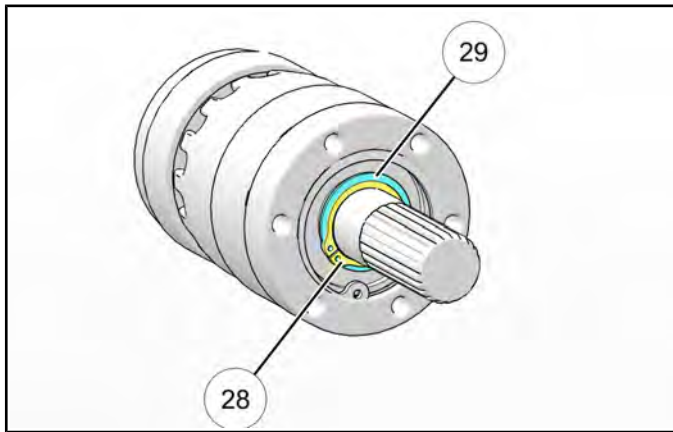


# TRANSMISSION

27. Remove the snorkel tube and shaft assembly from the transmission case.

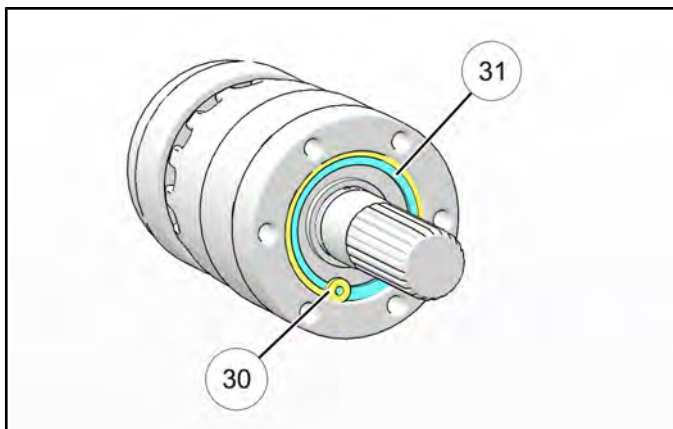


28. Remove the snap ring (28) and shim (29) from the snorkel shaft.



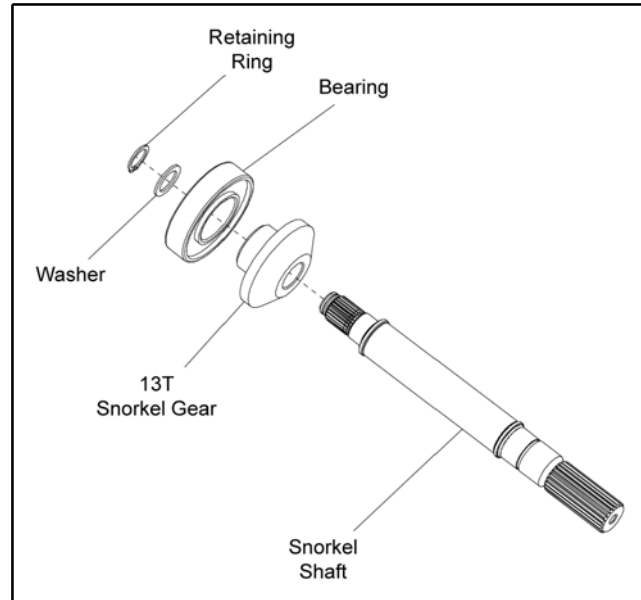
29. Use an arbor press to remove the snorkel tube from the snorkel shaft.

30. Remove the snap ring (30) and shim (31) retaining the bearing in the snorkel tube.



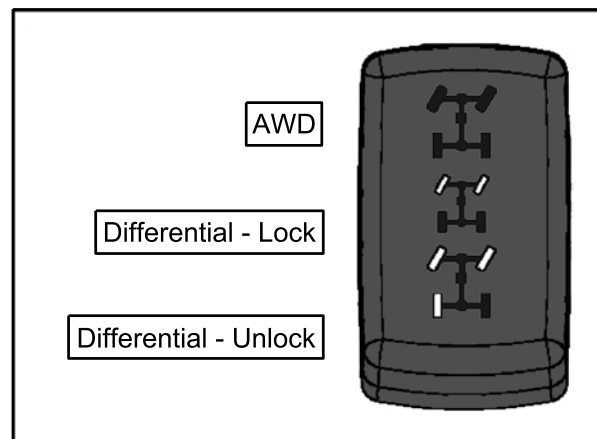
31. Lightly tap on the bearing from the opposite side to remove it from the snorkel tube.

32. Remove the retaining ring to remove the remaining washer, bearing and gear from the snorkel shaft.



## Differential Operation (Turf Mode Models Only)

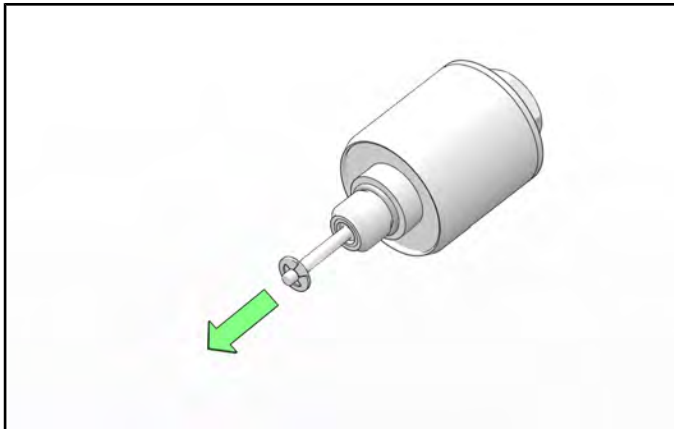
Transmissions equipped with Turf Mode have two traction operational modes: Differential Lock and Differential Unlock. Locking the rear differential is beneficial in low traction and rough terrain conditions. Unlocking the rear differential makes maneuvering easier and minimizes damage to terrain.



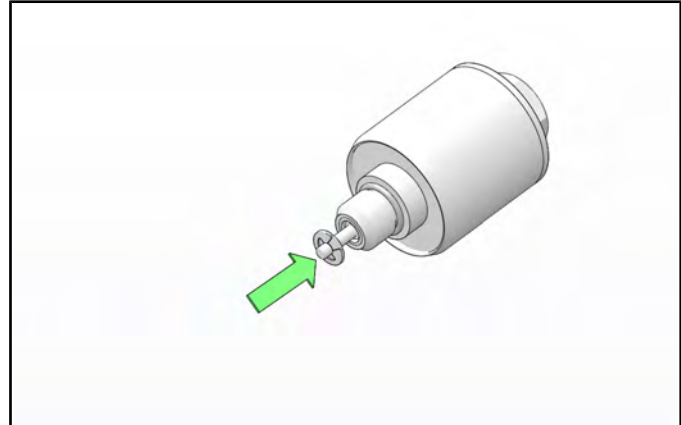
When "Differential-Unlock" is selected, the rear differential becomes unlocked for tighter turns. An electrical solenoid mounted in the rear portion of the gearcase actuates the shift fork. The solenoid plunger extends out to move the fork and slides the engagement dog away from the side gear that is part of the planetary differential assembly. This unlocks the rear differential.

# TRANSMISSION

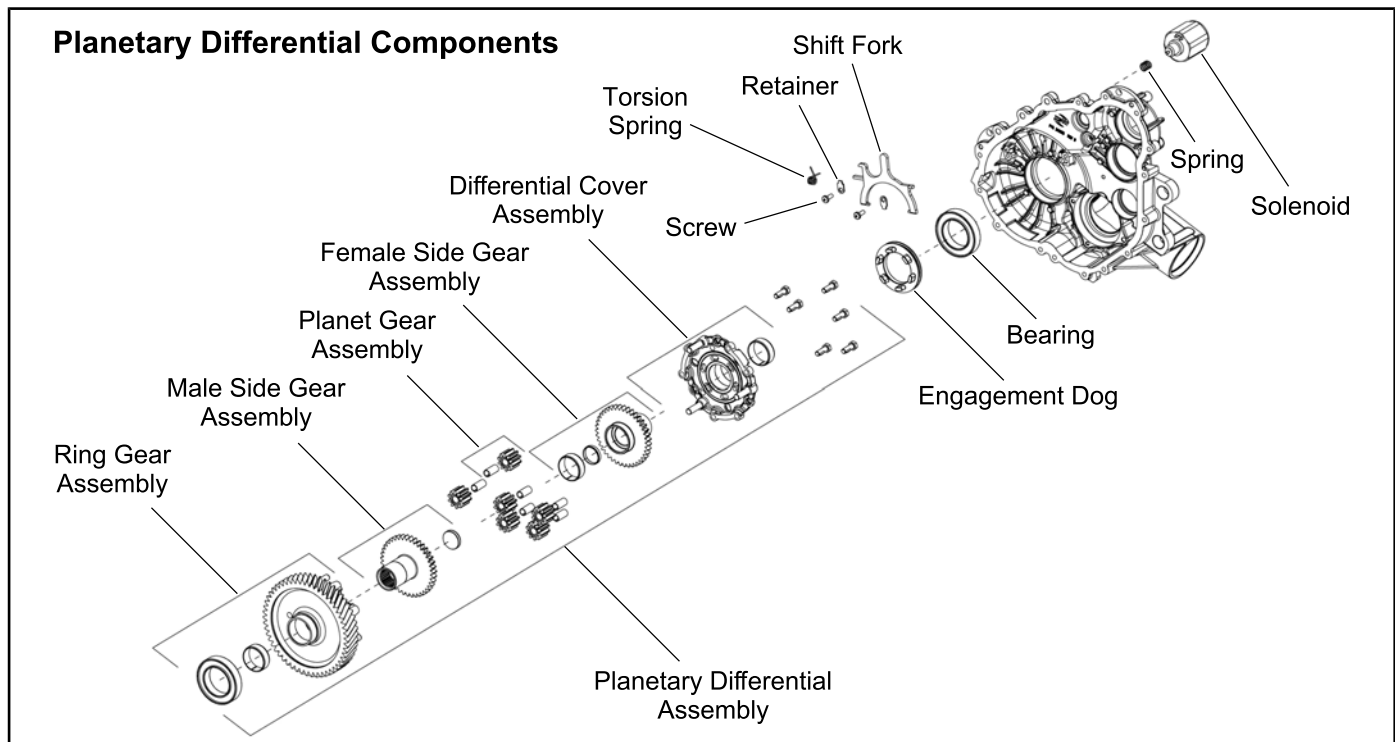
The rear drive shafts are now dependent on the differential allowing for tighter turns.



to retract. Spring tension moves the shift fork back into place and mates the engagement dog to the side gear that is part of the planetary differential assembly. This locks the rear differential as a solid rear axle, increasing traction.



When "Differential-Lock" is selected, power is removed from the electrical solenoid allowing the solenoid plunger

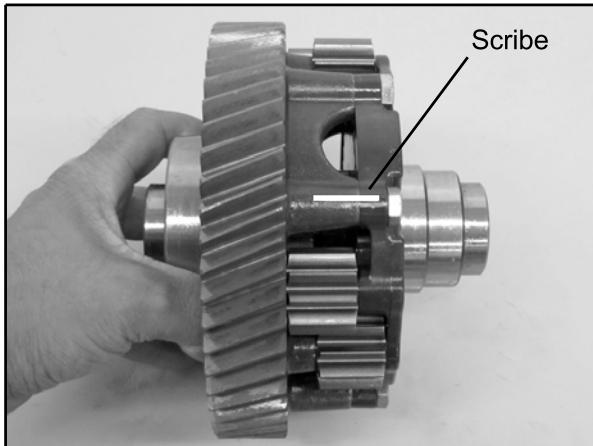


# TRANSMISSION

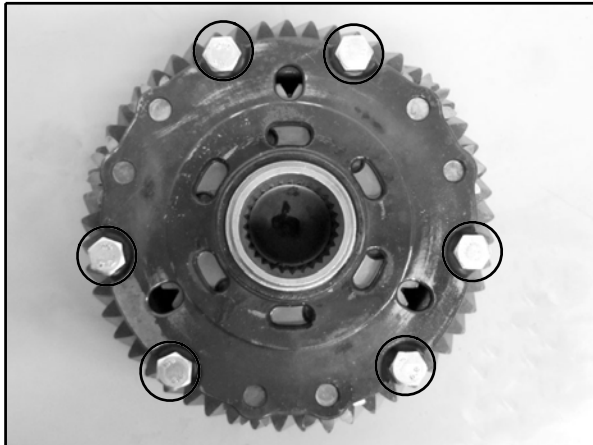
## Planetary Differential Disassembly (Turf Mode Models Only)

**NOTE:** If the gearcase is completely assembled, perform the Transmission Disassembly, page procedure.

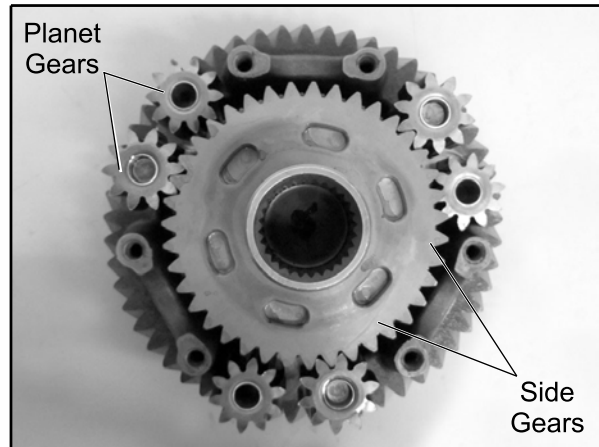
1. Use a scribe to mark the differential cover and ring gear prior to disassembly.



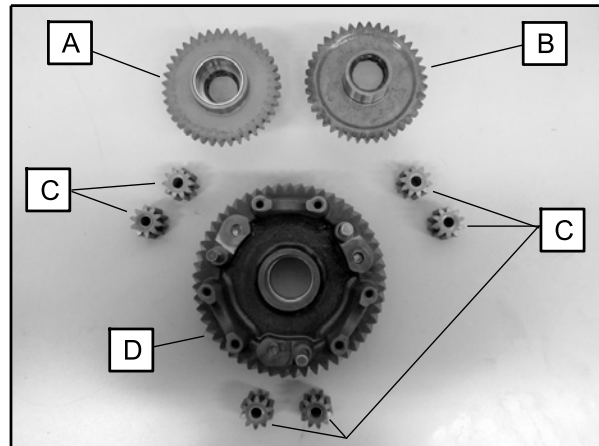
2. Remove the six screws retaining the differential cover and remove the cover.



3. Remove the six planet gears and each side gear assembly from the ring gear.



4. Inspect the female side gear (A), male side gear (B), planet gears (C) and ring gear (D). Replace components or bushings as needed. Bushing replacement can be performed on all necessary differential components. If bushing replacement is required, proceed to Planetary Differential Bushing Replacement (Turf Mode Models Only), page 6.21.

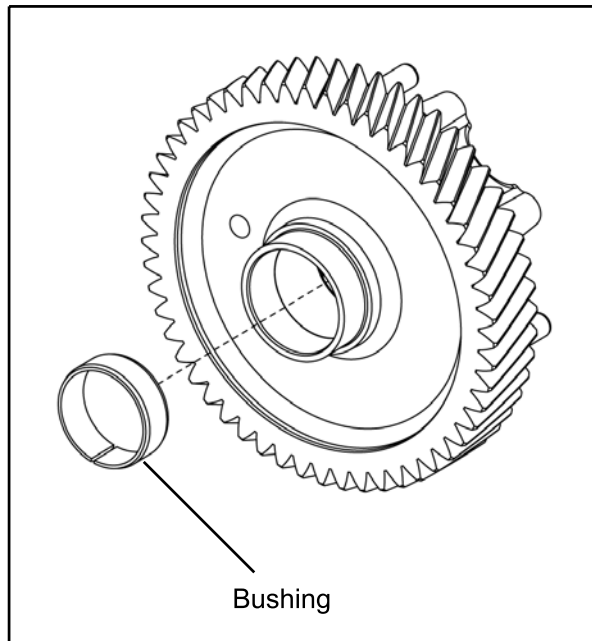


## Planetary Differential Bushing Replacement (Turf Mode Models Only)

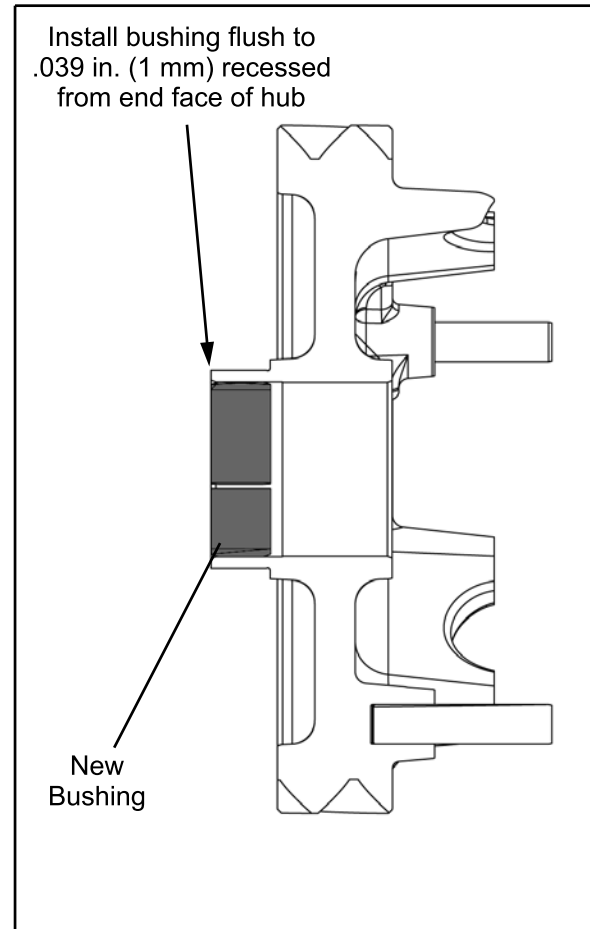
**NOTE:** If the differential is completely assembled, perform the “Planetary Differential Disassembly” procedure.

### Ring Gear Bushing Replacement

1. Press the old bushing out of the ring gear.
2. Thoroughly clean the bore of the ring gear and check for any unwanted burrs.
3. Press the new bushing into the ring gear housing.



4. Install the bushing to the specified depth as shown.

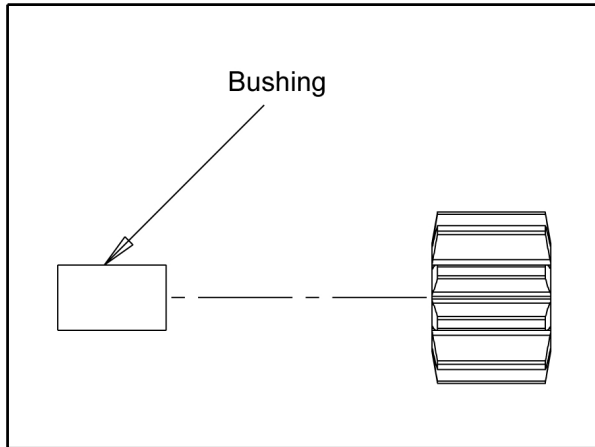


### Planet Gear Bushing Replacement

5. Press the old bushing out of the planet gear.
6. Thoroughly clean the bore of the planet gear and check for any unwanted burrs.

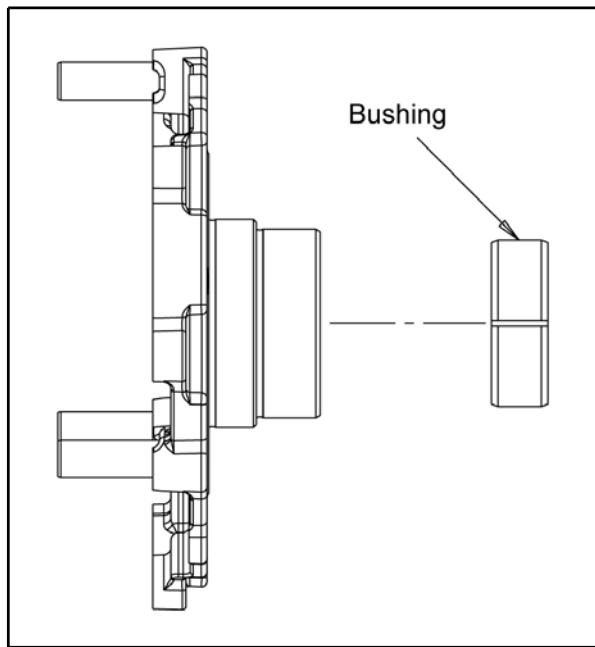
# TRANSMISSION

7. Press the new bushing into the planet gear until it is flush on each end. Repeat this procedure for the remaining planet gears.

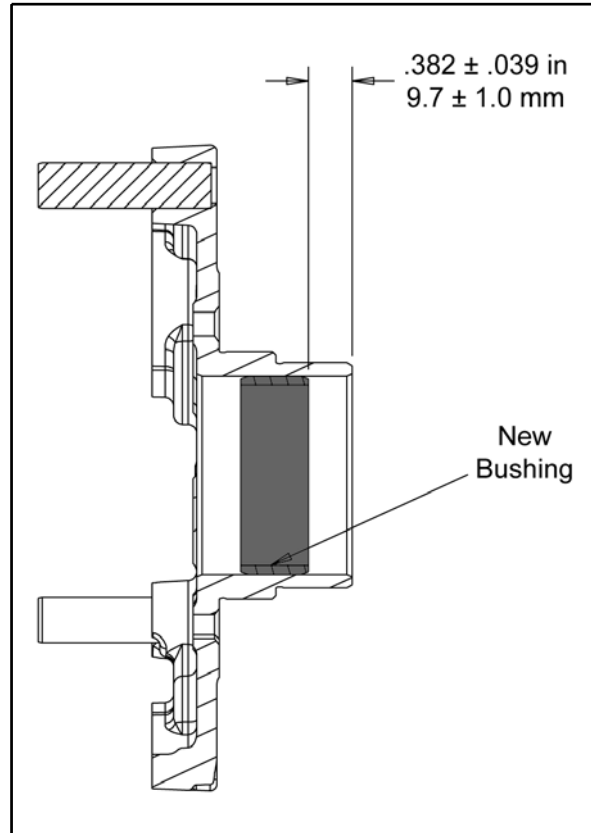


## Differential Cover Bushing Replacement

8. Press the old bushing out of the differential cover.
9. Thoroughly clean the bore of the differential cover and check for any unwanted burrs.
10. Press the new bushing into the differential cover.

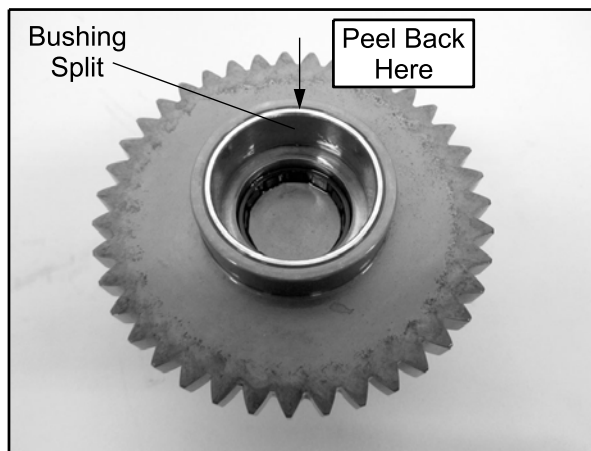


11. Install the bushing to the specified depth as shown.



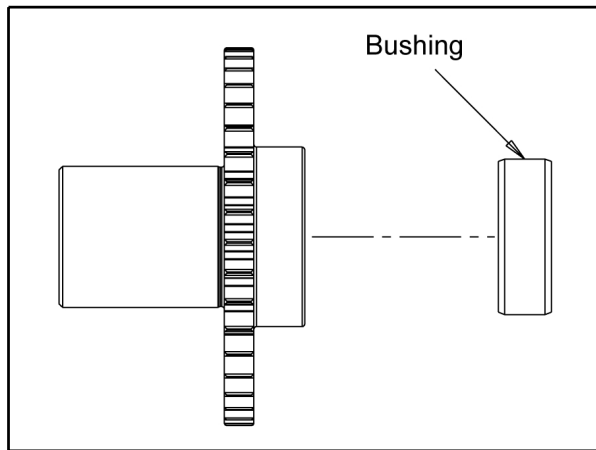
## Female Side Gear Bushing Replacement

12. Locate the bushing split. Using a small chisel or flat blade screwdriver, peel back and remove the old bushing from the side gear, being careful not to damage the side gear.



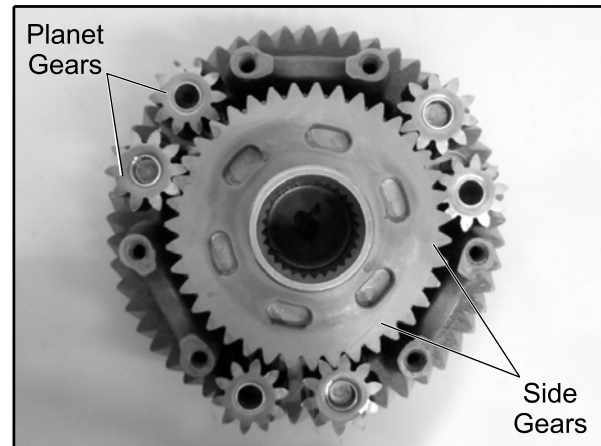
13. Thoroughly clean the bore of the side gear and check for any unwanted burrs.

14. Press the new bushing into the side gear until it bottoms out.



## Planetary Differential Assembly (Turf Mode Models Only)

1. Thoroughly clean the differential components.
2. Assemble the side gears and place them onto the ring gear along with the six planet gears.



3. Align and install the differential cover using the previously made scribe marks.
4. Apply Loctite® 2760™ to cover screws.
5. Install screws hand tight. Place assembly in soft jaw vise and torque to specification.

6



 = T

Differential Cover Screws:  
**22 ft-lb (30 Nm)**

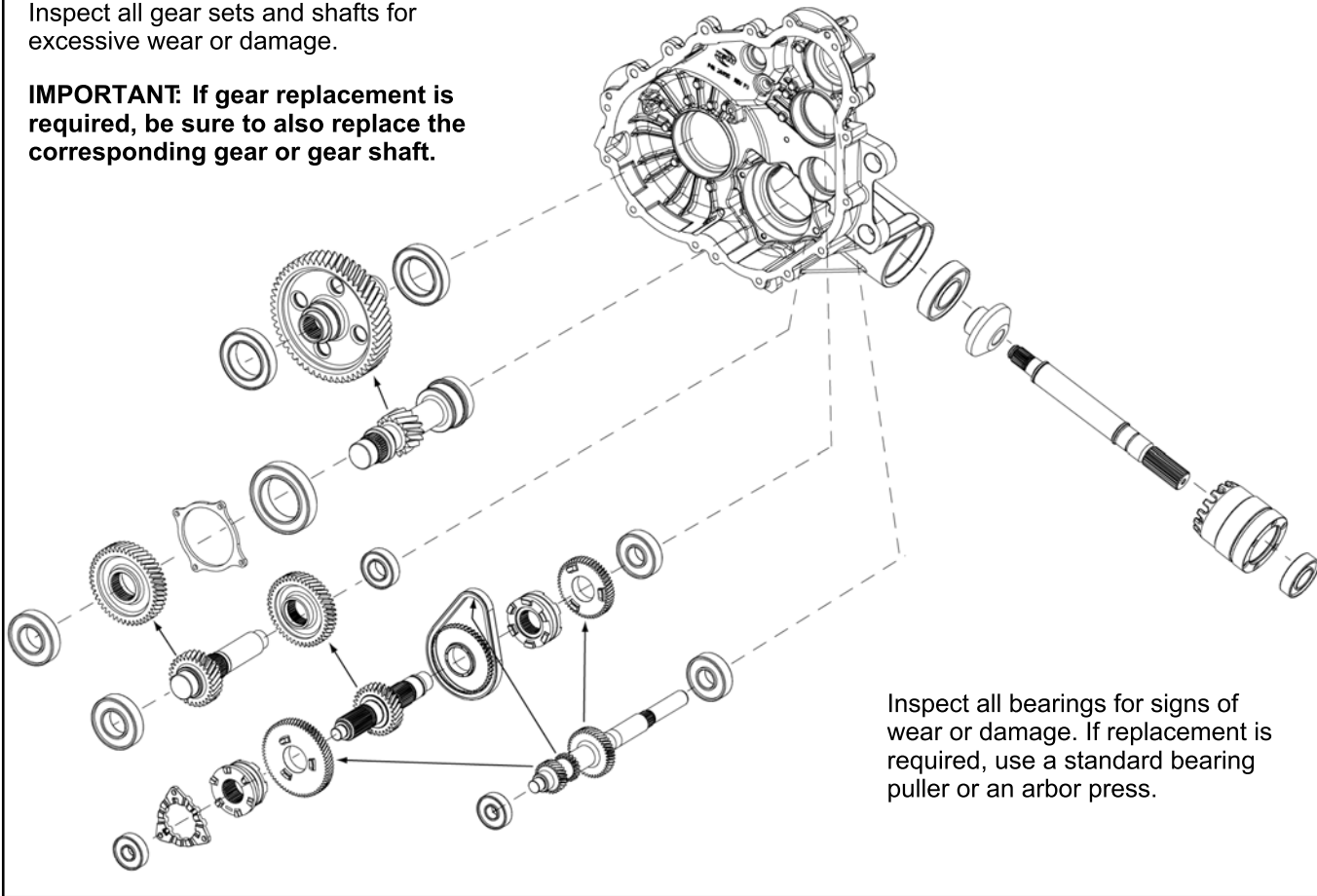


# TRANSMISSION

## Gear / Shaft / Bearing Inspection

Inspect all gear sets and shafts for excessive wear or damage.

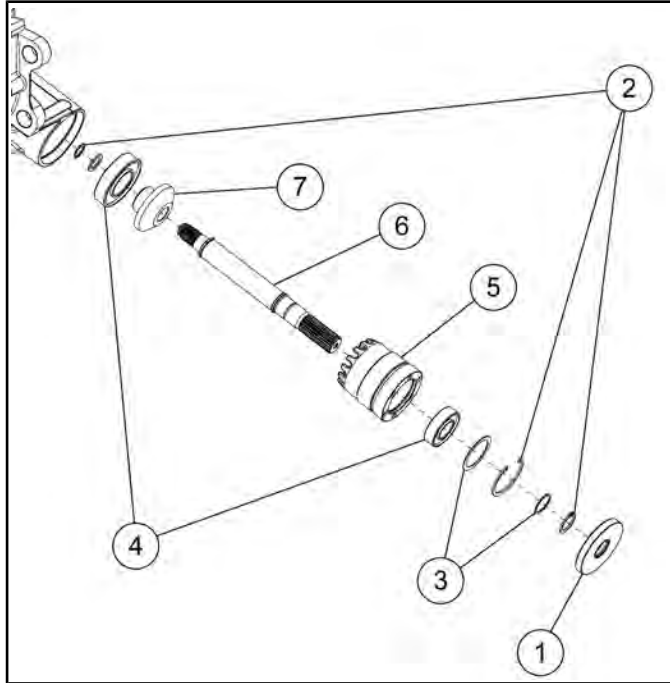
**IMPORTANT:** If gear replacement is required, be sure to also replace the corresponding gear or gear shaft.



Inspect all bearings for signs of wear or damage. If replacement is required, use a standard bearing puller or an arbor press.

## Transmission Assembly / Snorkel Gear Backlash Procedure

1. Reassemble the snorkel tube and snorkel shaft assembly by reversing the disassembly procedure (see "Snorkel Shaft Removal / Disassembly" in Transmission Disassembly, page 6.14").

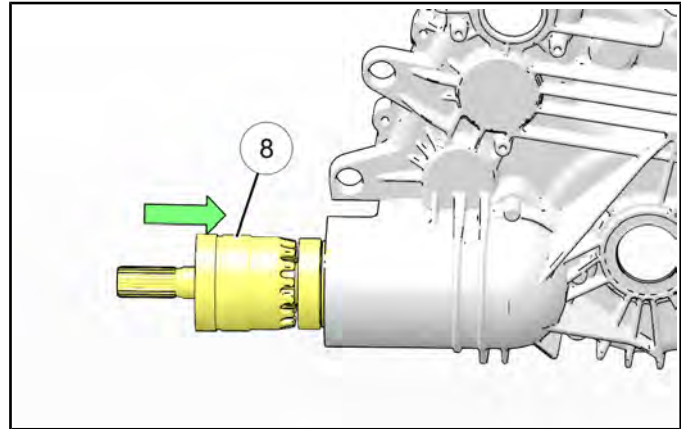


① Seal	⑤ Snorkel Tube
② Snap Ring	⑥ Snorkel Shaft
③ Washer	⑦ 13T Gear
④ Bearing	

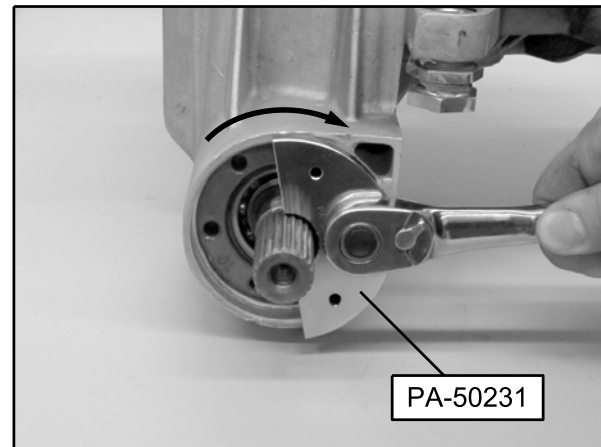
2. After the 13T gear and bearing are pressed onto the snorkel shaft (flush to the shoulder), install the washer and new retaining ring.
3. Press the gear back towards the retaining ring. Avoid excessive force so the retaining ring is not damaged or pre-stressed significantly.

**NOTE:** Failure to press the gear back against the washer and retaining ring will lead to a gear backlash change after vehicle is placed into service.

4. Apply a small amount of white lithium grease or Anti-Seize on the threads ⑧ of the snorkel tube.



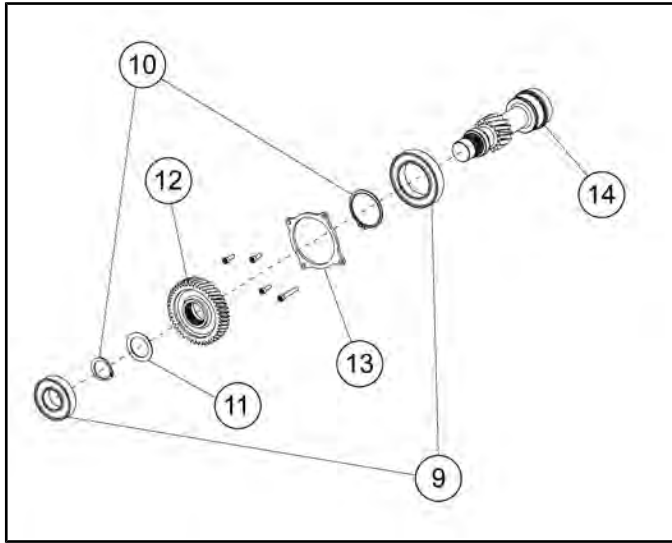
5. Install the snorkel shaft into the gearcase. Using the Snorkel Tool (PA-50231), tighten the snorkel tube until it is lightly seated in the transmission housing.



6

# TRANSMISSION

6. Inspect the pinion shaft assembly. Replace bearings if needed. Inspect each gear for damage, chips or abnormally worn teeth.

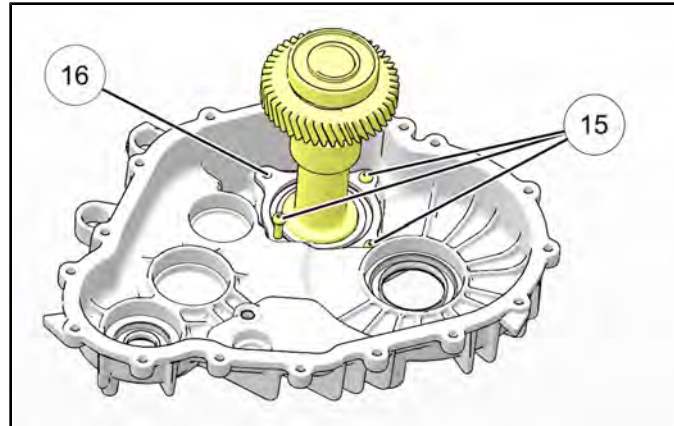


⑨ Bearing	⑫ Gear
⑩ Snap Ring	⑬ Bearing Cover
⑪ Washer	⑭ Pinion Shaft

**NOTE:** If pinion shaft was disassembled, the bearing cover must be installed on the shaft before installing the gear.

7. Install the pinion shaft assembly. Be sure to properly mesh the snorkel shaft bevel gear with the pinion shaft bevel gear.
8. Apply Loctite® 242™ to the threads of the bearing cover retaining screws.

9. Using a 5 mm Allen wrench, install only the three screws ⑮ that secure the pinion shaft assembly as shown below. Leave the longer locking screw ⑯ out at this point. Torque the bearing cover retaining screws to specification.



Bearing Cover Retaining Screws:  
**10 ft-lb (14 Nm)**

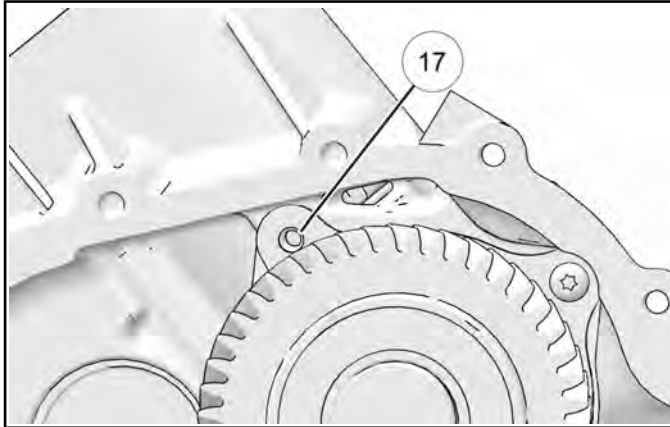
**IMPORTANT: DO NOT** install the longer screw. Installing the longer screw will lock the snorkel tube and not allow for backlash setting adjustment.

10. Rotate the snorkel tube *counterclockwise* using the snorkel tool (PA-50231) until the snorkel gear and pinion gear have 'zero' backlash.

**NOTE: DO NOT** overtighten the snorkel tube. At the 'zero' backlash position, you should still be able to turn the snorkel shaft using your fingers, but it will feel rough and may have some tight spots.


# TRANSMISSION

11. Look down into the transmission housing to see the snorkel locking screw hole opening ⑰ to reference your starting point.



**NOTE:** If you have a hard time seeing into the hole, insert a small Allen wrench, punch or screwdriver into the hole to feel when the notch is aligned with the hole.

12. Slowly rotate the snorkel tube *clockwise* while counting the number of notches passing through the hole opening as you rotate the tube. Rotate the snorkel tube to the **3rd** notch from the 'zero' backlash position obtained in step 11.
13. Check the pinion shaft gear backlash again by feel. If the pinion shaft gear lash appears to be too tight, rotate the snorkel shaft *clockwise* to the next notch (4th notch).
14. Once the backlash is set, apply Loctite® 242™ to the threads and install the locking screw to secure the snorkel tube. Torque the locking screw to specification.

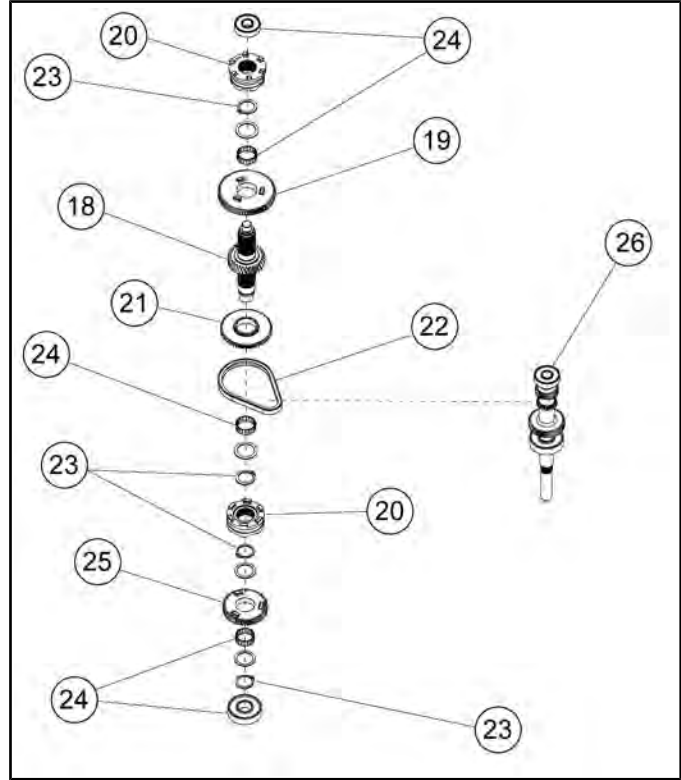
 = T  
**Snorkel Locking Screw:**  
**10 ft-lb (14 Nm)**

### Transmission Assembly

**NOTE:** The snorkel shaft and pinion shaft must be installed prior to transmission assembly. The snorkel shaft cannot be installed after assembling the transmission.

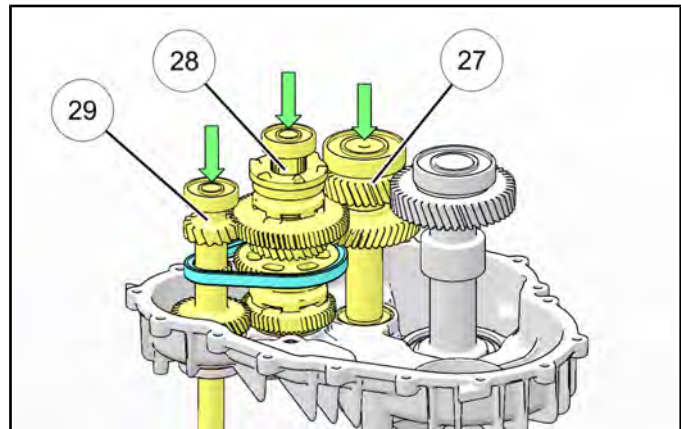
15. Clean both transmission case halves thoroughly. Inspect case half mating surfaces for damage.

16. Assemble the reverse shaft assembly and input shaft assembly if previously disassembled (see illustrations).



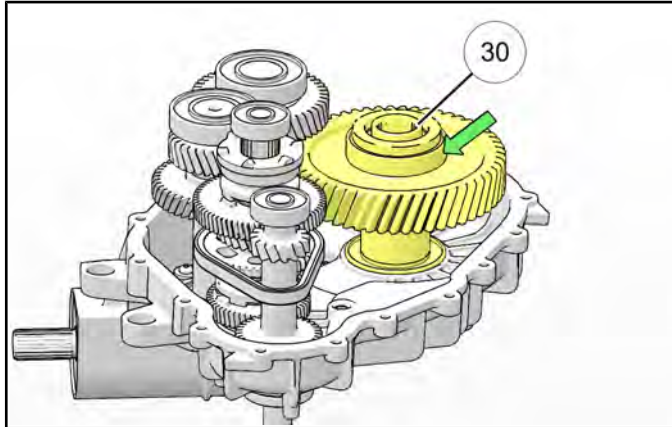
⑱ Reverse Shaft	㉓ Snap Ring
⑲ Low Gear	㉔ Bearing
㉒ Engagement Dog	㉕ High Gear
㉑ Reverse Sprocket	㉖ Input Shaft
㉔ Silent Chain	

17. Install the idler gear shaft assembly ⑳, gear cluster assembly ㉗, and input shaft assembly ㉘ into the transmission housing, all at the same time.

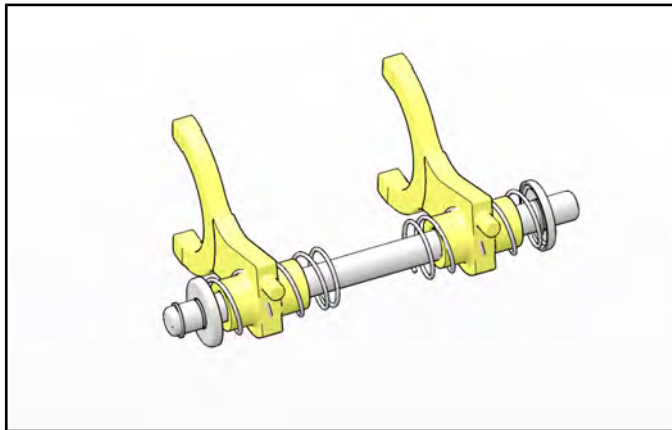


# TRANSMISSION

18. Install the rear output shaft assembly ⑳.

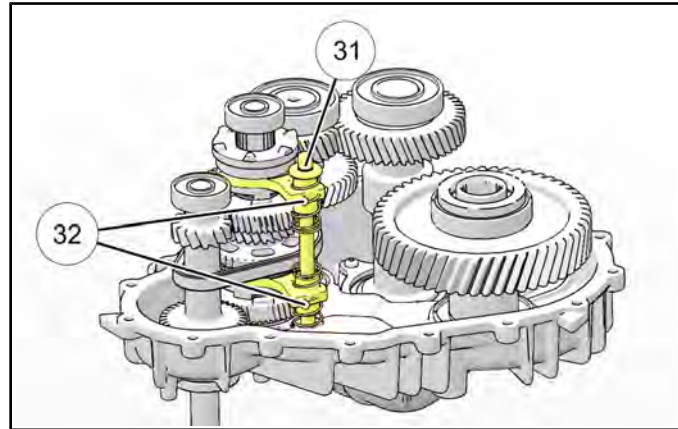


19. Assemble the shift shaft rail if previously disassembled.



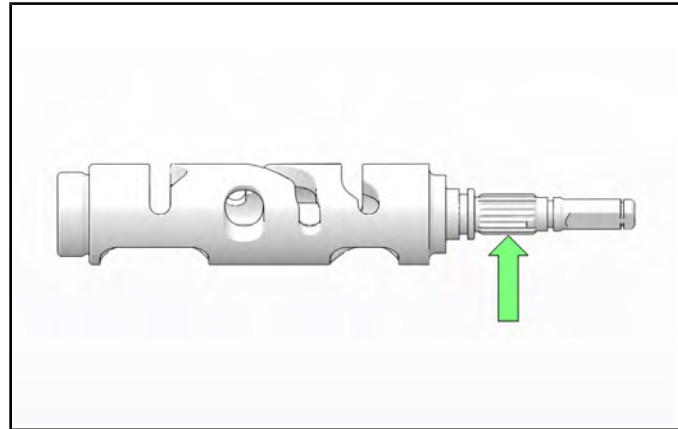
**NOTE:** Both shift forks need to be orientated the same way, so that the shift fork pins are both offset to the same side of the rail.

20. Install the shift shaft rail ㉑ and shift forks into the transmission housing as an assembly. Be sure the shift forks are engaged into the engagement dogs.

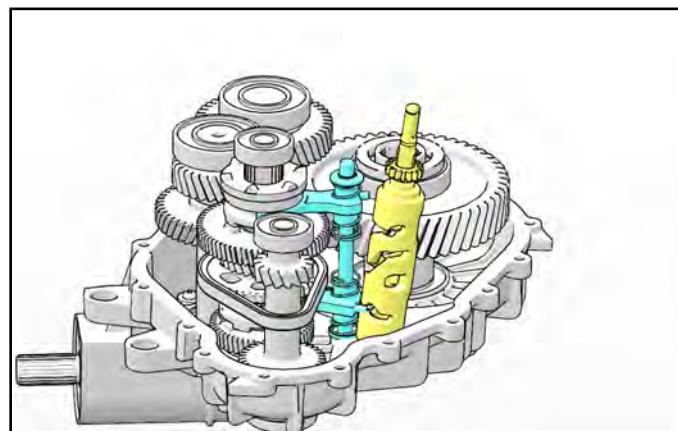


**NOTE:** Shift fork pins should be offset towards the input shaft as shown above ㉒.

21. Inspect the shift drum for any damage or wear. Inspect the splines of the shift drum.



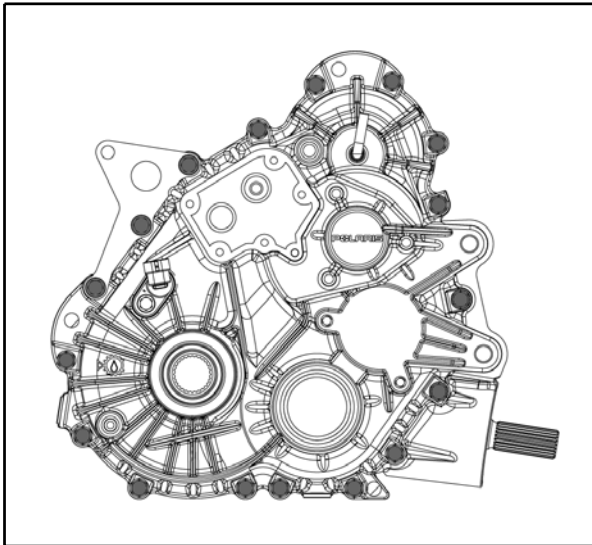
22. Install the shift drum into the transmission housing. Lift up on the shift shaft rail and move the rail assembly towards the shift drum to allow the shift fork ends to be installed into the shift drum.





## TRANSMISSION

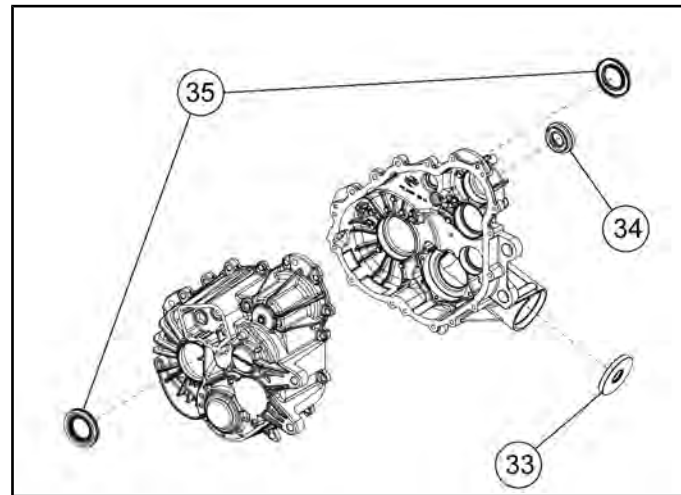
23. Apply a continuous bead of Crankcase 3 Bond Sealant (PN 2871557) to left-hand transmission mating surface.
24. Install the transmission case cover and retaining bolts. Torque bolts to specification.



Transmission Case Bolts:  
**20 ft-lbs (27 Nm)**

25. Install new seals into the transmission case halves.

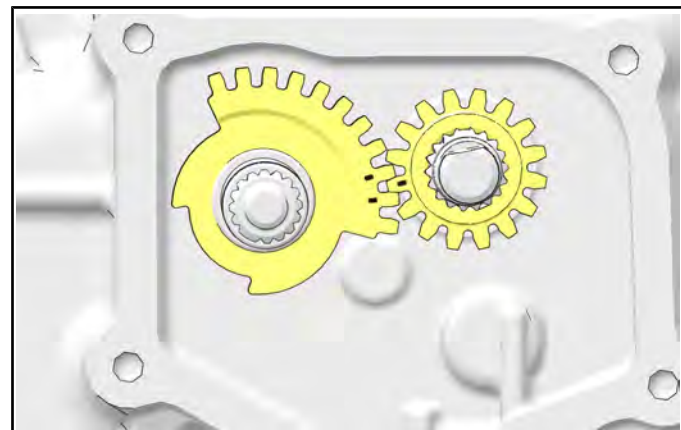
- The snorkel shaft seal (33), should be pressed in until it seats against the housing counter-bore.



- The input shaft seal (34), should be pressed in until it seats flush with the housing.
- The rear output shaft seals (35), can be installed using a standard bushing installation tool. Seals should be installed just past the case lead-in chamfer (0.070" or 1.8 mm from outer face of bore).

6

26. Thoroughly clean the shift shaft housing.
27. Install the sector gear (16T) onto the shift drum shaft. Install the shift shaft assembly and sector gear (11T) into the bushing pocket on the left side. Align the timing marks on the gears as shown.



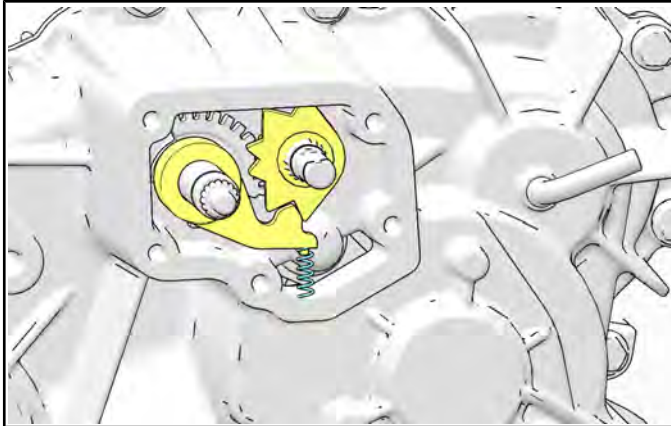
28. Install the spacer and then the detent star onto the shift drum shaft. Be sure to install the detent star with the raised edge facing outward and skip-tooth aligned.

6.29

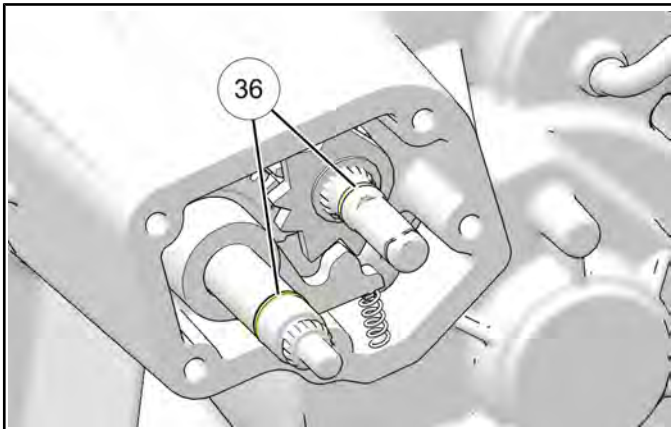


# TRANSMISSION

29. Install the detent pawl onto the shift shaft and carefully install the compression spring.




30. Install a new O-ring on each shift shaft. Apply a small amount of white lithium grease on the O-rings, shift shafts and component contact surfaces prior to installing the sector cover.




31. Clean the transmission and gear sector cover mating surfaces thoroughly.

32. Apply Crankcase Sealant (3-Bond) (PN 2871557) onto the cover and transmission case mating surface.


33. Install the sector cover and align the transmission case dowel with the alignment hole. Install and torque the bolts to specification.

 = T
Sector Gear Cover Bolts: <b>12 ft-lb (16 Nm)</b>

34. Install the transmission drain plug and torque to specification.

 = T
Fill / Drain Plug: <b>14 ft-lbs (19 Nm)</b>

35. Install the bellcrank onto the shift shaft. Note the key splined on the bellcrank and shift shaft. Install the nut and torque to specification.

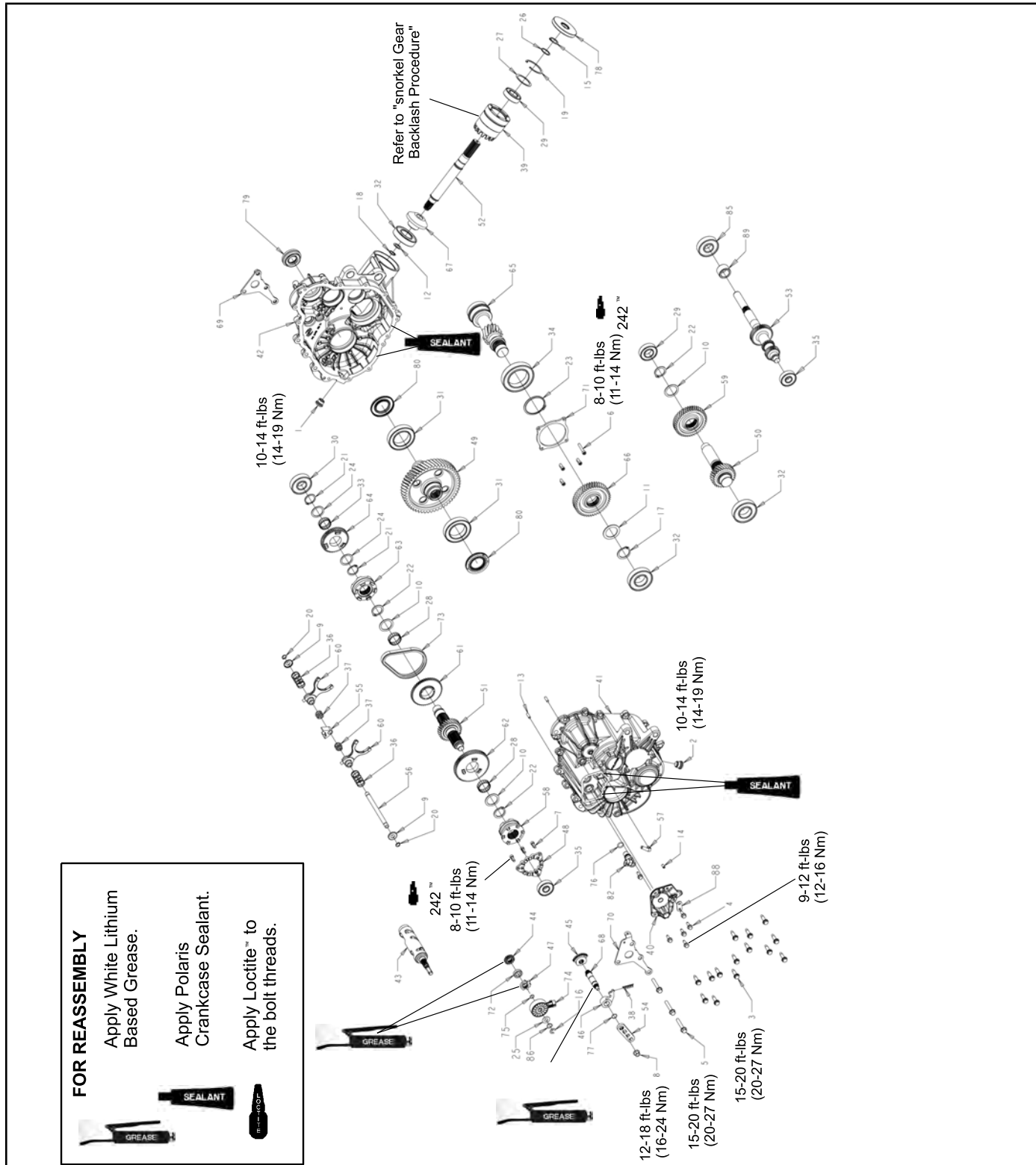
 = T
Bell Crank Nut: <b>18 ft-lb (24 Nm)</b>

36. Refer to Transmission Installation, page 6.11 to complete the repair.



# TRANSMISSION

## Transmission Assembly View (No Turf Mode)

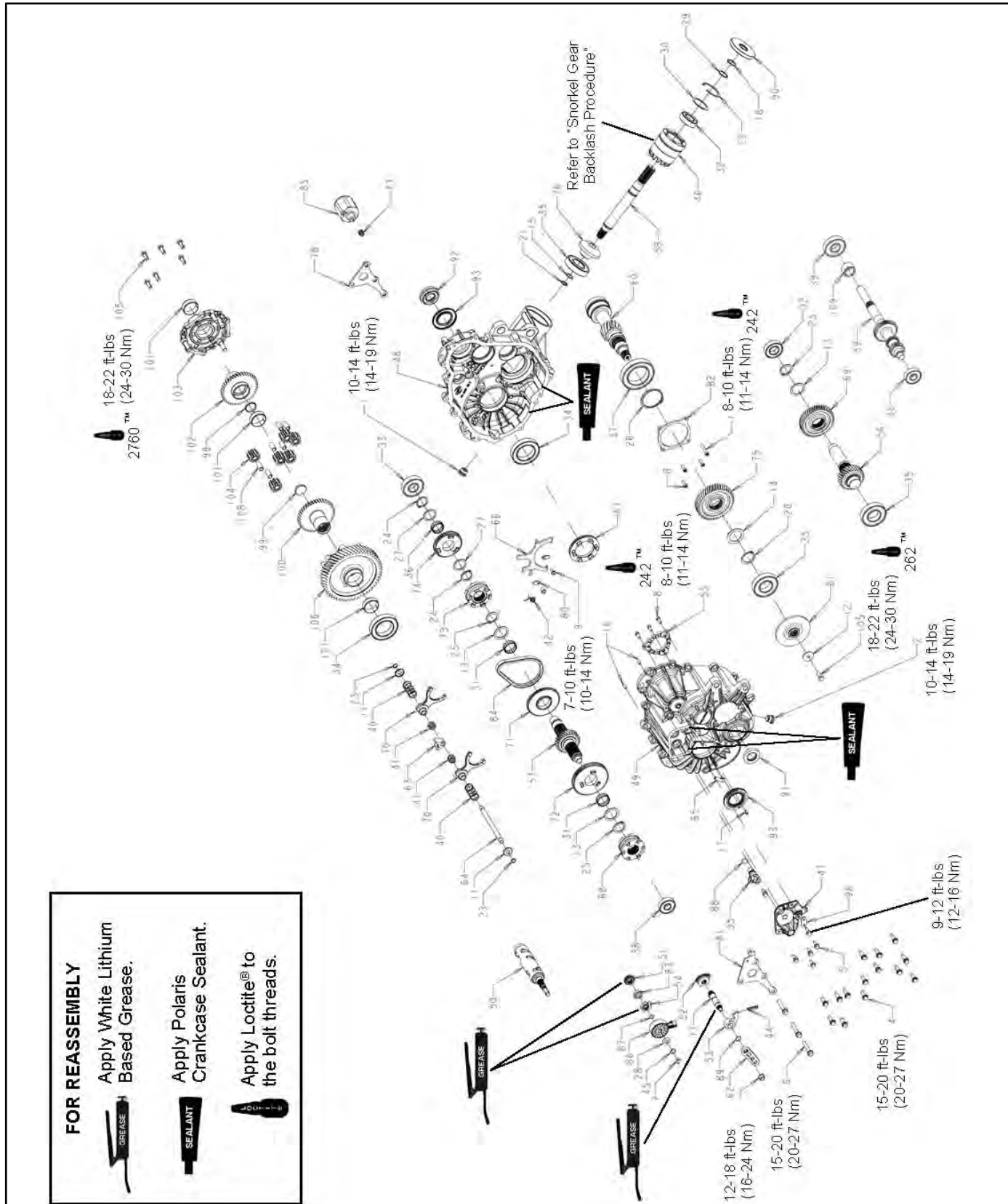


## TRANSMISSION

REF.	DESCRIPTION	REF.	DESCRIPTION
1.	Fill Plug	44.	Gear, Sector 16T
2.	Drain Plug, Magnetic	45.	Gear, Sector 31T
3.	Screw, M8 x 1.25 x 30	46.	Pawl, Detent
4.	Screw, M6 x 1 x 20	47.	Star, Detent
5.	Screw, M8 x 50	48.	Plate, Park, 12-Face
6.	Screw, M6 x 1 x 40	49.	Shaft, Output 53T
7.	Screw, M6 x 1 x 18	50.	Shaft, Idler 29T
8.	Nut, NyLoc, M8 x 1.25	51.	Shaft, Reverse 29T
9.	Washer, Cup	52.	Shaft, Front Output
10.	Washer	53.	Shaft, Input Helical
11.	Washer	54.	Bellcrank
12.	Washer	55.	Collar, Shift
13.	Pin, Dowel	56.	Rail, Shift Shaft
14.	Pin, Spring	57.	Tube, Vent, 1/4 in.
15.	Retaining Ring, External	58.	Shift Dog, Park
16.	Snap Ring	59.	Gear, 44T
17.	Retaining Ring, External	60.	Fork, Shift
18.	Retaining Ring, External	61.	Sprocket, Reverse
19.	Retaining Ring, Internal	62.	Gear, Low
20.	Retaining Ring, External	63.	Engagement Dog, 6-Face
21.	Retaining Ring, External	64.	Gear, High
22.	Retaining Ring, External	65.	Shaft, Pinion 11T
23.	Retaining Ring, External	66.	Gear, 46T
24.	Washer, Thrust	67.	Gear, Snorkel 13T
25.	Washer, Thrust	68.	Shaft, Shift
26.	Shim	69.	Weldment, Rear Mount Bracket
27.	Shim	70.	Bracket, Rear Mount
28.	Bearing, Needle Cage	71.	Cover, Bearing, Center Drive
29.	Bearing, Ball	72.	Spacer
30.	Bearing, Ball	73.	Chain, Silent
31.	Bearing, Ball	74.	Switch, Rotary, 2-Pin
32.	Bearing, Ball	75.	O-Ring
33.	Bearing, Needle Cage	76.	O-Ring
34.	Bearing, Ball	77.	O-Ring
35.	Bearing, Ball	78.	Seal, Triple Lip
36.	Spring, Compression	79.	Seal, Dual Lip
37.	Spring, Compression	80.	Seal, Triple Lip
38.	Spring, Compression, Detent	81.	N/A
39.	Tube, Snorkel	82.	Sensor, Speed
40.	Cover, Sector Gears	85.	Bearing, Ball
41.	Case, RH	86.	Spring, Wave
42.	Case, LH	88.	Bracket, Wire Harness
43.	Drum, Shift	89.	Collar Sleeve, Input Shaft

# TRANSMISSION

## TRANSMISSION ASSEMBLY VIEW (Turf Mode Models)



# TRANSMISSION

REF.	DESCRIPTION	REF.	DESCRIPTION	REF.	DESCRIPTION
1.	Fill Plug	37.	Bearing, Ball	72.	Gear, Low 67T
2.	Drain Plug, Magnetic	38.	Bearing, Ball	73.	Engagement Dog, 6-Face
4.	Screw, M8 x 1.25 x 30	39.	Bearing, Ball	74.	Gear, 53T
5.	Screw, M6 x 1 x 20	40.	Spring, Compression	75.	Gear, 46T
6.	Screw, M8 x 50	41.	Spring, Compression	76.	Gear, Snorkel 13T
7.	Screw, M6 x 1 x 40	42.	Spring, Torsion	77.	Shaft, Shift
8.	Screw, M6 x 1 x 18	43.	Spring, Compression	78.	Weldment, Rear Mount Bracket
9.	Screw, M6 x 1 x 16	44.	Spring, Compression, Detent	80.	Retainer, Fork
10.	Nut, NyLoc, M8 x 1.25	45.	Spring, Washer	81.	Bracket, Rear Mount
11.	Washer, Cup	46.	Tube, Snorkel	82.	Cover, Bearing, Center Drive
12.	Washer	47.	Cover, Sector Gears	83.	Spacer
13.	Washer	48.	Case, LH	84.	Chain, Silent
14.	Washer	49.	Case, RH	85.	Solenoid
15.	Washer	50.	Drum, Shift	86.	Switch, Rotary, 2-Pin
16.	Pin, Dowel	51.	Gear, Sector 16T	87.	O-Ring
17.	Pin, Spring	52.	Gear, Sector 31T	88.	O-Ring
18.	Retaining Ring, External	53.	Pawl, Detent	89.	O-Ring
19.	Snap Ring	54.	Star, Detent	90.	Seal, Triple Lip
20.	Retaining Ring, External	55.	Plate, Park, 12-Face	91.	Seal, Triple Lip
21.	Retaining Ring, External	56.	Shaft, Idler 29T	92.	Seal, Dual Lip
22.	Retaining Ring, Internal	57.	Shaft, Reverse 29T	93.	Seal, Triple Lip
23.	Retaining Ring, External	58.	Shaft, Front Output	95.	Sensor, Speed
24.	Retaining Ring, External	59.	Shaft, Input Helical	98.	Bracket, Wire Harness
25.	Retaining Ring, External	60.	Shaft, Pinion, 11T	99.	Plug, Expansion
26.	Retaining Ring, External	61.	Disc, Brake	100.	Side Gear, Male, 39T
27.	Washer, Thrust	62.	Bellcrank	101.	Bearing, Plain
28.	Washer, Thrust	63.	Collar, Shift	102.	Side Gear, Female, 39T
29.	Shim	64.	Rail, Shift Shaft	103.	Diff Cover
30.	Shim	65.	Tube, Vent, 1/4 in.	104.	Planet Gear
31.	Bearing, Needle Cage	66.	Fork, Pivot Shaft	105.	Screw, M8 x 1.25 x 25
32.	Bearing, Ball	67.	Dog, Engagement	106.	Ring Gear, 53T
33.	Bearing, Ball	68.	Shift Dog, Park	108.	Bearing, Plain
34.	Bearing, Ball	69.	Gear, 44T	109.	Collar Sleeve, Input Shaft
35.	Bearing, Ball	70.	Fork, Shift		
36.	Bearing, Needle Cage	71.	Sprocket, 48T, 6-Face		



# TRANSMISSION

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## TROUBLESHOOTING

### Shifting Difficulty

Check the following items when shifting difficulty is encountered.

- Shift cable adjustment/condition
- PVT alignment (clutch center distance)
- Idle speed (throttle cable routing)
- Transmission lubricant type/quality
- Loose fasteners on sector gear cover
- Worn rod ends, clevis pins, or pivot arm bushings
- Shift selector rail travel
- Worn, broken or damaged internal transmission components

**NOTE:** To determine if shifting difficulty or problem is caused by an internal transmission problem, isolate the transmission by disconnecting the shift cable end from the transmission bellcrank. Manually select each gear range at the transmission bellcrank, and test ride vehicle. If it functions properly, the problem is outside the transmission.

If transmission problem remains, disassemble transmission and inspect all gear dogs for wear (rounding) or damage. Inspect all bearings, circlips, thrust washers and shafts for wear.

# CHAPTER 7

## FINAL DRIVE

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# FINAL DRIVE

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## GENERAL INFORMATION

### Torque Specifications

ITEM	TORQUE
Ball Joint Bolts	<b>42 ft-lb (57 Nm)</b>
Caliper Mounting Bolts (front)	<b>30 ft-lb (42 Nm)</b>
Front Gearcase Cover Plate Screws	<b>11 ft-lbs (15 Nm)</b>
Front Gearcase Fill/Drain Plugs	<b>10 ft-lbs (14 Nm)</b>
Front Gearcase Mounting Bolts	<b>33 ft-lbs (45 Nm)</b>
Hub Castle Nut	<b>110 ft-lbs (149 Nm)</b>
Tie Rod End Fastener	<b>30 ft-lbs (41 Nm) + 90°</b>
Wheel Lug Nuts	<b>Aluminum: 120 ft-lbs (163 Nm) Steel: 60 ft-lb (81 Nm)</b>

### Special Tools

PART NUMBER	TOOL DESCRIPTION
2870026	CV Boot Clamp Pliers (earless type)
2872608	Roll Pin Removal Tool
PU-48951	Axle Boot Clamp Tool

#### **Bosch Automotive Service Solutions:**

1-800-345-2233 or <http://polaris.service-solutions.com/>

## BEARING CARRIER

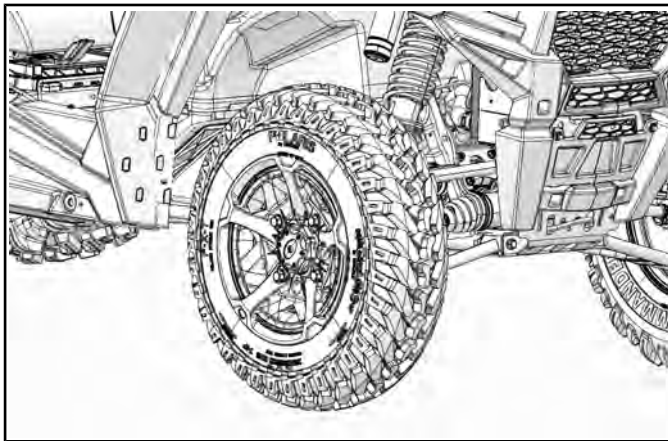
### Front Bearing Carrier Removal / Inspection

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

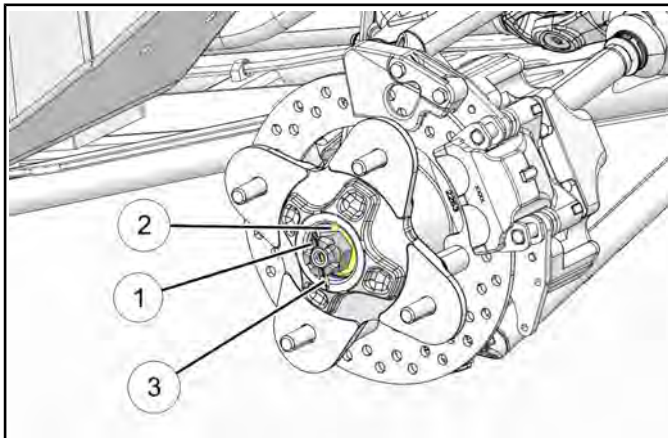
**⚠ WARNING**

Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Wear eye protection when removing bearings and seals.

2. Check bearings for side play by grasping the top and bottom of the tire firmly and checking for movement. The tire should rotate smoothly without binding or rough spots.



3. Remove the four wheel nuts and remove the front wheel.
4. Remove the cotter pin ① and loosen the front wheel hub castle nut ②. Remove the nut, and two cone washers ③ from the front wheel hub assembly.



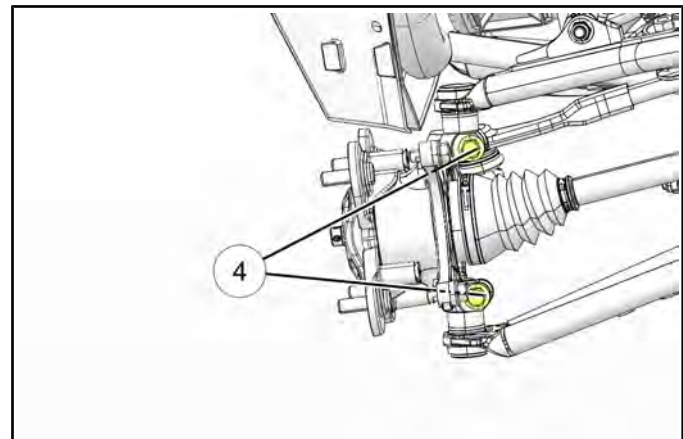
5. Remove the fastener retaining the steering tie rod end to the front bearing carrier.

6. Remove and discard the two front brake caliper mounting bolts and remove the caliper from the brake disc (see Chapter 9 – Front Caliper / Pad Removal, page 9.16)

**CAUTION**

Do not hang the caliper by the brake line. Use wire to hang caliper to prevent damage to the brake line.

7. Remove the front wheel hub assembly.
8. Remove and discard the upper and lower ball joint pinch bolts ④.



9. Using a soft faced hammer, lightly tap on the bearing carrier while removing the upper and lower ball joint ends.
10. Remove the bearing carrier from the front drive shaft.
11. Rotate bearing by hand and check for smooth rotation. Visually inspect bearing for moisture, dirt, or corrosion.

**NOTE:** Due to extremely close tolerances and minimal wear, the bearings must be inspected visually, and by feel. While rotating bearings by hand, inspect for rough spots, discoloration, or corrosion. The bearings should turn smoothly and quietly, with no detectable up and down movement and minimal movement sideways between inner and outer race.

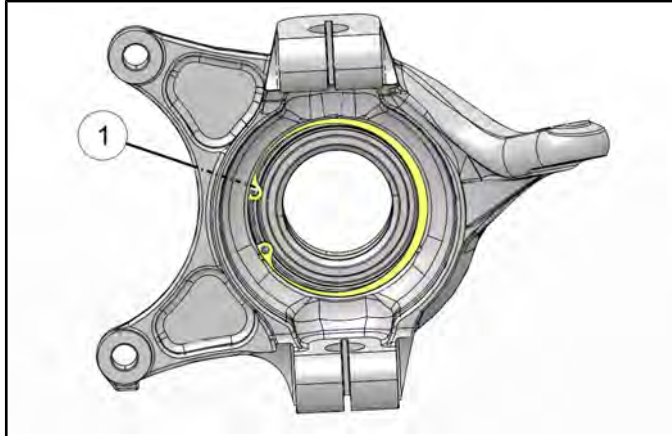
12. Replace bearing if moisture, dirt, corrosion, or roughness is evident.

# FINAL DRIVE

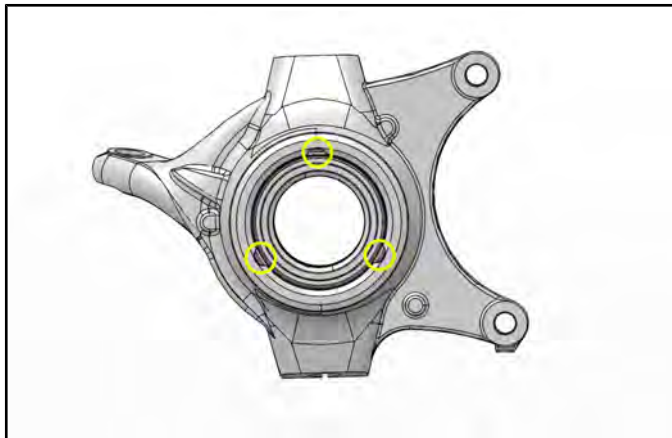
## Front Bearing Replacement

### Bearing Removal

1. Remove the outer snap ring ①.



2. From the back side of the bearing carrier, tap on the outer bearing race with a drift punch in the reliefs as shown.



3. Drive bearing out evenly by tapping on outer race only. Once bearing is at bottom of casting, support casting on outer edges so bearing can be removed.
4. Inspect the bearing carrier housing for scratches, wear or damage. Replace front bearing carrier if damaged.

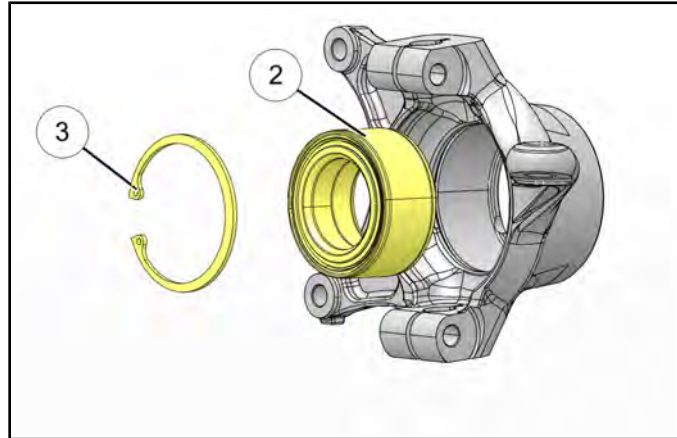
### Bearing Installation

1. Thoroughly clean the front bearing carrier housing and the outer race on the new bearing. Be sure that all oil residue has been removed from each surface.
2. Support the bottom of the bearing carrier housing.

#### CAUTION

Use an arbor and press only on the outer race, otherwise bearing damage may occur.

3. Apply **Loctite® 603™** retaining compound to the outer circumference of the new bearing ② race and carefully press the new bearing into the bearing carrier housing.

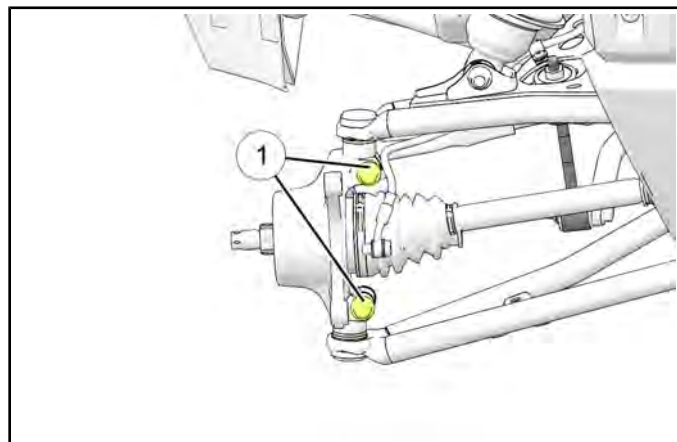


**NOTE: Use care to not allow any of the Loctite® compound to get in the bearing.**

4. Wipe the housing clean of any excess compound and install the snap ring ③.

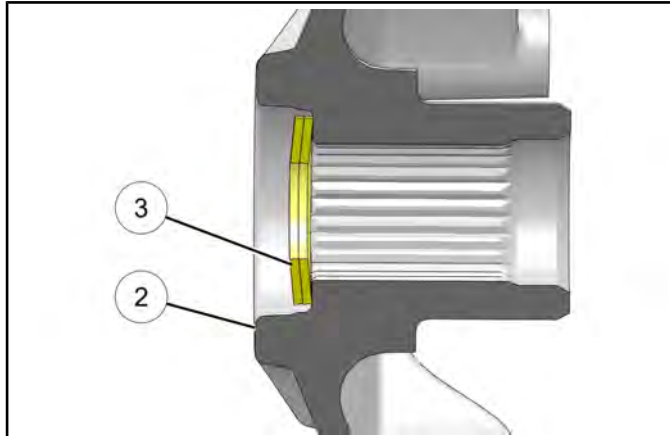
### Front Bearing Carrier Installation

1. Install drive shaft axle through the backside of the bearing carrier.
2. Install the upper and lower ball joint ends into the front bearing carrier.
3. Install **new** pinch bolts ① and nuts. Torque to specification.



Ball Joint Pinch Bolts:  
**42 ft-lb (57 Nm)**

4. Apply Anti-Seize to drive shaft axle splines.
5. Install front wheel hub assembly ②, cone washers ②, and hand tighten the castle nut. Install washers with domed side out.



6. Install **new** brake caliper mounting bolts and torque to specification.



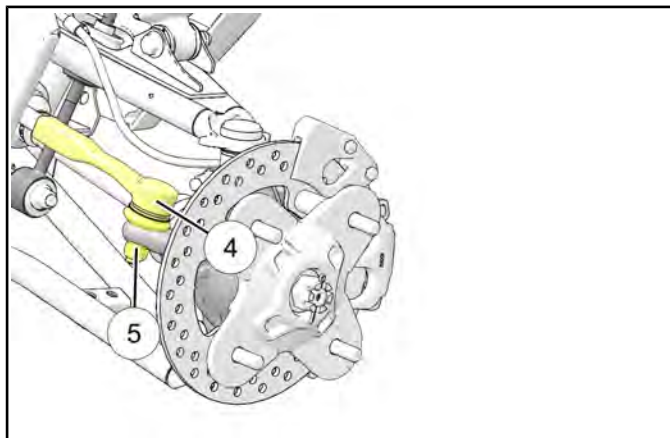
Front Caliper Mounting Bolts:  
30 ft-lb (42 Nm)

### CAUTION

New bolts have a pre-applied locking agent which is destroyed upon removal. Always use new brake caliper mounting bolts upon assembly.

7. Install the steering tie rod end ④ onto the front bearing carrier.

**NOTE:** Refer to the photos below to ensure proper placement of the tie rod end.

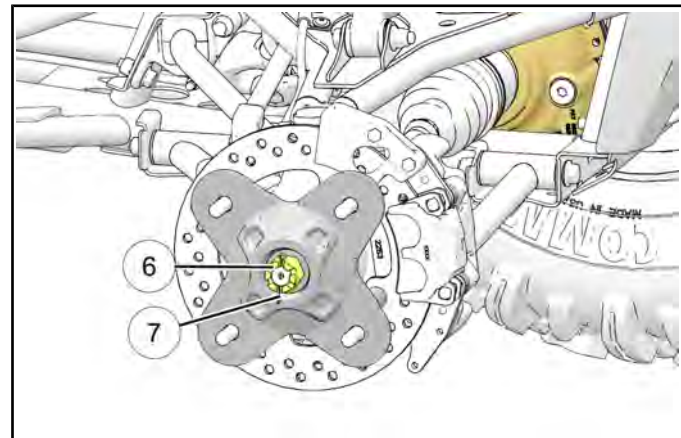


8. Torque the tie rod end fastener ⑤ to specification and install a **new** cotter pin.



Tie Rod End Fastener:  
30 ft-lbs (41 Nm) + 90°

9. Torque wheel hub nut ⑥ to specification and install a **new** cotter pin ⑦. Tighten nut slightly if necessary to align cotter pin holes. Bend both ends of cotter pin around end of spindle in different directions.



Wheel Hub Castle Nut:  
110 ft-lbs (149 Nm)

10. Install wheel and four wheel nuts. Torque wheel nuts to specification.



Wheel Nuts:  
Aluminum: 120 ft-lbs (163 Nm)  
Steel: 60 ft-lb (81 Nm)

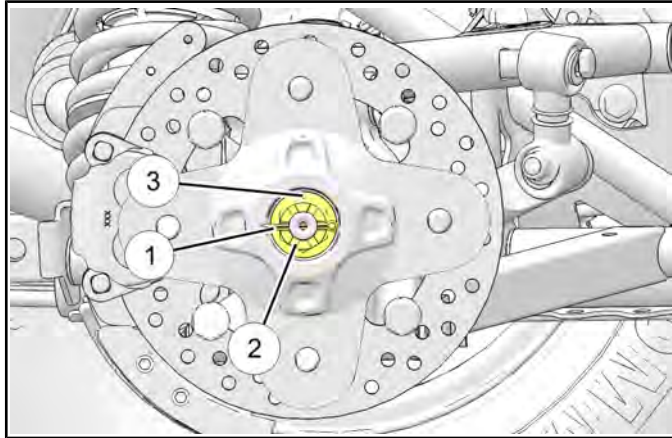
11. Rotate wheel and check for smooth operation.



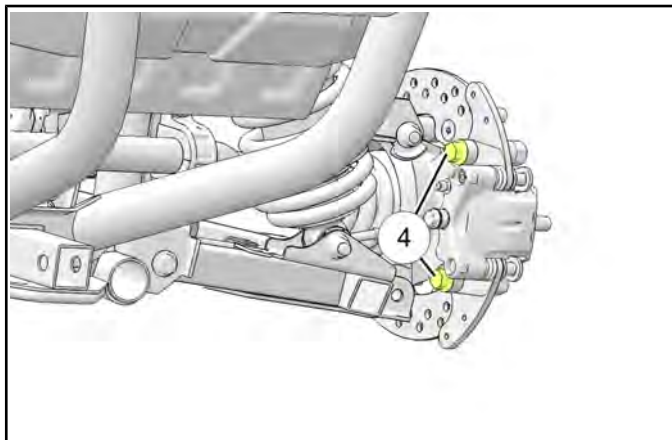
# FINAL DRIVE

## Rear Bearing Carrier Removal / Inspection

1. Elevate rear of vehicle and safely support machine under the frame area.
2. Check bearings for side play by grasping the top and bottom of the tire firmly and checking for movement. The tire should rotate smoothly without binding or rough spots.
3. Remove the cotter pin ① and loosen the rear wheel hub castle nut ②. Remove the nut, and two cone washers ③ from the rear wheel hub assembly.



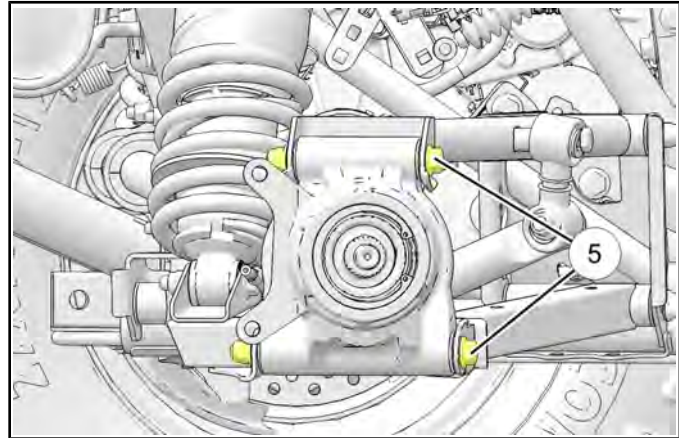
4. Remove the four wheel nuts and rear wheel.
5. Remove the two brake caliper mounting bolts ④. Remove the brake caliper assembly.



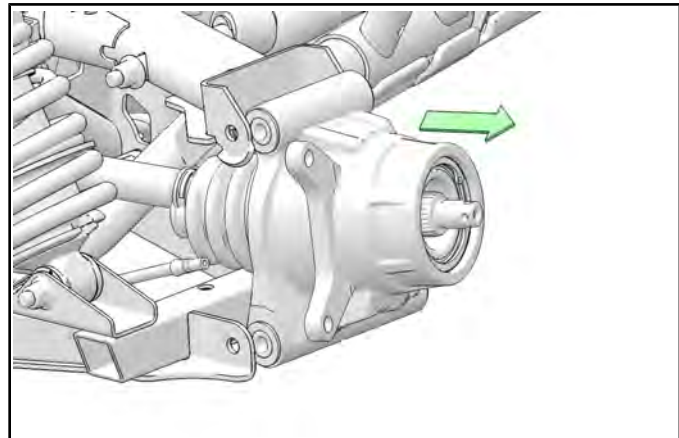
### CAUTION

Do NOT hang the caliper by the brake line. Use wire or rope to hang the caliper to prevent brake line damage.

6. Remove the fasteners ⑤ retaining the bearing carrier to the upper and lower control arms. Swing radius rod down. Discard the nut.



7. Remove the rear wheel hub and brake disc assembly.
8. Pull the bearing carrier out to remove from the vehicle.

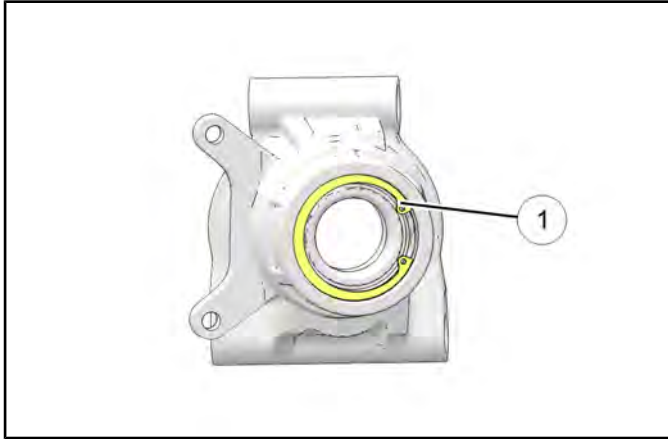


9. Rotate the bearing by hand and check for smooth rotation. Visually inspect the bearing for moisture, dirt and corrosion. Replace bearing if moisture, dirt or corrosion is evident.

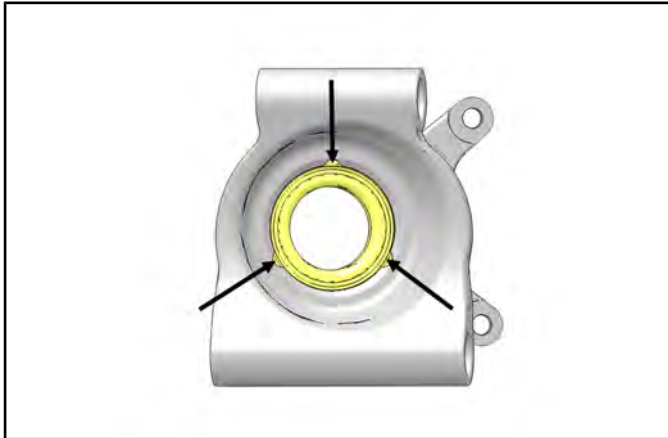
**NOTE:** Due to extremely close tolerances and minimal wear, the bearings must be inspected visually, and by feel. While rotating bearings by hand, inspect for rough spots, discoloration, or corrosion. The bearings should turn smoothly and quietly, with no detectable up and down movement and minimal movement sideways between inner and outer race.

## Rear Carrier Bearing Replacement

1. Remove the outer snap ring ①.



2. From the back side of the bearing carrier, tap on the outer bearing race with a drift punch in the reliefs as shown.

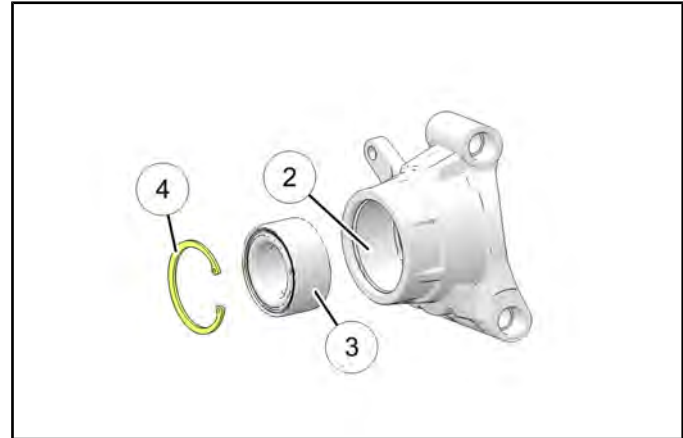


3. Drive bearing out evenly by tapping on outer race only. Once bearing is at bottom of casting, support casting on outer edges so bearing can be removed.
4. Inspect the bearing carrier housing for scratches, wear or damage. Replace rear bearing carrier if damaged.
5. Thoroughly clean the rear bearing carrier housing and the outer race on the new bearing. Be sure that all oil residue has been removed from each surface.
6. Support the bottom of the bearing carrier housing.

### CAUTION

Use an arbor and press only on the outer race or bearing damage may occur.

7. Apply **Loctite® 603™** retaining compound to the outer circumference of the new bearing race ② and carefully press the new bearing into the bearing carrier housing ③.



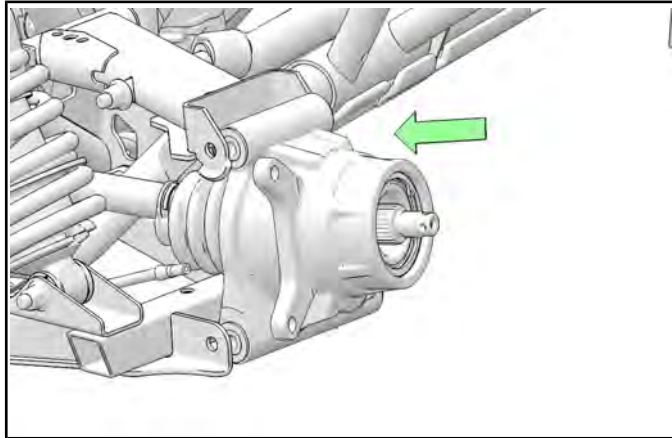
**NOTE:** Use care to not allow any of the **Loctite®** compound to get in the bearing.

8. Wipe the housing clean of any excess compound and install the snap ring ④.

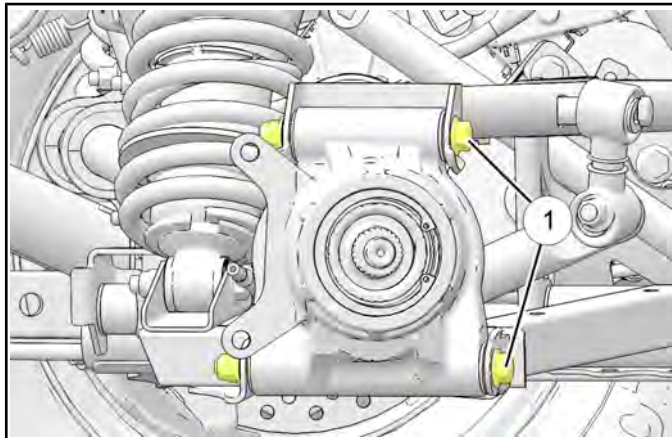
# FINAL DRIVE

## Rear Bearing Carrier Installation

1. Install drive shaft through the back side of the bearing carrier.



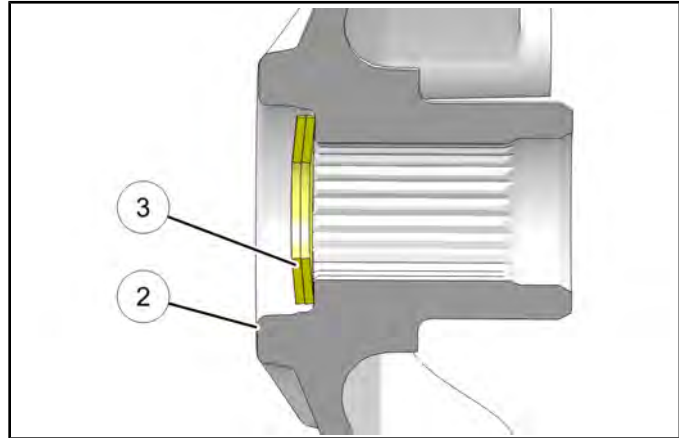
2. Install the fasteners ① that attach the upper and lower control arms to the bearing carrier. Torque bolts to specification.



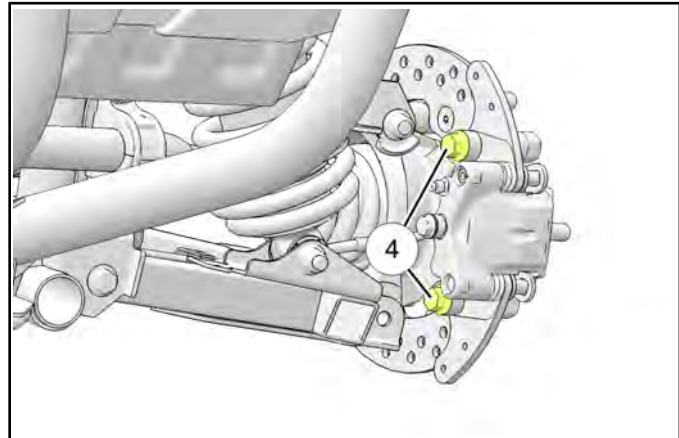
Rear Bearing Carrier Mounting Fasteners:  
**42 ft-lb (57 Nm)**

3. Apply a small amount of anti-seize to the drive shaft splines.


4. Install rear wheel hub assembly ②, cone washers ③ and hand tighten the castle nut. Install washers domed side out.

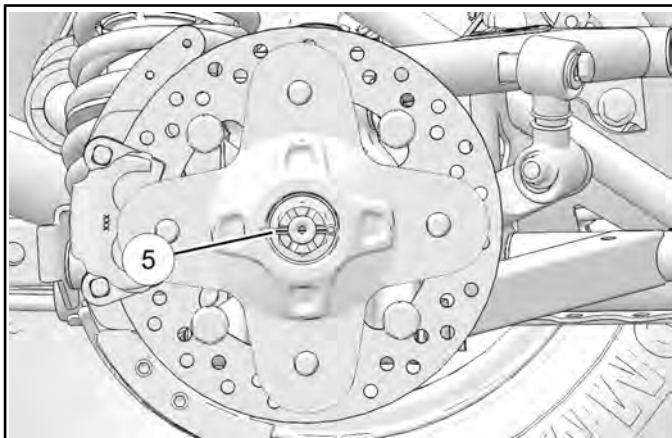


5. Install the rear brake caliper assembly and new bolts ④. Torque bolts to specification.



Brake Caliper Mounting Bolts:  
**46 ft-lb (62 Nm)**

6. Torque wheel hub nut to specification and install a new cotter pin . Tighten nut slightly if necessary to align cotter pin slot.



Hub Castle Nut:  
**110 ft-lbs (149 Nm)**

7. Install wheel and four wheel nuts finger tight. Lower vehicle and torque wheel nuts to specification.



Wheel Lug Nuts:  
**Aluminum: 120 ft-lbs (163 Nm)**  
**Steel: 60 ft-lb (81 Nm)**

8. Rotate wheel and check for smooth operation. Bend both ends of the cotter pin around the end of the spindle.



# FINAL DRIVE

## DRIVE SHAFT

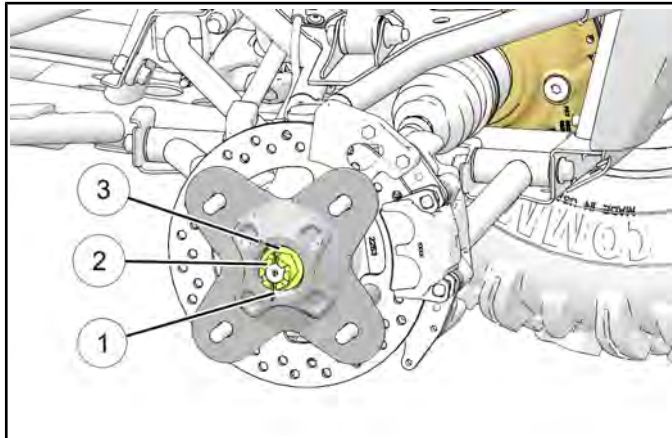
### Front Half Shaft Removal

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

**⚠ WARNING**

Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Wear eye protection when removing bearings and seals.

2. Remove the four wheel nuts and remove the front wheel.
3. Remove the cotter pin ① and loosen the front wheel hub castle nut ②. Remove the nut, and cone washers ③ from the front wheel hub assembly.



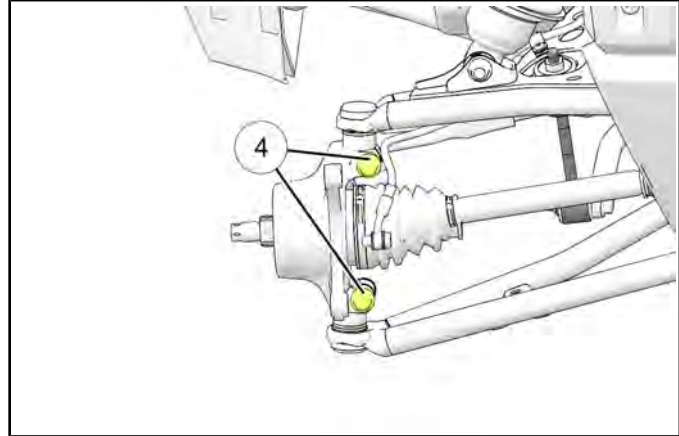
4. Remove and discard the two front brake caliper mounting bolts and remove the caliper from the brake disc (see Chapter 9 – Front Caliper / Pad Removal, page 9.16).

**CAUTION**

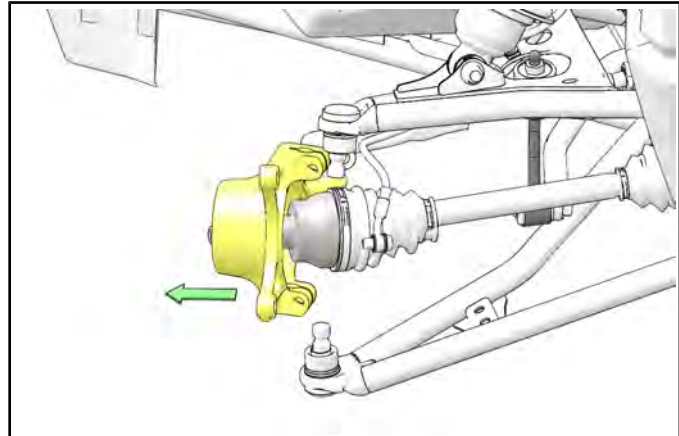
Do not hang the caliper by the brake line. Use wire to hang caliper to prevent damage to the brake line.

5. Remove the front wheel hub assembly.

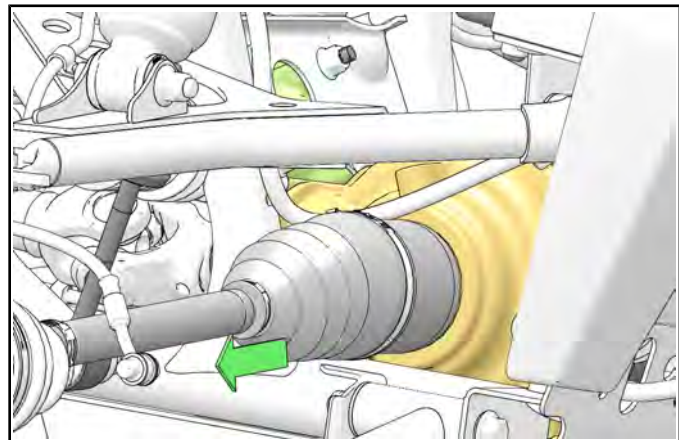
6. Remove and discard the upper and lower ball joint pinch bolts ④ and nuts.



7. Using a soft faced hammer, lightly tap on the bearing carrier while removing the upper ball joint end.
8. Remove the drive shaft from the front bearing carrier.

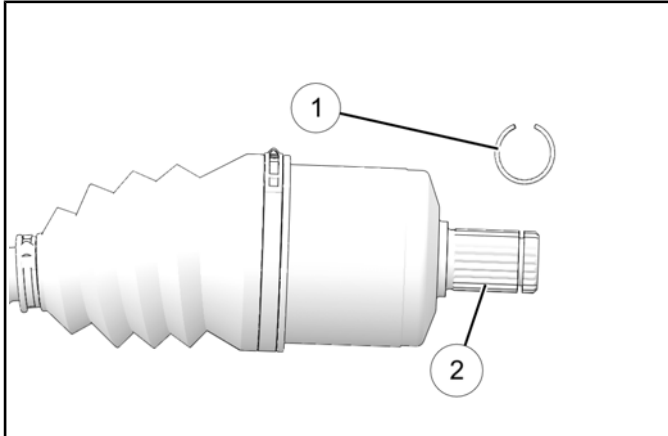


9. With a short, sharp jerk, remove drive shaft from the front gearcase.

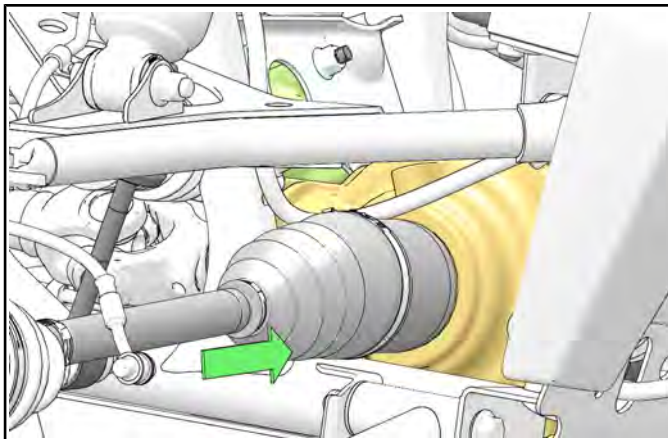


## Front Half Shaft Installation

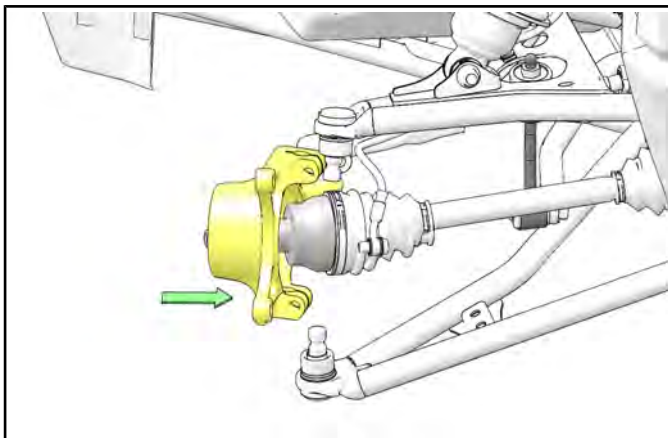
1. Install **new** spring ring ① on drive shaft. Apply an anti-seize compound to the splines ②.



2. Align splines of drive shaft with front gearcase and reinstall the drive shaft. Use a rubber mallet to tap on the outboard end of the drive shaft if necessary

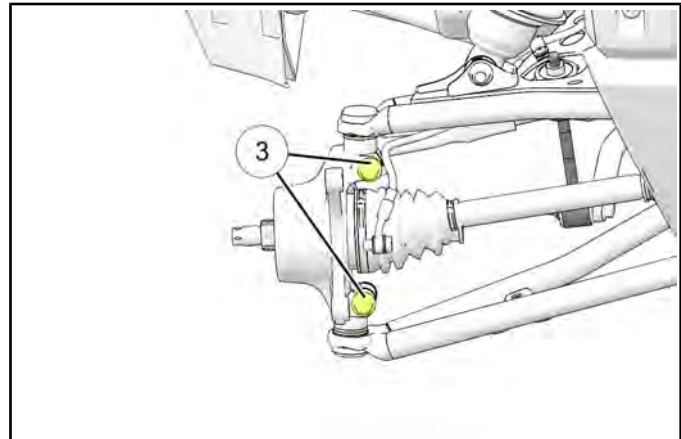


3. Install drive shaft into the front bearing carrier.



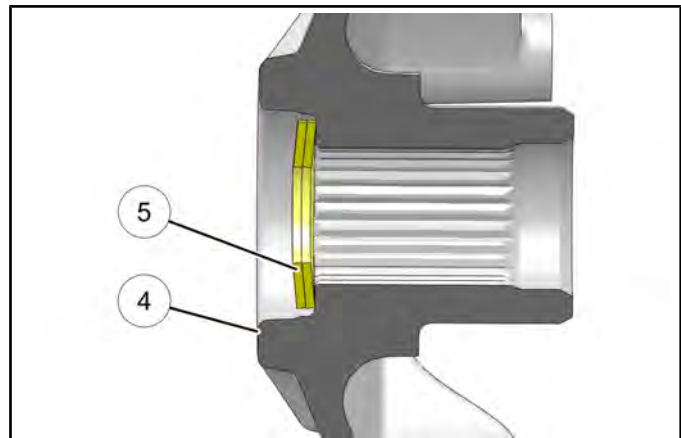
4. Install the upper and lower ball joint ends into the front bearing carrier.

5. Install **new** pinch bolts ③ and nuts. Torque to specification.



Ball Joint Pinch Bolts:  
42 ft-lb (57 Nm)

6. Apply Anti-Seize to drive shaft axle splines.
7. Install front wheel hub assembly ④, cone washers ⑤, and hand tighten the castle nut. Install washers with domed side out.

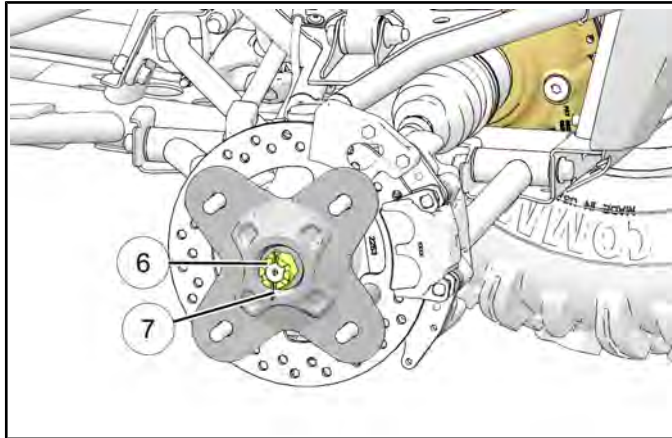


7



# FINAL DRIVE

- Torque wheel hub nut ⑥ to specification and install a **new** cotter pin ⑦. Tighten nut slightly if necessary to align cotter pin holes. Bend both ends of cotter pin around end of spindle in different directions.



Wheel Hub Castle Nut:  
110 ft-lbs (149 Nm)

- Install **new** brake caliper mounting bolts and torque to specification.



Front Caliper Mounting Bolts:  
30 ft-lb (42 Nm)

## CAUTION

New bolts have a pre-applied locking agent which is destroyed upon removal. Always use new brake caliper mounting bolts upon assembly.

- Install wheel and four wheel nuts. Torque wheel nuts to specification.

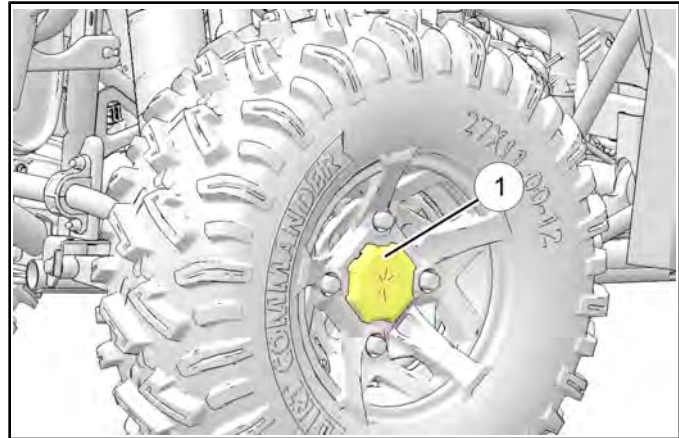


Wheel Nuts:  
Aluminum: 120 ft-lbs (163 Nm)  
Steel: 60 ft-lb (81 Nm)

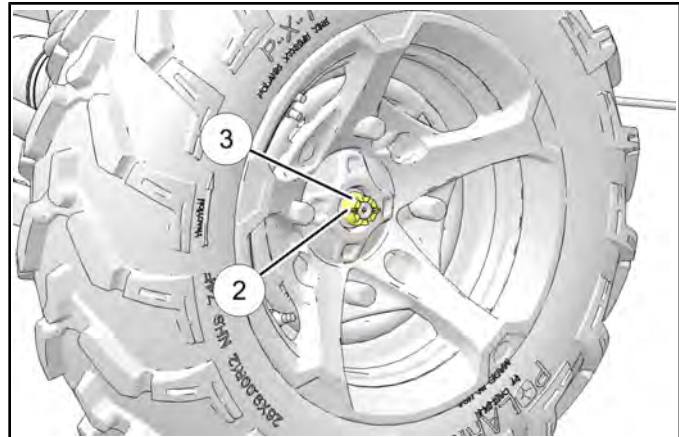
- Rotate wheel and check for smooth operation.

## Rear Half Shaft Removal

- Remove the center cap ① on the wheel.



- Remove the cotter pin ② and loosen the castle nut ③.



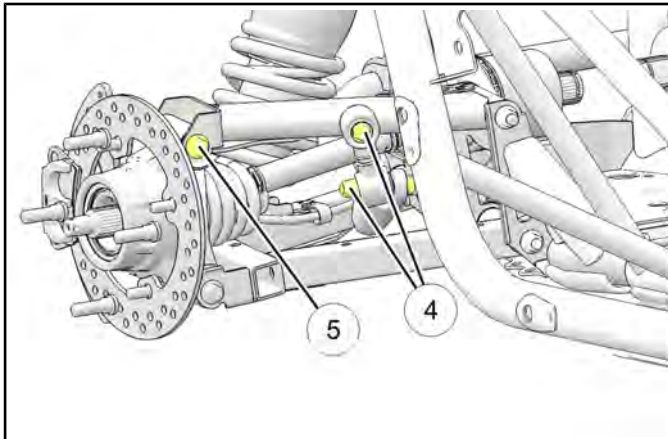
- Slightly loosen the four wheel nuts.
- Safely raise and secure the vehicle.

## WARNING

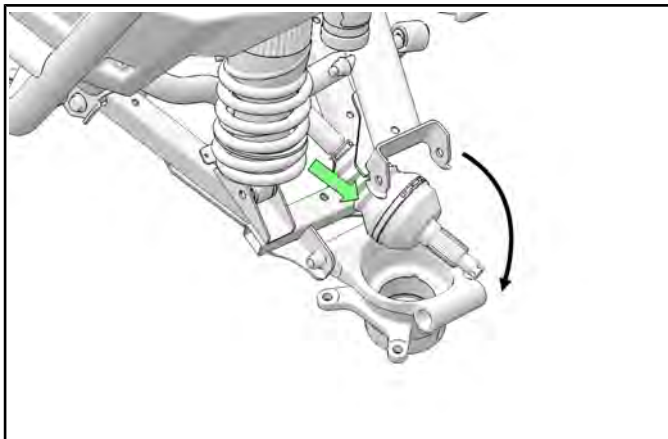
Serious injury may result if the machine tips or falls. Be sure machine is secure before continuing this procedure. Always wear eye protection.

- Completely remove the four wheel nuts and the wheel.

6. **50" ONLY** Remove the fasteners ④ retaining the rear stabilizer bar to the upper control arm.



7. Remove the fasteners ⑤ retaining the upper control arm to the bearing carrier.
8. Rotate the bearing carrier down while pushing in on the half shaft.



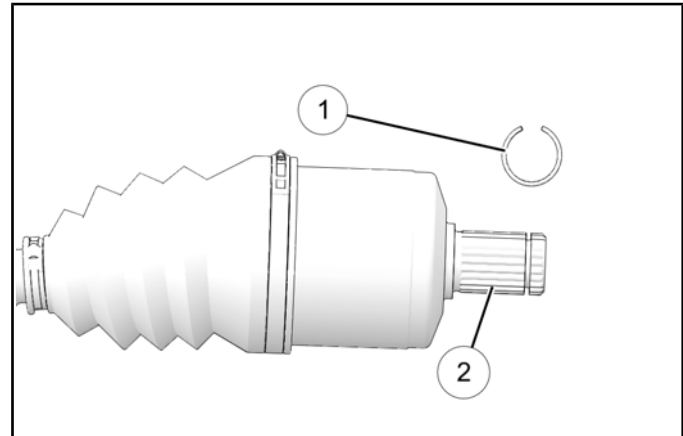
## CAUTION

Be careful not to pinch or stretch the brake line. Use rope or wire to secure the bearing carrier.

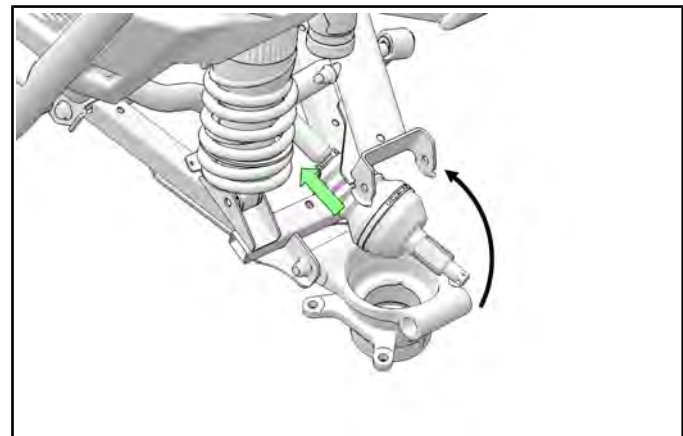
9. With a quick, short jerk outward, remove the half shaft from the transmission.

## Rear Half Shaft Installation

1. If the half shaft is not being replaced, install a **new** spring ring ① on the half shaft. Apply anti-seize to the splines ②.



2. Align splines of the half shaft with transmission splines and reinstall the half shaft by pushing in with a quick jerk.



3. Install the half shaft through the carrier bearing and rotate the bearing carrier upward. Install fasteners ③ and torque to specification.

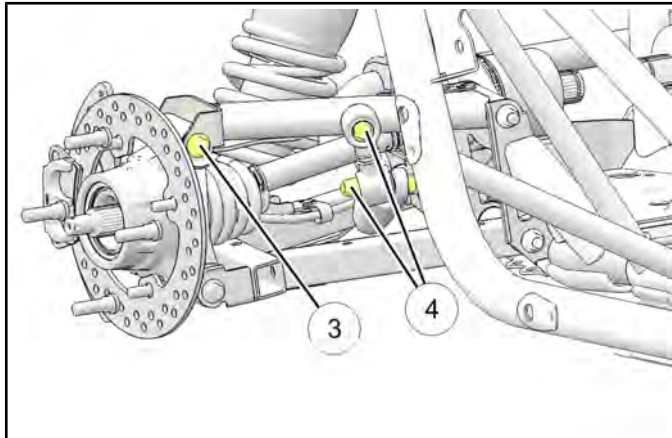


Bearing Carrier Mounting Fasteners:  
**42 ft-lb (57 Nm)**

7

# FINAL DRIVE

4. **50" ONLY** Install the stabilizer bar linkage onto the upper control arm ④. Torque fasteners to specification.



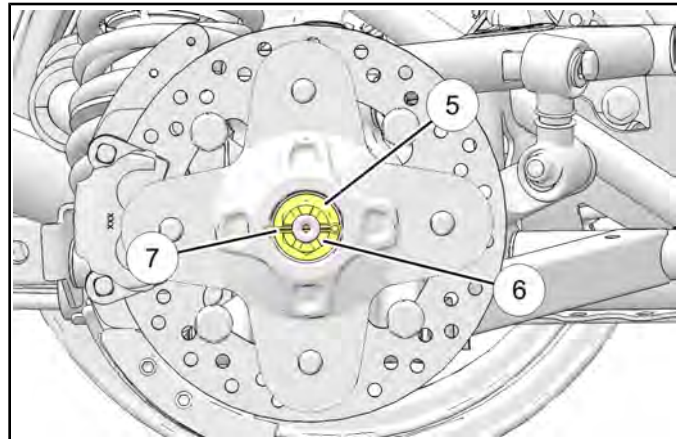
Stabilizer Bar Linkage Fasteners:  
**40 ft-lbs (54 Nm)**

5. Install the wheel and four wheel nuts finger tight.  
6. Lower the vehicle to the ground and torque wheel lug nuts to specification.



Wheel Lug Nuts:  
**Aluminum: 120 ft-lbs (163 Nm)**  
**Steel: 60 ft-lb (81 Nm)**

7. Install two washers ⑤ and castle nut ⑥ over the spindle. Torque castle nut to specification.



Hub Castle Nut:  
**110 ft-lbs (149 Nm)**

8. Install a new cotter pin ⑦. Tighten the castle nut a little tighter if necessary to allow the holes to align.  
9. Install the center cap on the rim.

## Drive Shaft / CV Joint Handling Tips

Care should be exercised during drive shaft removal or when servicing CV joints. Drive shaft components are precision parts.

Cleanliness and following these instructions is very important to ensure proper shaft function and a normal service life.

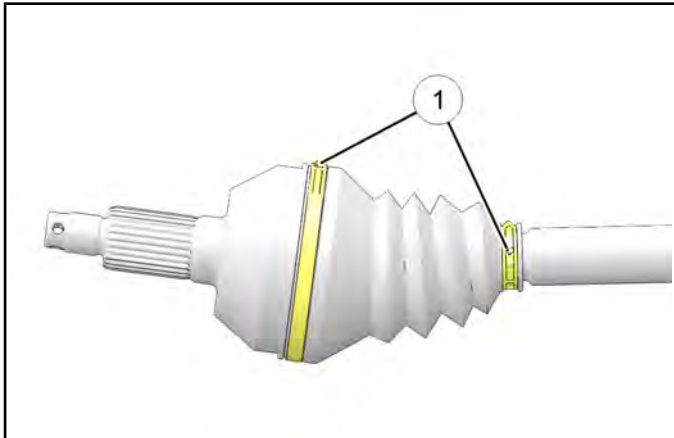
- The complete drive shaft and joint should be handled by getting hold of the interconnecting shaft to avoid disassembly or potential damage to the drive shaft joints.
- Over-angling of joints beyond their capacity could result in boot or joint damage.
- Make sure surface-ground areas and splines of shaft are protected during handling to avoid damage.
- Do not allow boots to come into contact with sharp edges or hot engine and exhaust components.
- The drive shaft is not to be used as a lever arm to position other suspension components.
- Never use a hammer or sharp tools to remove or to install boot clamps.

- Be sure joints are thoroughly clean and that the proper amount and type of grease is used to refill when joint boots are replaced and when joints are cleaned. Refer to text for grease capacity of CV joints and CV joint boots.

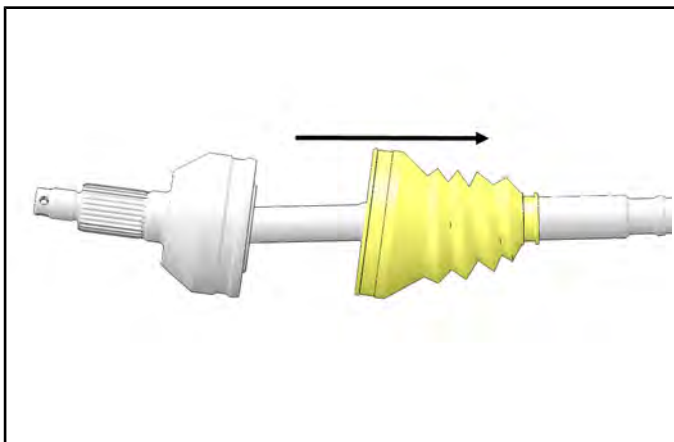
4. Place the drive shaft in a soft-jawed vise. Using a soft-faced hammer, or brass drift, strike the inner race of the joint to drive the joint off the drive shaft. Be sure to tap evenly around the joint to avoid binding.

## Outer CV Joint / Boot Replacement

1. Use a side cutters to cut and discard the boot clamps ①.



2. Remove the large end of the boot from the CV joint and slide the boot down the shaft.

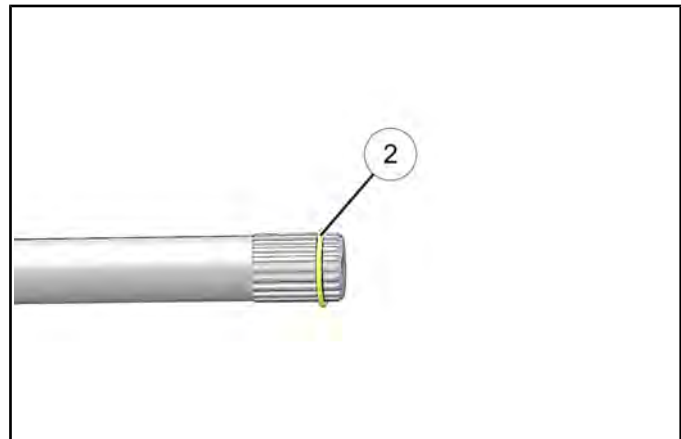


3. Clean the grease from the face of the joint.



**IMPORTANT: Tap on inner race only!**

5. Make sure circlip ② is on the shaft and not left in the joint.





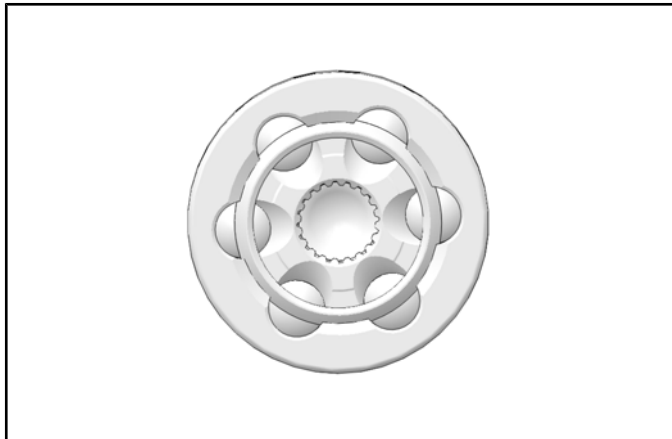
## FINAL DRIVE

6. Remove the CV boot from the shaft.

### CAUTION

Complete disassembly of the CV joint is NOT recommended. The internal components are precision fit and develop their own characteristic wear patterns. Intermixing the internal components could result in looseness, binding, and/or premature failure of the joint.

**IMPORTANT:** If the grease in the joint is obviously contaminated with water and/or dirt, the joint should be replaced.



7. Thoroughly clean the joint with an appropriate solvent and dry the joint to prevent any residual solvent from being left in the joint upon reassembly.
8. Visually inspect the joint by tilting the inner race to one side to expose each ball. Severe pitting, galling, play between the ball and its cage window, any cracking or damage to the cage, pitting or galling or chips in raceways call for joint replacement.

**NOTE:** Shiny areas in ball tracks and on the cage spheres are normal. Do not replace CV joints because parts have polished surfaces. Replace CV joint only if components are cracked, broken, worn or otherwise unserviceable.

9. Clean the splines on the end of the shaft and apply a light coat of grease prior to reassembly.
10. Slide the small boot clamp and boot (small end first) onto the drive shaft and position the boot in its groove machined in the shaft.
11. Install a **new** circlip on the end of the shaft.

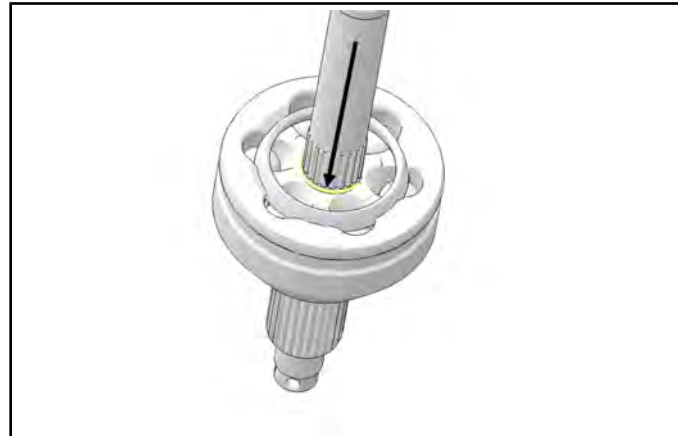
12. Grease the joint with the special CV joint grease provided in the boot replacement kit. Fill the cavity behind the balls and the splined hole in the joint's inner race. Pack the ball tracks and outer face flush with grease. Place any remaining grease into the boot.

### CAUTION

The grease provided in the replacement kit is specially formulated for wear resistance and durability. DO NOT use substitutes or mix with other lubricants.

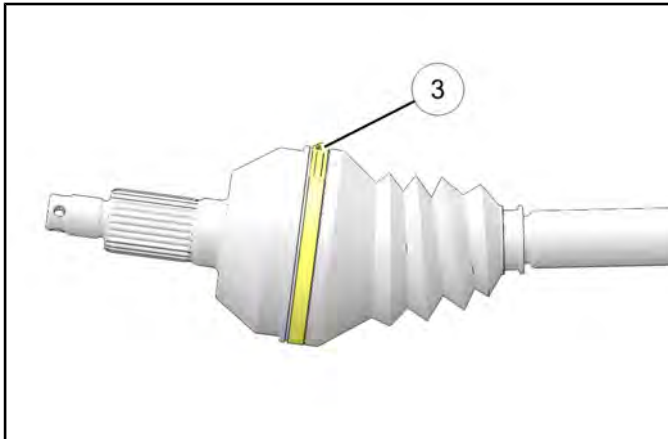
**NOTE:** The amount of grease provided in the boot kit is pre-measured. Use entire contents of package.

13. Slide the joint onto the drive shaft splines and align the circlip with the lead-in chamfer on the inner race of the joint.



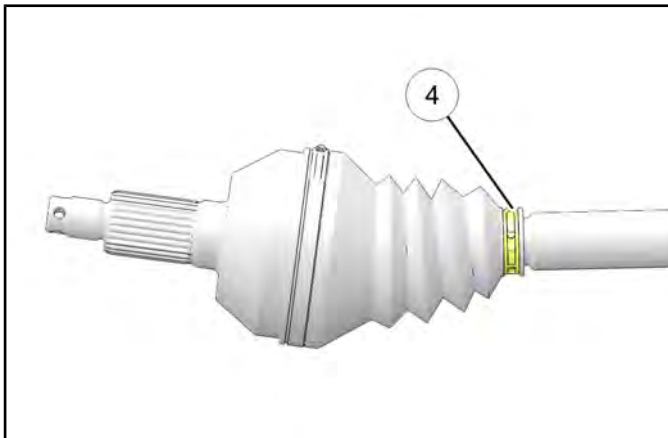
14. Use a soft-faced hammer to tap the joint onto the drive shaft until it locks into place.
15. Pull on the joint to make sure it is securely locked in place.
16. Remove excess grease from the CV joint's external surfaces and place the excess grease in the boot.
17. Pull the boot over the joint and position the boot lips into the grooves on the joint housing and shaft. Make sure the boot is not dimpled or collapsed.

18. Install and tighten the large clamp ③ using the appropriate clamp tool.



**Axle Boot Clamp Tool: PU-48951  
or  
CV Boot Clamp Pliers: 8700226**

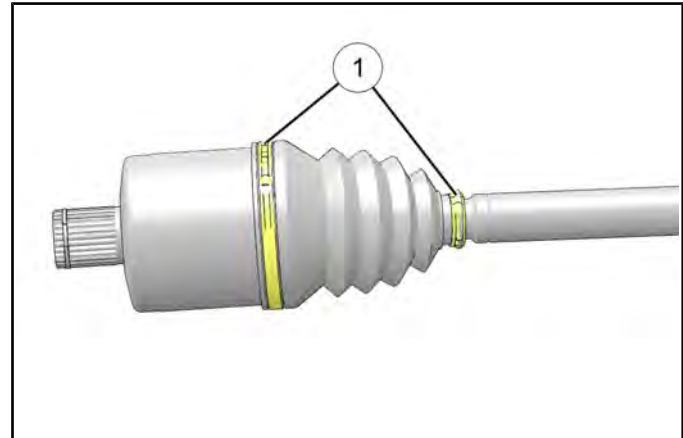
19. While pulling out on the CV shaft, fully extend the CV joint and slide a straight O-ring pick or a small slotted screw driver between the small end of the boot and the shaft. This will allow the air pressure to equalize in the CV boot in the position that the joint will spend most of its life. Before you remove your instrument, be sure the small end of the boot is in its correct location on the shaft.
20. Install and tighten the small clamp ④ on the boot using the appropriate clamp tool.



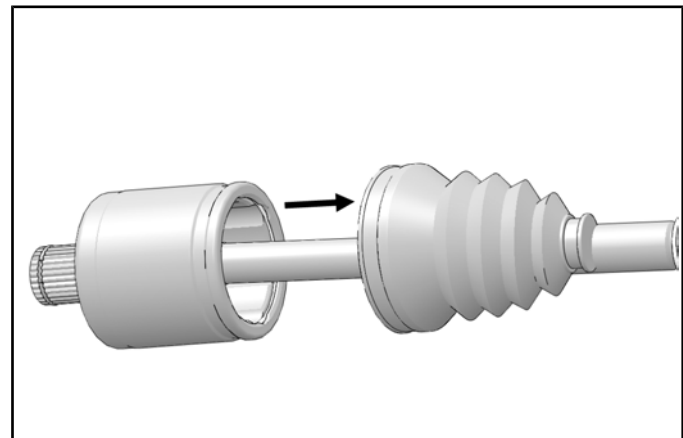
**Axle Boot Clamp Tool: PU-48951  
or  
CV Boot Clamp Pliers: 8700226**

## Inner Plunging Joint / Boot Replacement

1. Use a side cutters to cut and discard the boot clamps ①.



2. Remove the large end of the boot from the plunging joint and slide the boot down the shaft.

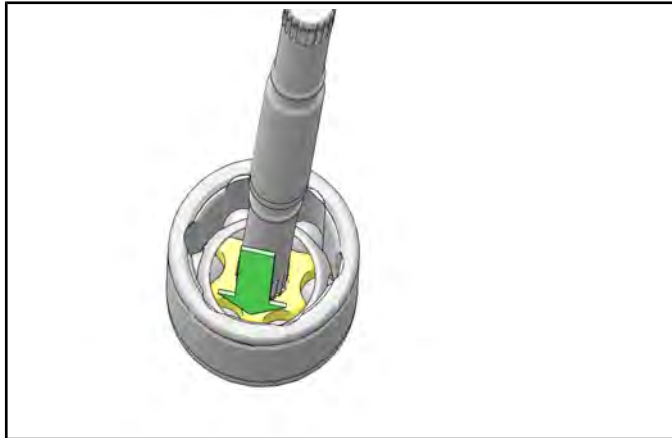


3. Clean the grease from the face of the joint and place the drive shaft in a soft-jawed vise.



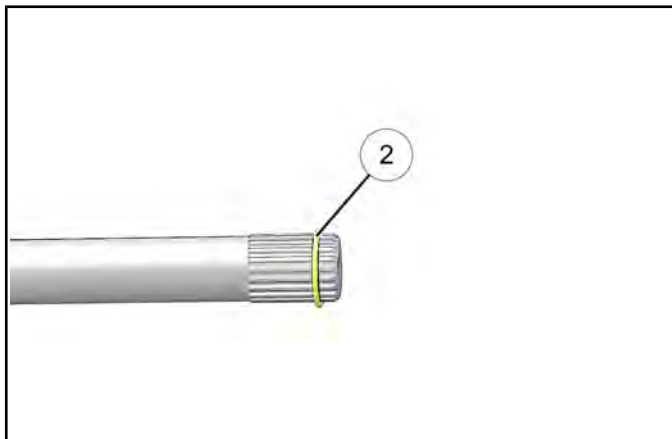
## FINAL DRIVE

- Using a soft-faced hammer, or brass drift, strike the inner race of the joint to drive the joint off the shaft. Be sure to tap evenly around the joint to avoid binding.



**IMPORTANT:** Tap on inner race only!

- Make sure the circlip ② is on the shaft and not left in the joint.

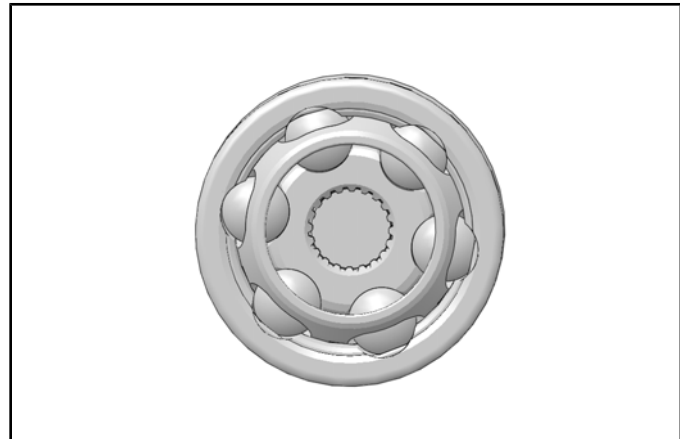


- Remove the boot from the shaft.

### CAUTION

Complete disassembly of the plunging joint is NOT recommended. The internal components are precision fit and develop their own characteristic wear patterns. Intermixing the internal components could result in looseness, binding, and/or premature failure of the joint.

**IMPORTANT:** If the grease in the joint is obviously contaminated with water and/or dirt, the joint should be replaced.



- Thoroughly clean the joint with an appropriate solvent and dry the joint to prevent any residual solvent from being left in the joint upon reassembly.
- Visually inspect the joint for damage. Replace if needed.
- Clean the splines on the end of the shaft and apply a light coat of grease prior to reassembly.
- Slide the small boot clamp and boot (small end first) onto the drive shaft and position the boot in its groove machined in the shaft.
- Install a **new** circlip on the end of the shaft.

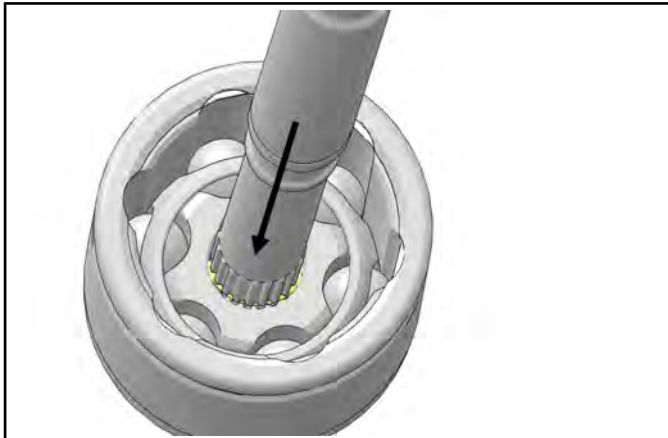
- Grease the joint with the special joint grease provided in the boot replacement kit. Fill the cavity behind the balls and the splined hole in the joint's inner race. Pack the ball tracks and outer face flush with grease. Place any remaining grease into the boot.

## CAUTION

The grease provided in the replacement kit is specially formulated for wear resistance and durability. **DO NOT** use substitutes or mix with other lubricants.

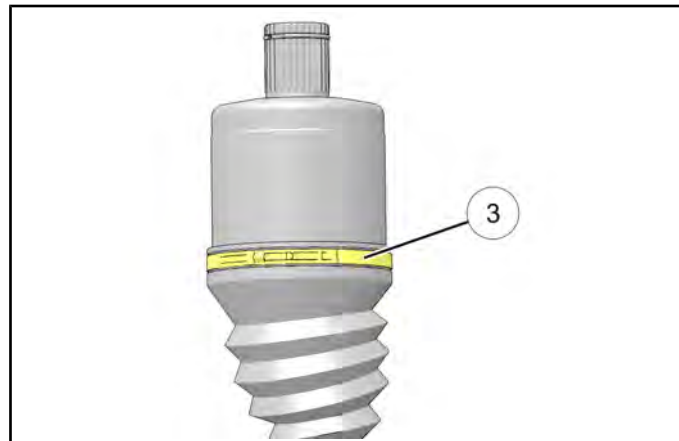
**NOTE:** The amount of grease provided in the boot kit is pre-measured. Use entire contents of package.

- Fully compress the joint and push the drive shaft firmly into the inner race.
- Align the circlip with the lead-in chamfer.



- Use a soft-faced hammer to tap the joint onto the drive shaft until you reach the end of the splines and the joint locks in place.
- Pull on the joint to test that the circlip is seated and that the joint is securely fastened to the shaft.
- Remove excess grease from the plunging joint's external surfaces and place the excess grease in the boot.
- Pull the boot over the joint and position the boot lips into the grooves on the joint housing and shaft. Make sure the boot is not dimpled or collapsed.

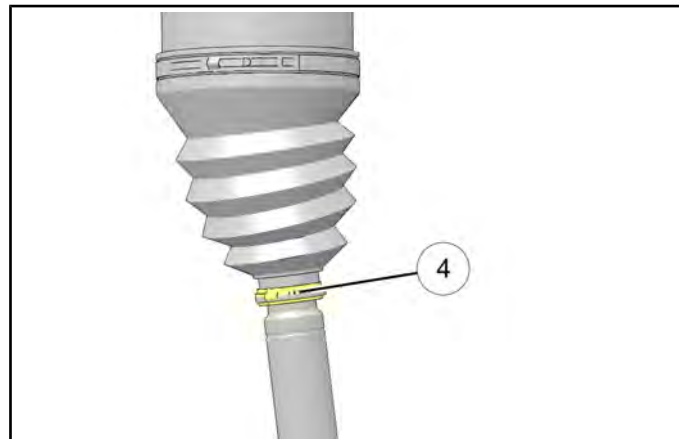
- Install and tighten the small clamp ③ using the appropriate clamp tool.



**Axle Boot Clamp Tool: PU-48951**  
or  
**CV Boot Clamp Pliers: 8700226**

- Pull out on the drive shaft to center the joint in the housing. Slide a straight O-ring pick or a small slotted screw driver between the large end of the boot and the joint housing and lift up to equalize the air pressure in the boot.

- Position the boot lip in its groove. Install and tighten the large clamp ④ using the appropriate clamp tool.

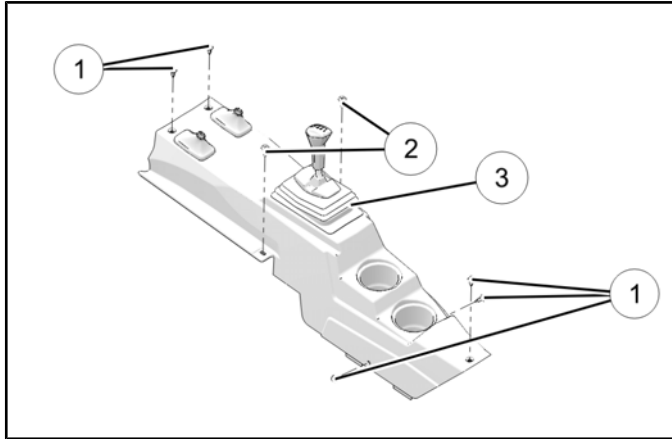


**Axle Boot Clamp Tool: PU-48951**  
or  
**CV Boot Clamp Pliers: 8700226**

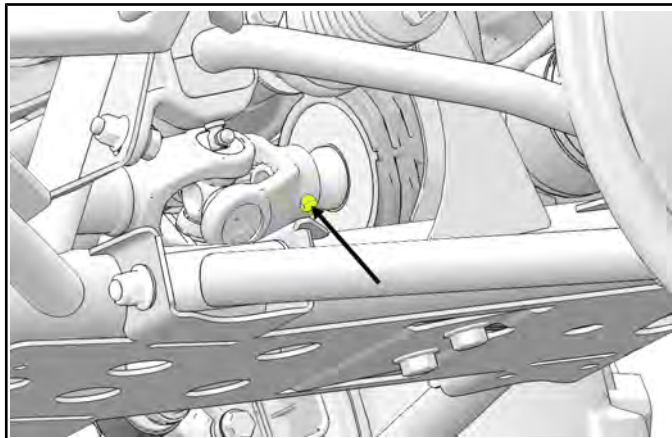
# FINAL DRIVE

## Prop Shaft Removal

1. Remove the center console by removing the five push rivets ①, two T-40 Torx screws ② and push the shifter boot ③ through the console.



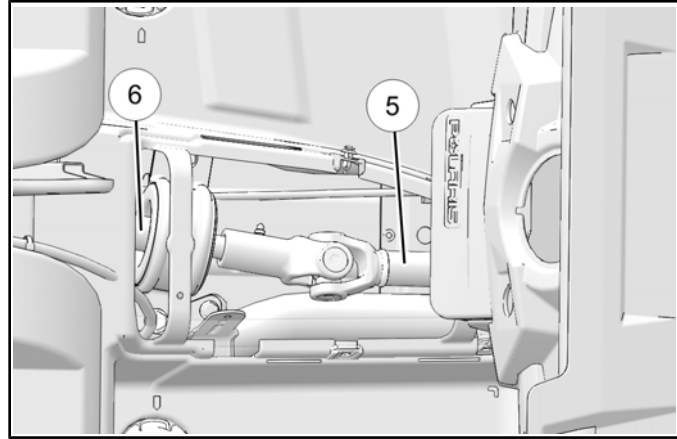
2. Safely lift and secure the vehicle.
3. Remove the right side front wheel.
4. Draw a paint line on the front prop shaft yoke to the front gearcase input shaft to ease alignment on installation.
5. Locate the prop shaft roll pin and use the Roll Pin Removal Tool (PN 2872608) to remove the roll pin. Discard the roll pin.



**Roll Pin Removal Tool:  
2872608**

6. Draw a paint line (if none are present) between the front prop shaft yoke and the splines on the rear prop shaft for proper alignment on installation.
7. Remove the two fasteners ④ retaining the prop shaft support bearing to the frame.

8. While moving the prop shaft support bearing assembly rearward, slide the front prop shaft ⑤ off the rear prop shaft ⑥ and remove it from the vehicle.

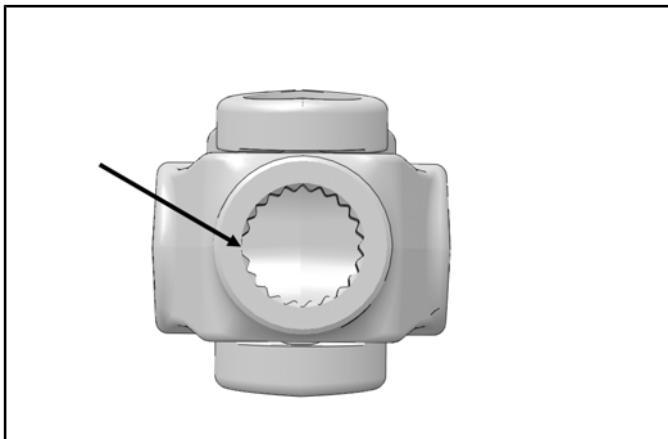
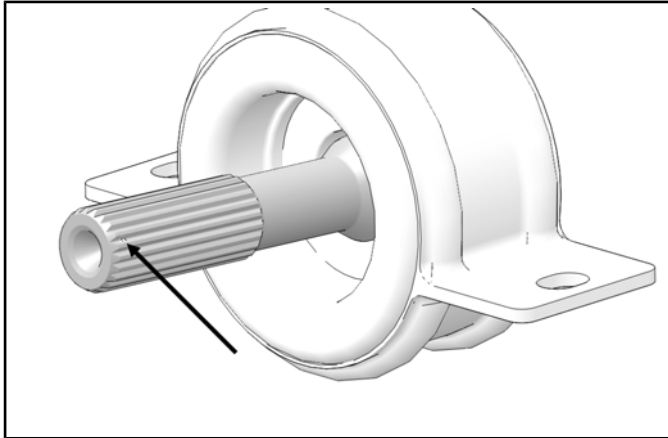


**NOTE: If difficulty is encountered removing the front prop shaft, first remove the front prop shaft off the splines of the front gearcase.**

9. Remove the support bearing rubber bushing by pulling it off the rear prop shaft bearing.
10. Pull the rear prop shaft towards the front of the vehicle to disengage it from the splines on the transmission snorkel shaft.
11. Remove the rear prop shaft out the left rear of the vehicle.

## Prop Shaft Installation

1. Lubricate the transmission snorkel shaft splines with Polaris All Purpose Grease.
2. Install the rear prop shaft through the left rear of the vehicle and install the shaft onto the snorkel shaft splines.
3. Lubricate the front and rear prop shaft mid joint with Polaris All Purpose Grease.
4. Install the support bushing on the rear prop shaft bearing.
5. Align the keyways on the front and rear prop shafts as shown and slide them together.



**NOTE:** Paint marks are applied to the front and rear prop shafts to aid in shaft alignment and installation. Reference these marks during installation.

6. Install and torque the support bearing fasteners to specification.



Prop Shaft Support Bearing Fasteners:  
**33 ft-lb (45 Nm)**

7. Align the front prop shaft paint mark with the front gearcase input shaft mark so the holes align. Install a new roll pin.
8. Install wheel and wheel nuts. Torque wheel nuts to specification.



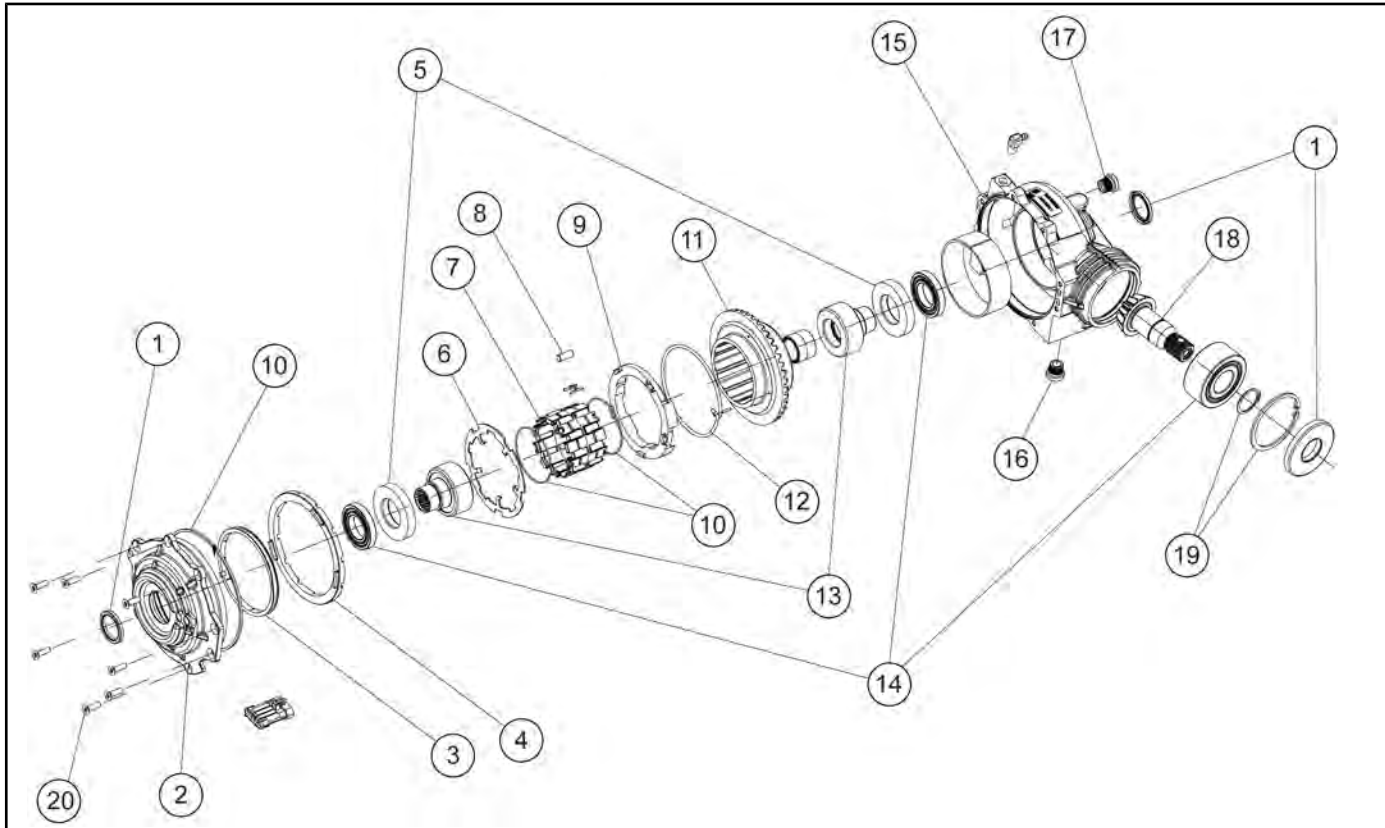
Wheel Lug Nuts:  
**Aluminum: 120 ft-lbs (163 Nm)**  
**Steel: 60 ft-lb (81 Nm)**

9. Install the center console.

# FINAL DRIVE

## FRONT GEARCASE / CENTRALIZED HILLIARD

### Front Gearcase Assembly View



① Seal	⑪ Ring Gear
② Cover Plate	⑫ Spring
③ AWD Coil	⑬ Output Hub
④ Backlash Spacer	⑭ Bearing
⑤ Nylon Spacer	⑮ Gearcase Housing
⑥ Armature Plate	⑯ Drain Plug <b>10 ft-lbs (14 Nm)</b>
⑦ Roller Cage	⑰ Fill / Check Plug <b>10 ft-lbs (14 Nm)</b>
⑧ Roller	⑱ Pinion Gear
⑨ Spring Retainer	⑲ Snap Ring
⑩ O-ring	⑳ Cover Plate Screws <b>11 ft-lbs (15 Nm)</b>

## All Wheel Drive Operation

The AWD switch may be turned on or off while the vehicle is moving, however, AWD will not enable until the engine RPM drops below 3100. Once the AWD is enabled, it remains enabled until the switch is turned off.

Engage the AWD switch before getting into conditions where the front wheel drive may be needed. If the rear wheels are spinning, release the throttle before switching to AWD.

### CAUTION

Switching to AWD while the rear wheels are spinning may cause severe drive shaft and gearcase damage. Always switch to AWD while the rear wheels have traction or are at rest.

With the AWD switch off, the vehicle drives through the rear wheels only (2 wheel drive). When the AWD is enabled, the front drive acts as an on-demand AWD system. This means, the front drive will engage once the rear wheels have lost traction, and will remain engaged until the torque requirement goes away (i.e. rear wheels regain traction).

### CAUTION

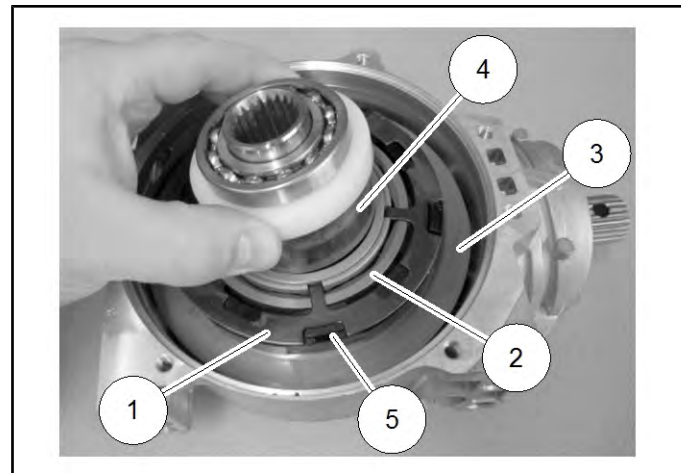
If the rear wheels are spinning, release the throttle before turning the AWD switch on. If AWD is engaged while the wheels are spinning, severe drive shaft and front gearcase damage could result.

**AWD Engagement:** When the AWD switch is activated, the AWD coil is powered by a 12 Vdc input which creates a magnetic field. This magnetic field attracts an armature plate ① that is keyed to the roll cage ②. When the ring gear ③ and roll cage are spinning (vehicle is moving), the energized coil and armature plate will apply drag to the roll cage that indexes the rollers inside the ring gear to an engagement position. While in the engagement position, the front drive will be in an “over-running” condition (not engaged), until the rear wheels lose traction. Once the rear wheels begin to lose traction, the front drive will engage by coupling the output hubs ④ to the ring gear via the rollers. The front drive will remain engaged until the torque requirement goes away (i.e. rear wheels regain traction).

**AWD Disengagement:** Once the rear wheels regain traction, the front wheels will return to the “over-running” condition. The vehicle is now back to rear wheel drive until the next loss of rear wheel traction occurs.

**Torsion Spring Operation:** The torsion spring ⑤ acts as a return mechanism to help disengage the coupling of

the output hubs and ring gear by creating an “over-running” condition for the rollers upon disengagement.



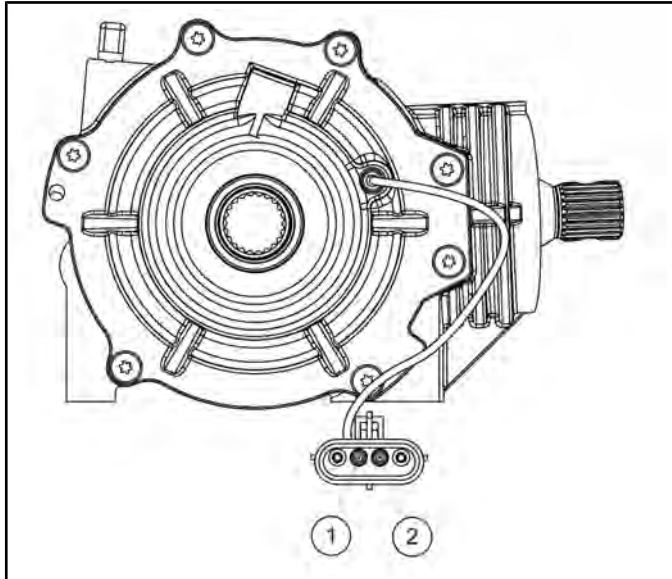


# FINAL DRIVE

## AWD Diagnosis

### Symptom: AWD Will Not Engage

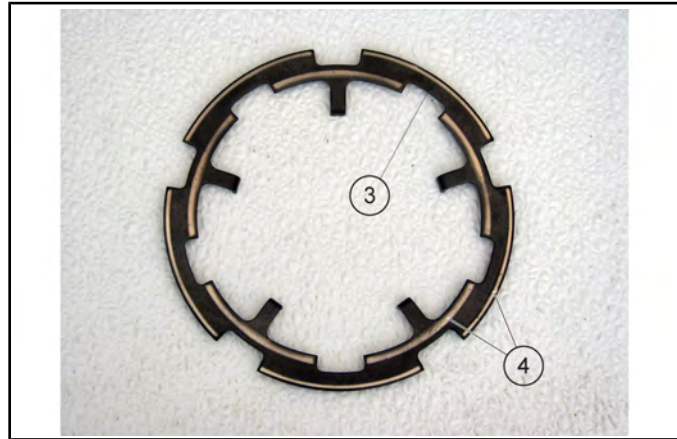
1. Check the gearcase coil resistance. To test the coil resistance, measure between the power wire ① (GY) and ground wire ② (BN/WH). Measurement should be within specification.



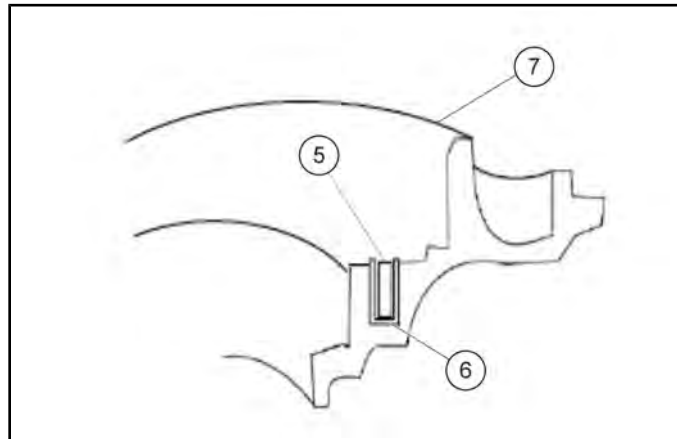
**Front Gearcase Coil Resistance:  
21 - 27  $\Omega$**

2. Turn on ignition and AWD switches and place gear selector in High or Low. Check for minimum battery voltage at Gray and Brown/White chassis wires that power the coil. Should have a minimum of 11 Vdc.
3. If electrical tests are within specification, remove gearcase (see Chapter 7 – Front Gearcase Removal, page ) and inspect components.

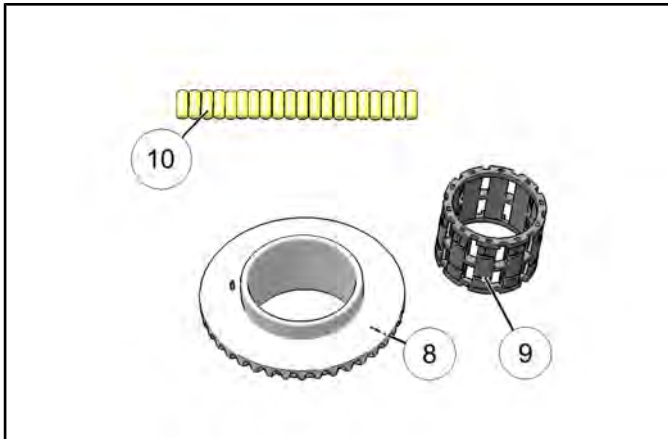
4. Inspect armature plate ③ for a consistent wear pattern. There should be two distinct wear bands ④. If only one band of wear is present (or if there is wear between the two bands), inspect the coil area as indicated in Step 5. A wear band with an interrupted wear mark may indicate a warped plate, which may cause intermittent operation.



5. Check to make sure the coil ⑤ is seated in the U-shaped ⑥ insert that is pressed into the gearcase cover ⑦. The top of the coil should be seated below the U-shaped insert. The U-shaped insert controls the pole gap. If the top of the coil is above the surface of the U-shaped insert it raises the armature plate, thereby increasing pole gap. If the pole gap increases the coil will not be strong enough to engage the AWD system. If this is found, replace the cover plate assembly.



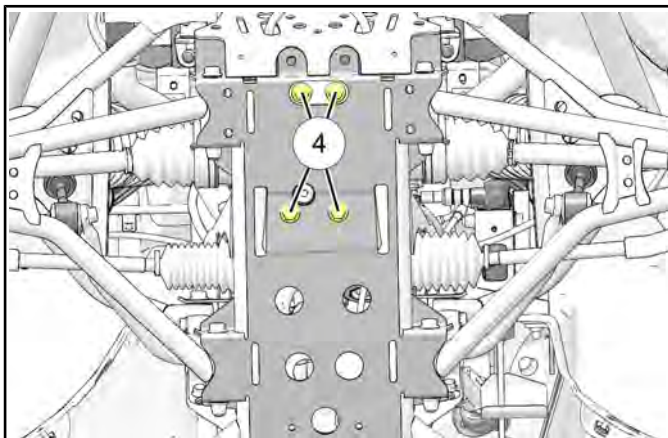
6. Inspect the roller surface on the inside of the ring gear for gouging/rough spots.



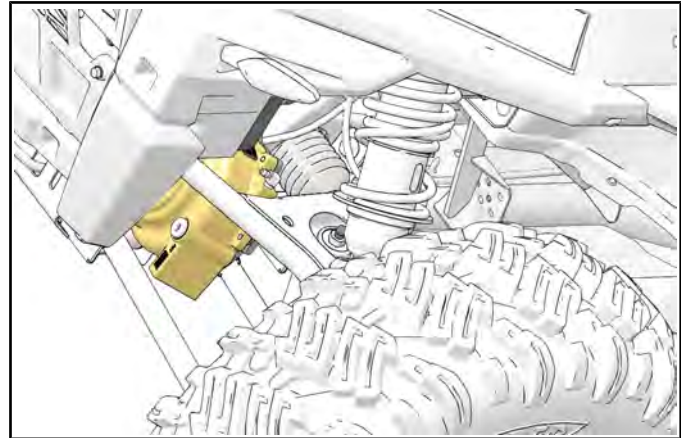
7. Inspect the roll cage ⑨ assembly for cracks or excessive wear. If damaged, replace the roll cage assembly.
8. Inspect the rollers ⑩ for nicks and scratches. The rollers must slide up, down, in and out freely within the roll cage sliding surfaces and H-springs.

## Front Gearcase Removal

1. Raise and support vehicle
2. Place gear selector in neutral.
3. Remove both front half shafts from the front gearcase. See Chapter 7 – Front Half Shaft Removal, page 7.10
4. Remove the front section of the prop shaft (see Chapter 7 – Prop Shaft Removal, page 7.20).
5. Disconnect the wire harness for the front gearcase and remove the harness from the retaining dart.
6. Remove the vent line from the front gearcase and plug vent line fitting.
7. Remove the four bolts ④ securing the front gearcase to the frame.

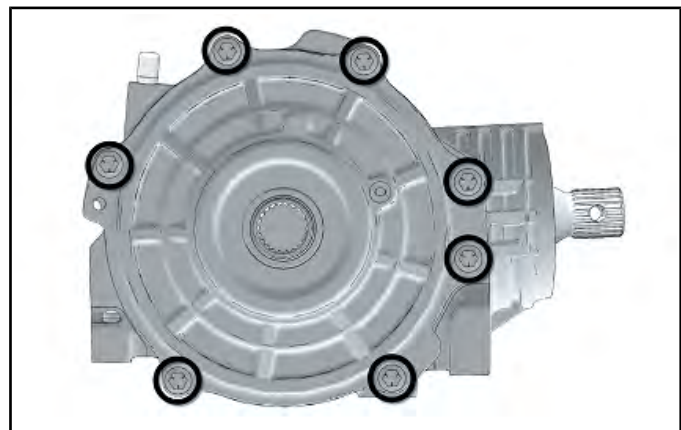


8. Rotate front of gearcase up so the input shaft is facing down. Lift and remove the gearcase from the front LH wheel well area and slide it out of the vehicle above the upper A-arm.



## Front Gearcase Disassembly / Inspection

1. Drain and properly dispose of gearcase fluid. Remove any metal particles from the drain plug magnet.
2. Remove the seven cover screws and remove the cover plate assembly.

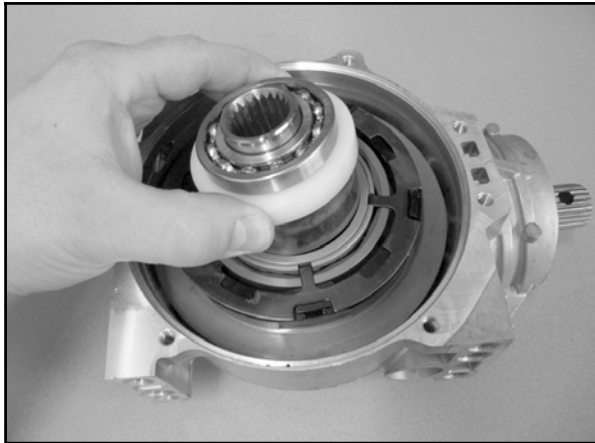


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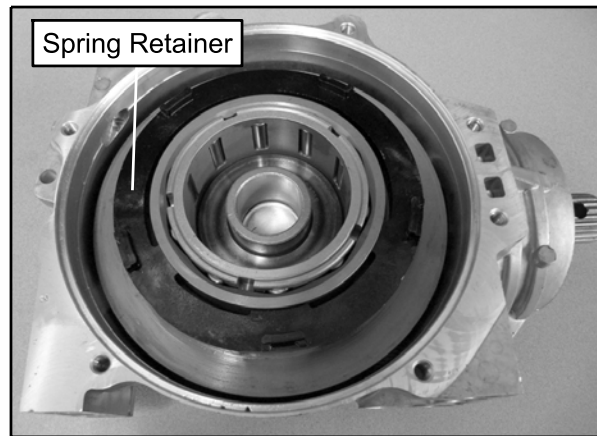
## FINAL DRIVE

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3. Remove the LH output hub assembly from the clutch housing or outer cover plate assembly.

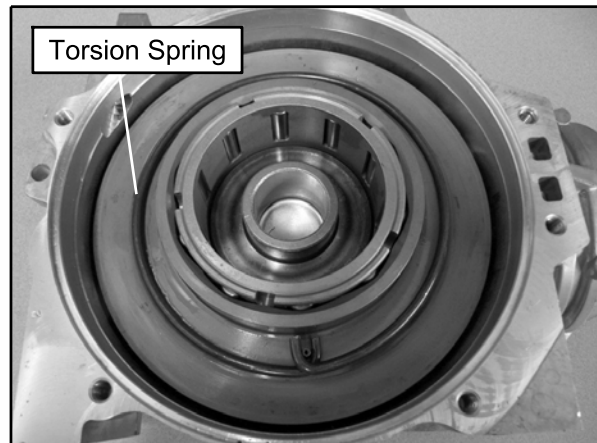
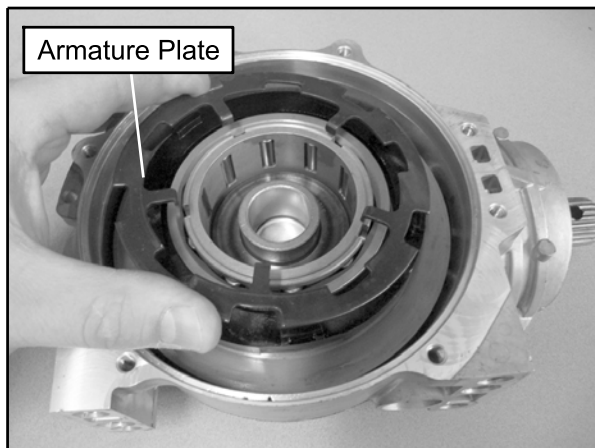


5. Remove the torsion spring retainer and torsion spring from the top of the ring gear.

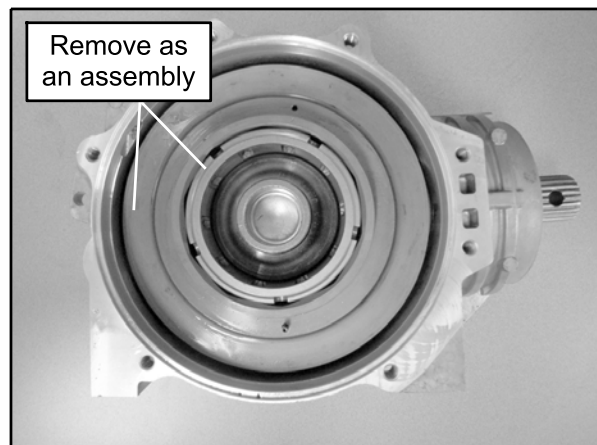


**NOTE: Nylon spacer is non-serviceable and should not be removed.**

4. Remove and inspect the armature plate. Refer to AWD Diagnosis, page 7.24 for detailed inspection process.



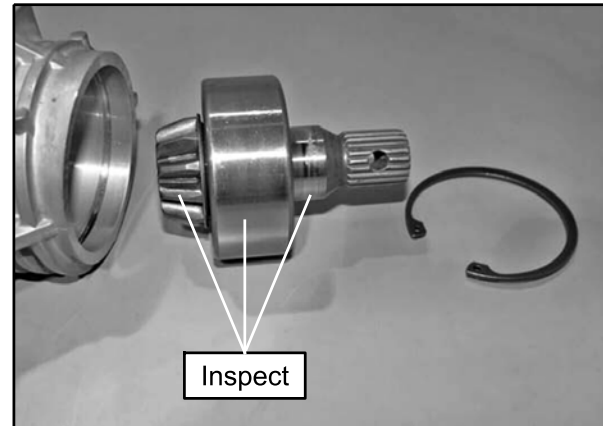
6. Remove the clutch housing / ring gear and roll cage assembly from the gearcase housing.



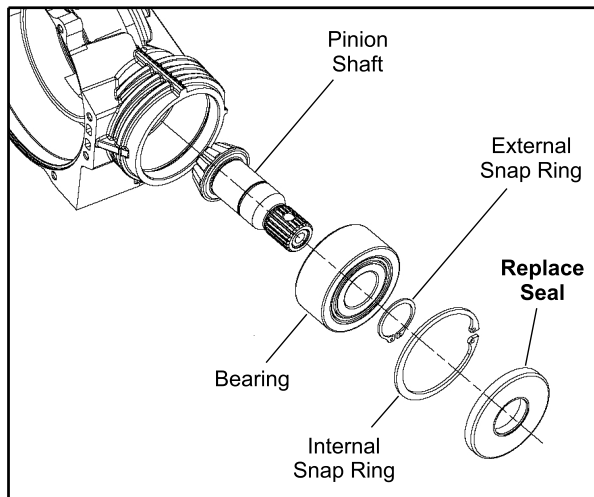
7. Remove the RH output hub assembly from the gearcase housing.



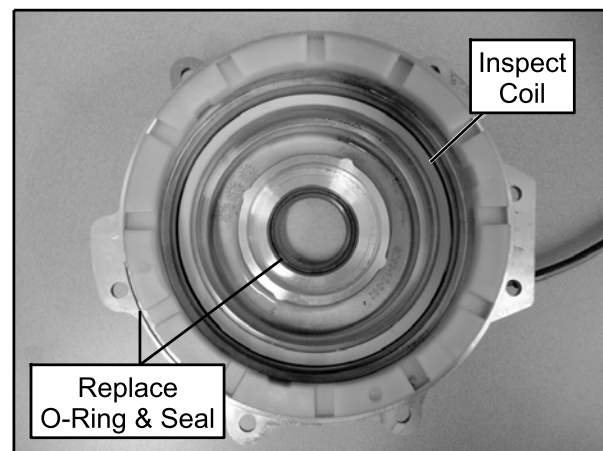
9. Inspect the pinion gear for chipped, broken or missing teeth. Inspect the pinion bearing for signs of wear and the pinion shaft seal surface for pitting.



8. Remove pinion seal, internal retaining ring and pinion gear assembly from the gearcase housing. Inspect and clean the gearcase housing and replace all oil seals and O-rings.



10. Inspect the AWD coil located in the outer cover plate assembly. Refer to AWD Diagnosis, page 7.24 for detailed inspection process. Replace the cover plate seal and O-ring.

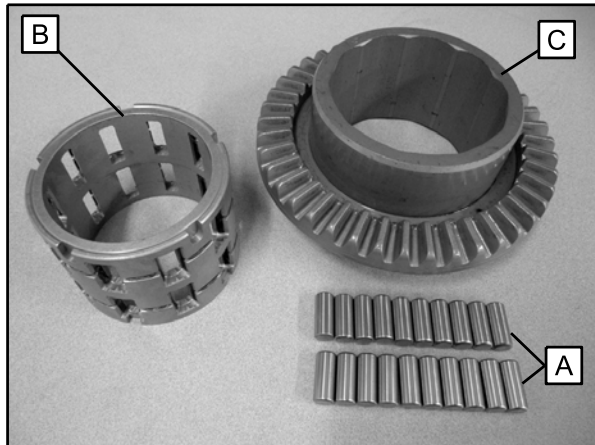


11. Remove the roll cage assembly and rollers from the clutch housing. Use a shop towel to cover the housing in order to retain all the rollers.

**NOTE:** Rollers are spring loaded. Take care not to allow them to fall out or lose them upon removal of the roll cage.

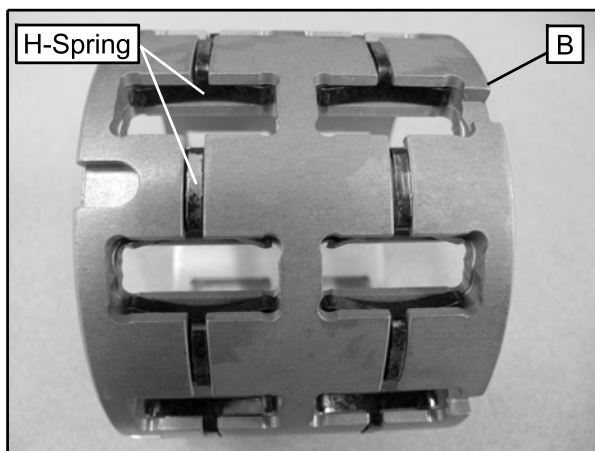
## FINAL DRIVE

12. Thoroughly clean all parts and inspect the rollers (A) for nicks and scratches. The rollers must slide up and down and in and out freely within the roll cage (B) sliding surfaces and H-springs.

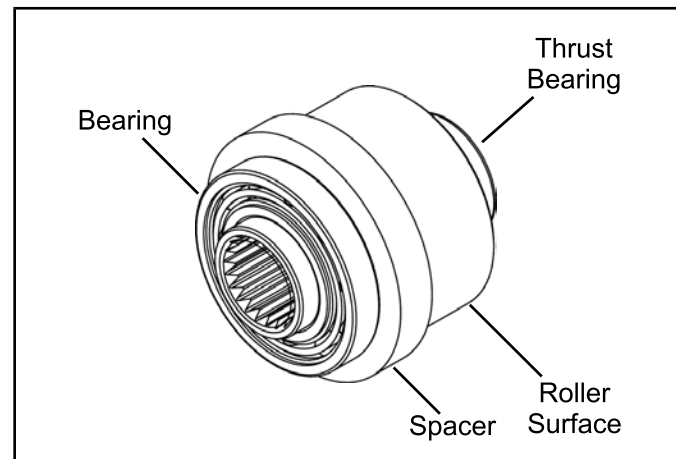


**NOTE: Refer to the “Electronic Parts Catalog” for individual part availability. Most parts are to be replaced as an assembly or as a complete kit.**

13. Inspect clutch housing / ring gear (C) for a consistent wear pattern. Inspect the ring gear for chipped, broken, or missing teeth.
14. Inspect the roll cage assembly (B) sliding surfaces and H-springs. The sliding surfaces must be clean and free of nicks, burrs or scratches. If damaged, replace the roll cage assembly.



15. Inspect both output hub assemblies. Inspect the bearings and replace if needed.



16. Clean and inspect all remaining front gearcase components. Check each for excessive wear or damage.

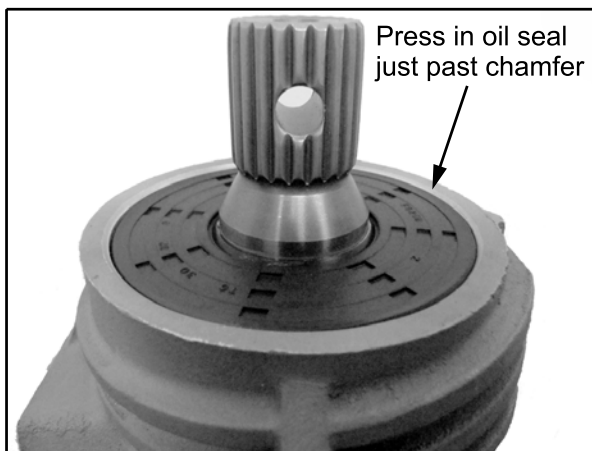


## Front Gearcase Assembly

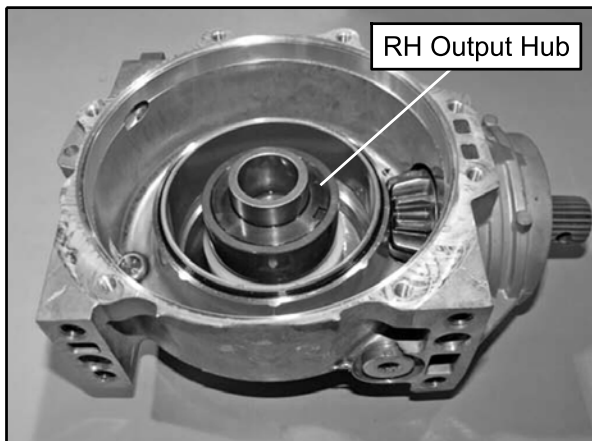
1. As mentioned during gearcase disassembly section, replace all O-rings, seals and worn components.
2. Install pinion shaft assembly and install internal snap ring.

**NOTE:** If bearing replacement was required, press new bearing onto the pinion shaft and install a new external snap ring.

3. Install a new pinion shaft seal into the pinion gear housing. Using a universal seal installer, press the new seal into the housing until the seal is just below the housing chamfer.

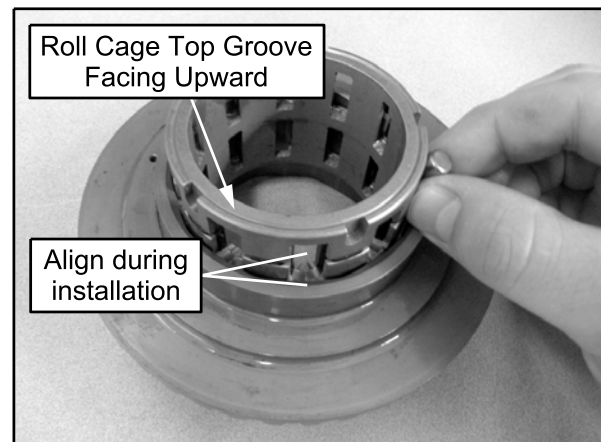


4. Install the RH output hub into the gearcase housing.

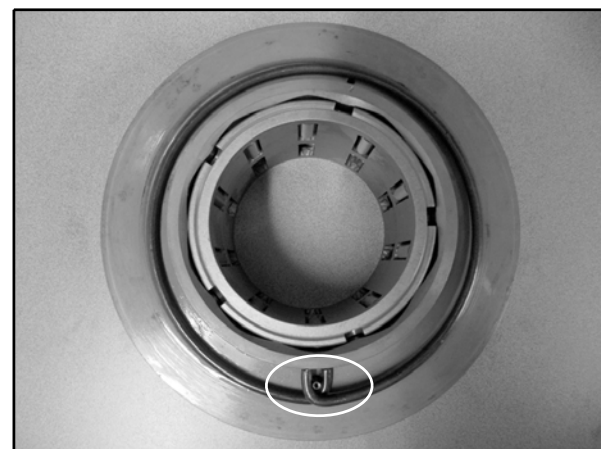


5. Carefully install the rollers into the roll cage assembly while installing the assembly into the clutch housing.

**NOTE:** Install roll cage so that the ring gear grooves line up with the roll cage windows (see below). Be sure roll cage top groove is facing upward.



6. Install the torsion spring by wrapping each leg of the spring around the dowel pin on the ring gear.



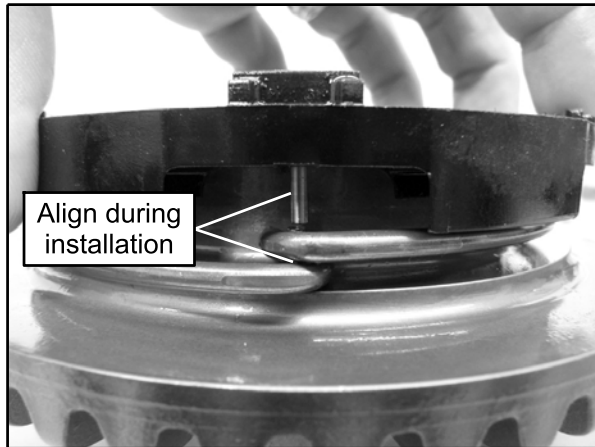
7



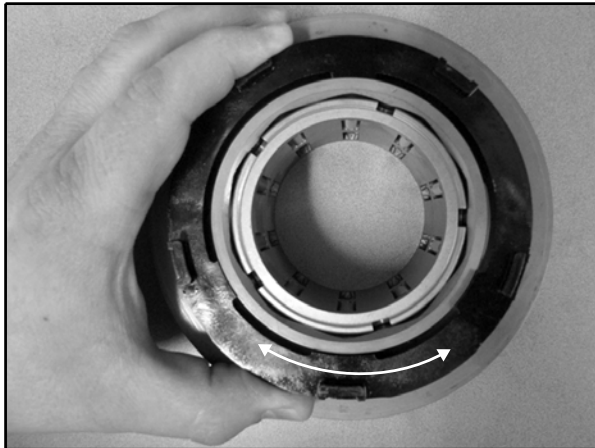
## FINAL DRIVE

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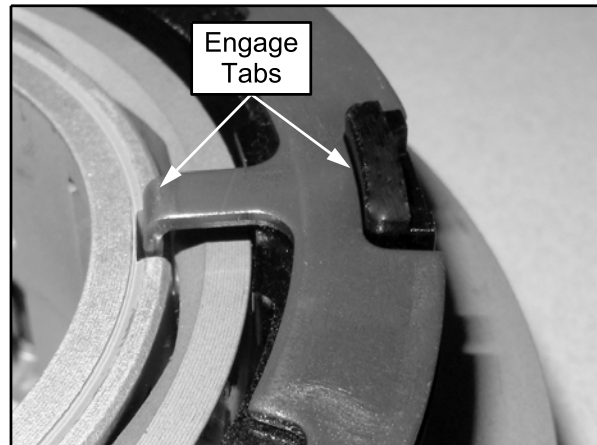
7. Align spring retainer dowel pin with ring gear dowel pin and install the retainer on top of the torsion spring.



8. Check the action of the torsion spring by rotating in both directions to ensure the spring and retainer are installed properly.

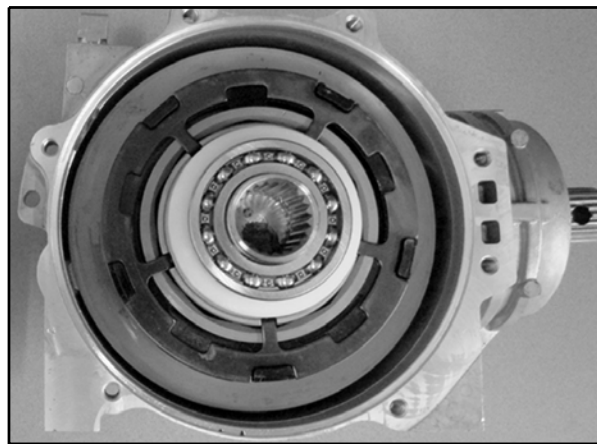


9. Install armature plate. Be sure all of the armature plate tabs are fully engaged into the roll cage assembly and that it is resting properly on the torsion spring retainer.



**NOTE:** Verify armature plate tabs are in the roll cage slots and that it rests properly on the spring retainer.

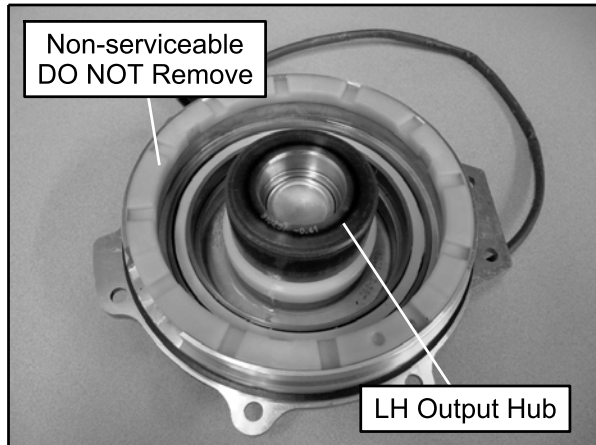
10. Carefully install the ring gear and roll cage assembly into the gearcase housing.



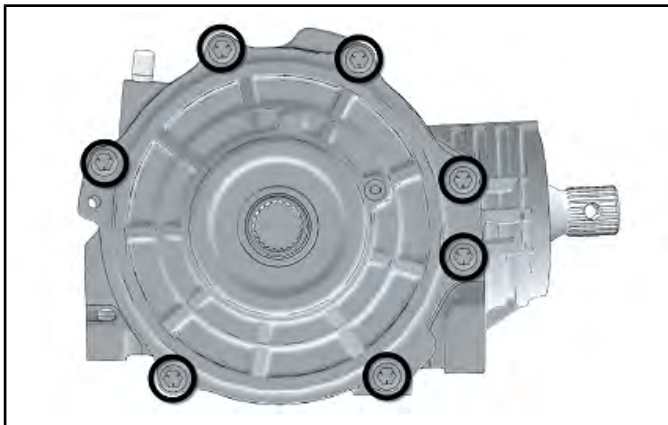
11. Install a new O-ring on the cover plate assembly.

**NOTE:** Be sure the square O-ring is placed flat on the cover surface. If the O-ring is twisted fluid leakage may occur.

- Carefully install the LH output hub assembly into the cover plate. Take care not to damage the new cover plate seal while installing the output hub.



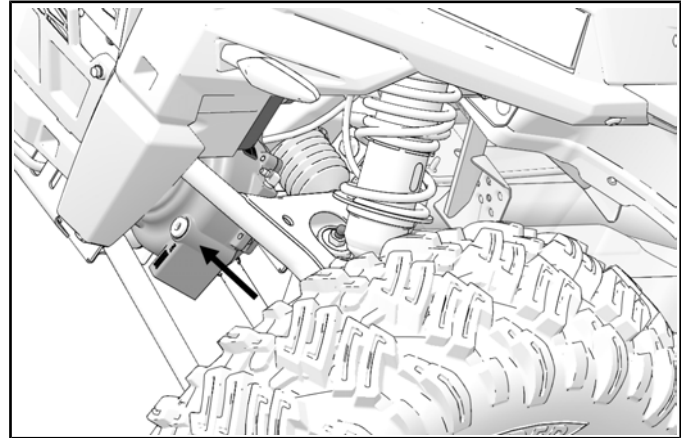
- Install the output cover assembly onto the gearcase housing. Install the seven cover plate screws and torque to specification.



Cover Plate Screws:  
11 ft-lbs (15 Nm)

## Front Gearcase Installation

- Install the gearcase back into the vehicle through the LH wheel well area, above the upper A-arm.

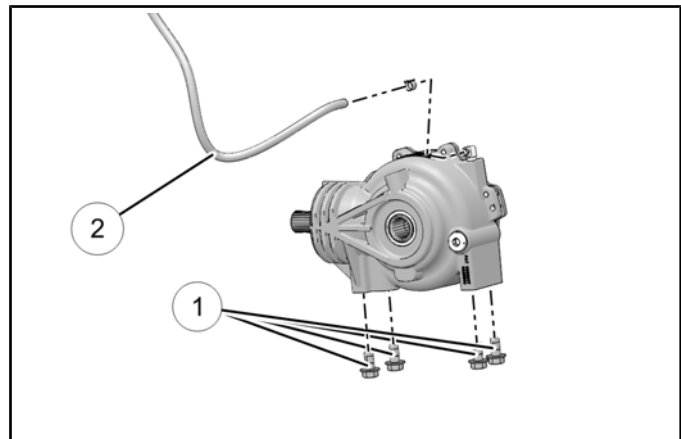


- Lubricate the front gearcase splines with Anti-Seize.
- Install the prop shaft onto the front gearcase input shaft. Use a NEW spring pin in the front prop shaft.
- Install the four bolts ① that secure the front gearcase to the frame and torque to specification.



Front Gearcase Mounting Bolts:  
33 ft-lbs (45 Nm)

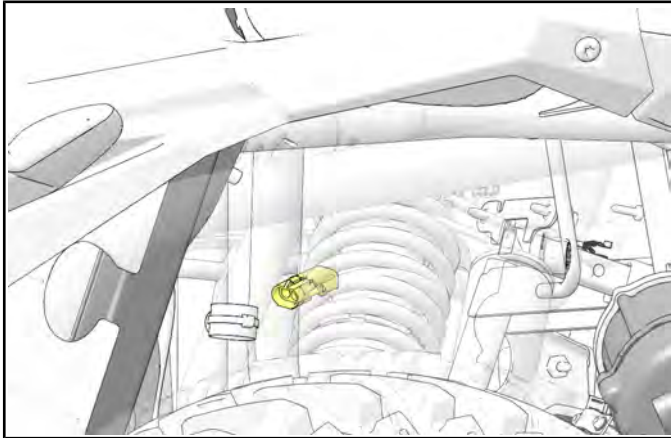
- Install the vent line ②.



## FINAL DRIVE

---

6. Connect the AWD wire harness.



7. Refer to Front Half Shaft Installation, page 7.11 and install both front drive shafts into the gearcase.
8. Add the proper lubricant to the front gearcase. Refer to Chapter 2 for fluid fill and change information.



**Recommended Front Gearcase Fluid:**

Polaris Demand Drive

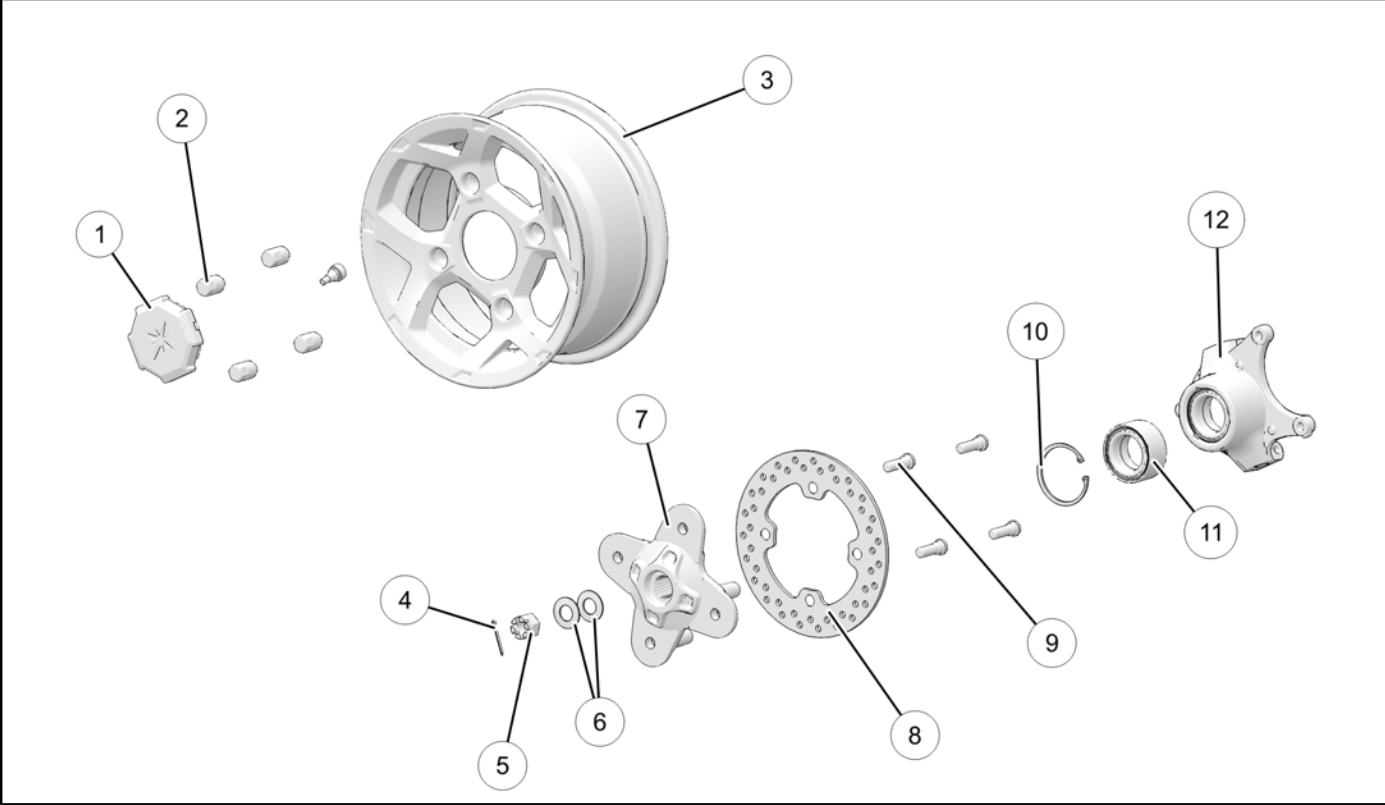
(PN 2877922) (Quart)

**Capacity:**≈ 7.5 oz. (222 mL)

(fill on a level surface to bottom of threads on the fill hole)

**WHEEL HUBS**

**Front Hub Assembly View**

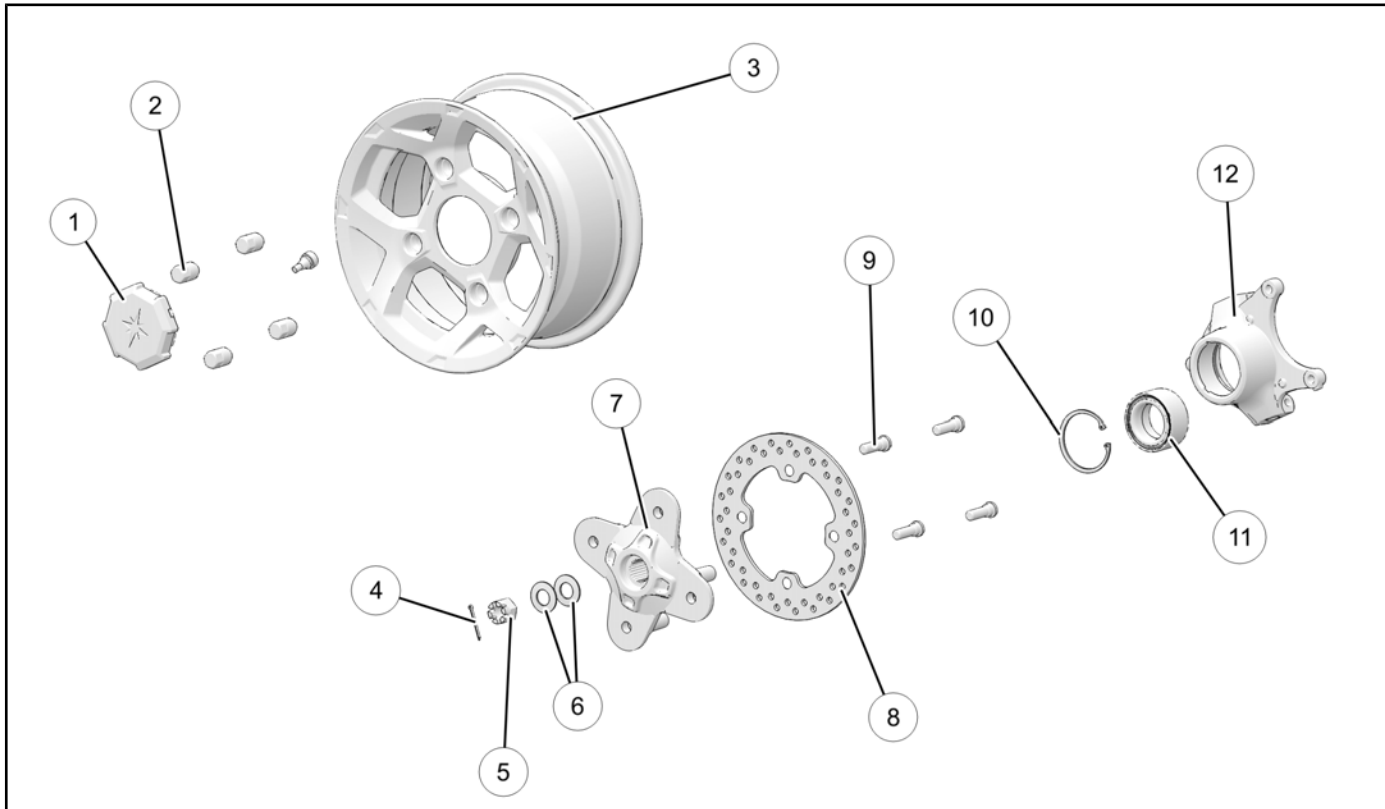


7

① Wheel Cap	⑦ Wheel Hub
② Wheel Nuts <b>Aluminum: 120 ft-lbs (163 Nm)</b> <b>Steel: 60 ft-lb (81 Nm)</b>	⑧ Brake Disc
③ Front Rim (Aluminum shown)	⑨ Studs
④ Cotter Pin	⑩ Retaining Ring
⑤ Castle Nut <b>110 ft-lbs (149 Nm)</b>	⑪ Sealed Bearing
⑥ Cone Washer	⑫ Bearing Carrier

# FINAL DRIVE

## Rear Hub Assembly View



① Wheel Cap	⑦ Wheel Hub
② Wheel Nuts <b>Aluminum: 120 ft-lbs (163 Nm)</b> <b>Steel: 60 ft-lb (81 Nm)</b>	⑧ Brake Disc
③ Rear Rim (Aluminum shown)	⑨ Studs
④ Cotter Pin	⑩ Retaining Ring
⑤ Castle Nut <b>110 ft-lbs (149 Nm)</b>	⑪ Sealed Bearing
⑥ Cone Washer	⑫ Bearing Carrier

# CHAPTER 8

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# STEERING / SUSPENSION

## GENERAL INFORMATION

### Special Tools

PART NUMBER	TOOL DESCRIPTION
2200421	Gas Shock Recharging Kit
2871351	IFP Depth Tool
2877408	Shock Spring Spanner Wrench
PU-45281-A	Shock Body Holding Tool
PU-50939	Seal Protector Sleeve
PU-51024	Shock Rod Holding Tool
PU-51039	Gas Shock Fill Tool

**Bosch Automotive Service Solutions:**  
1-800-345-2233 or <http://polaris.service-solutions.com/>

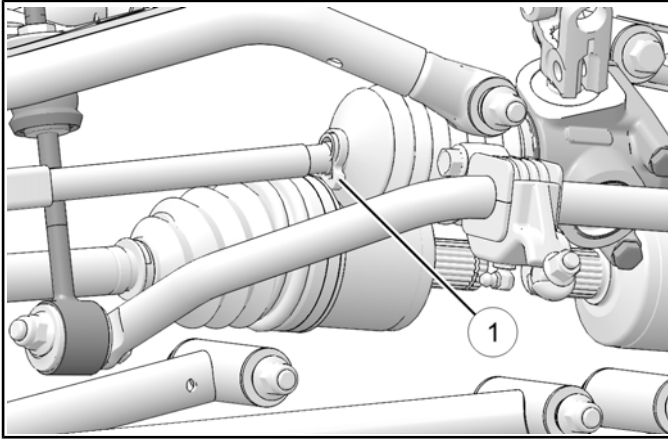
### Torque Specifications

ITEM	SPECIFICATION
A-Arm Mounting Bolts (front)	<b>42 ft-lb (57 Nm)</b>
Ball Joint Fasteners	<b>42 ft-lb (57 Nm)</b>
Bearing Carrier Bolts	<b>42 ft-lb (57 Nm)</b>
EPS Unit Mount Bracket Fasteners	<b>16 ft-lb (22 Nm)</b>
Pivot Tube Fasteners	<b>40 ft-lb (54 Nm)</b>
Shock Mounting Bolts	<b>42 ft-lb (57 Nm)</b>
Stabilizer Bar Link Fasteners	<b>40 ft-lbs (54 Nm)</b>
Stabilizer Bar Mounting Fasteners	<b>17 ft-lb (23 Nm)</b>
Steering Pivot Bolts	<b>40 ft-lb (54 Nm)</b>
Steering Shaft to EPS unit	<b>15 ft-lbs (20 Nm)</b>
Steering Shaft to Steering Rack	<b>48 ft-lb (65 Nm)</b>
Steering Wheel Nut	<b>65 ft-lbs (88 Nm)</b>
Tilt Shock Bolts	<b>7 ft-lb (10 Nm)</b>
Wheel Lug Nuts	<b>Aluminum: 120 ft-lbs (163 Nm) Steel: 60 ft-lb (81 Nm)</b>

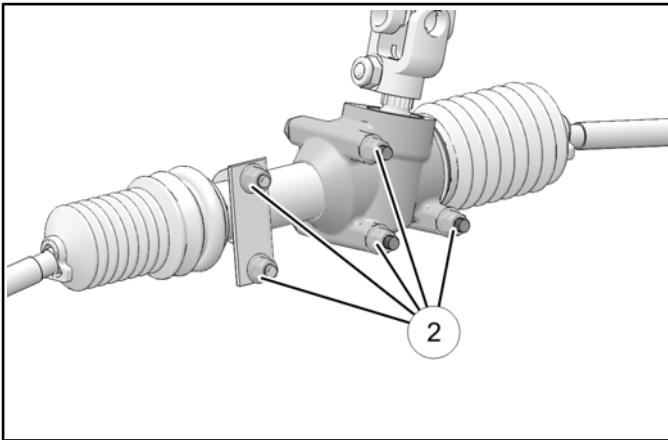
## STEERING - GENERAL

### Steering Rack Replacement

1. Safely lift the vehicle and remove both front wheels.
2. Remove the lower steering shaft. (see Chapter 8 – Lower Steering Shaft Removal, page 8.12)
3. Remove the fasteners ① for both tie rod ends retaining the tie rod end to the knuckle.



4. Remove the steering rack mounting bolts ② and remove the steering rack out of the vehicle.



5. Reverse procedure for installation. Torque NEW fasteners to specification.



Steering Shaft to Rack Fasteners:  
**48 ft-lb (65 Nm)**

Power Steering Unit Mounting Bolts:  
**30 ft-lb (41 Nm)**

Steering Shaft to EPS Unit Pinch Bolt:  
**15 ft-lbs (20 Nm)**

Power Steering Unit Mount Bracket Nuts:  
**16 ft-lb (22 Nm)**

Pivot Tube Fasteners:  
**40 ft-lb (54 Nm)**

Tilt Shock Fastener:  
**7 ft-lb (10 Nm)**

Steering Wheel Nut:  
**65 ft-lbs (88 Nm)**

Tie Rod End to Knuckle:  
**30 ft-lbs (41 Nm) + 90°**

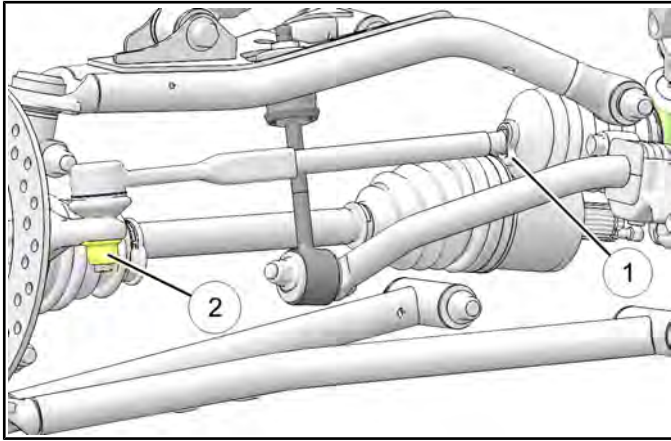
Wheel Lug Nuts:  
**Aluminum: 120 ft-lbs (163 Nm)**  
**Steel: 60 ft-lb (81 Nm)**

## STEERING / SUSPENSION

---

### Tie Rod Replacement

1. Safely lift the vehicle.
2. Remove the four wheel nuts.
3. Remove the fastener ① retaining the tie rod end to the knuckle.



4. Mark the location of the tie rod jam nut ② on the tie rod. Loosen the tie rod jam nut and unthread the tie rod end off the tie rod.
5. Install new tie rod end and thread it back to the original location of the other tie rod end. Tighten jam nut to specification.



Tie Rod Jam Nut:  
**14 ft-lbs (19 Nm)**

6. Install the tie rod end into the knuckle. Tighten new fastener to specification.



Tie Rod End to Knuckle:  
**30 ft-lbs (41 Nm) + 90°**

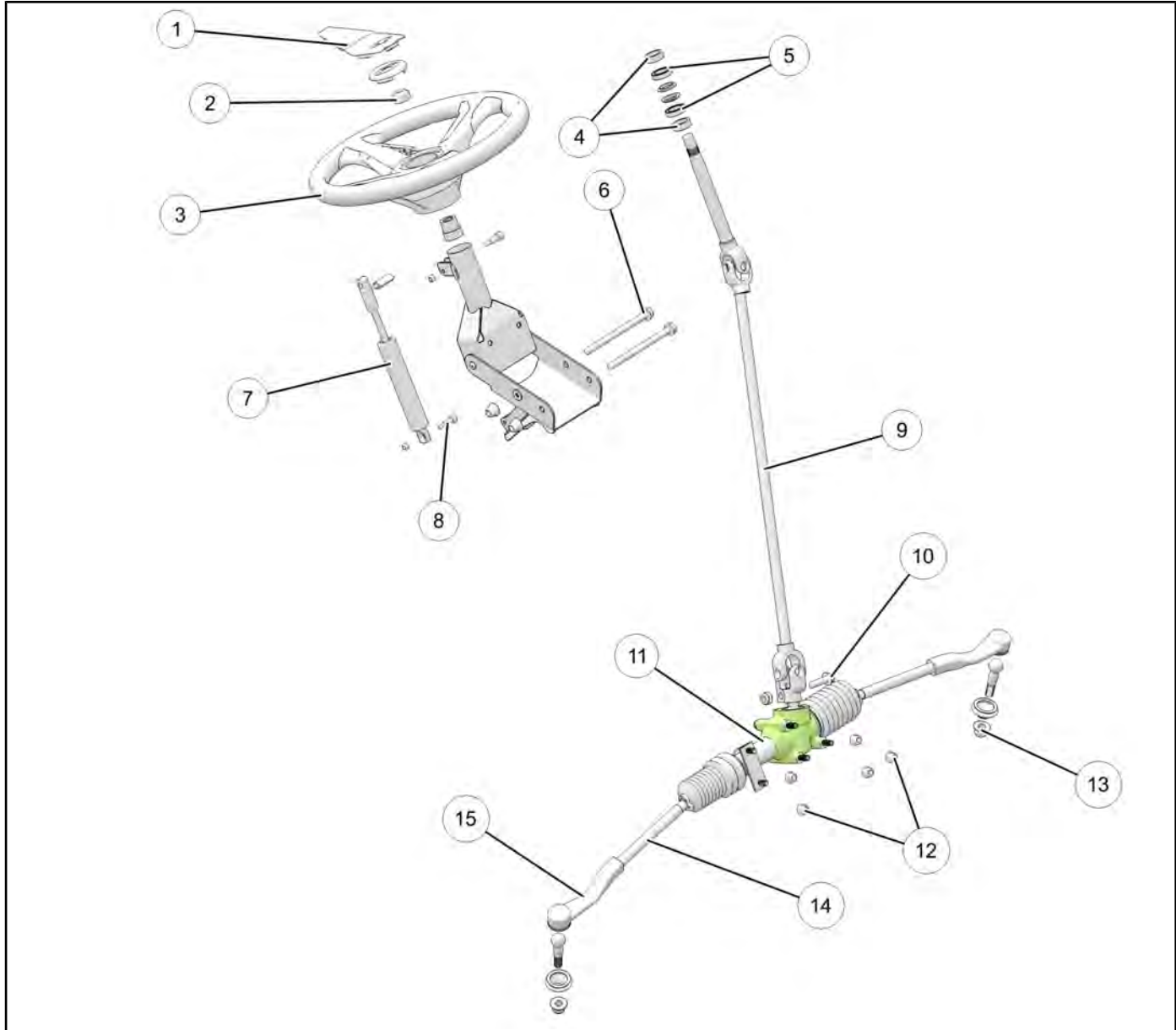
7. Install the wheel and four wheel nuts. Tighten lug nuts to specification.



Wheel Lug Nuts:  
**Aluminum: 120 ft-lbs (163 Nm)**  
**Steel: 60 ft-lb (81 Nm)**

**STEERING ASSEMBLY (NON-EPS)**

**Steering Assembly View**



**8**

① Steering Wheel Cover	⑥ Steering Pivot Fasteners <b>40 ft-lb (54 Nm)</b>	⑪ Steering Rack
② Steering Wheel Nut <b>65 ft-lbs (88 Nm)</b>	⑦ Tilt Steering Shock	⑫ Rack Mounting Fasteners <b>16 ft-lbs (22 Nm)</b>
③ Steering Wheel	⑧ Tilt Shock Fasteners <b>7 ft-lb (10 Nm)</b>	⑬ Tie Rod End Nuts <b>30 ft-lbs (41 Nm) + 90°</b>
④ Bushing	⑨ Steering Shaft	⑭ Tie Rod Jam Nut <b>14 ft-lbs (19 Nm)</b>
⑤ Bearing	⑩ Shaft to Rack Fasteners <b>48 ft-lb (65 Nm)</b>	⑮ Tie Rod End

# STEERING / SUSPENSION

## Steering Wheel Removal (non-EPS)

<b>CAUTION</b>
This procedure should NOT be used on EPS models. Using this procedure on an EPS model can permanently damage the EPS unit and cause a Power Steering Fault.

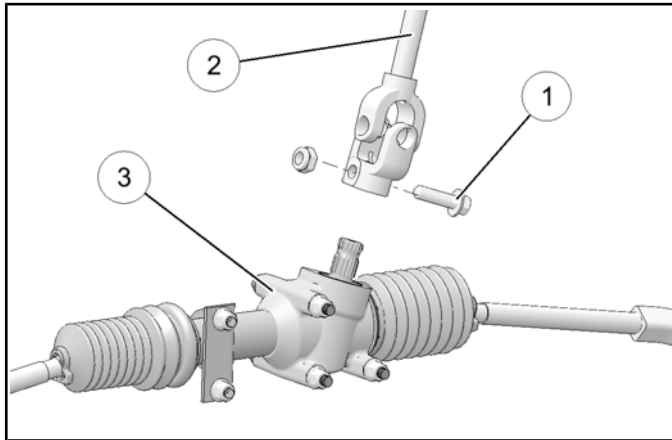
1. Remove the steering wheel cap.
2. Loosen the nut and back it half way off the steering shaft.
3. With a glove on your hand, place it under the steering wheel. Lift upward on the inner portion of the steering wheel while using a hammer to strike the steering shaft nut.

**NOTE: If the steering wheel will not pop loose, proceed to Steering Shaft Removal (non-EPS), page 8.6.**

4. Once the steering wheel pops loose, completely remove the nut and lift the steering wheel off the shaft.

## Steering Shaft Removal (non-EPS)

1. Remove the pinch bolt ① retaining the lower portion of the steering shaft ② to the steering gear box assembly ③.



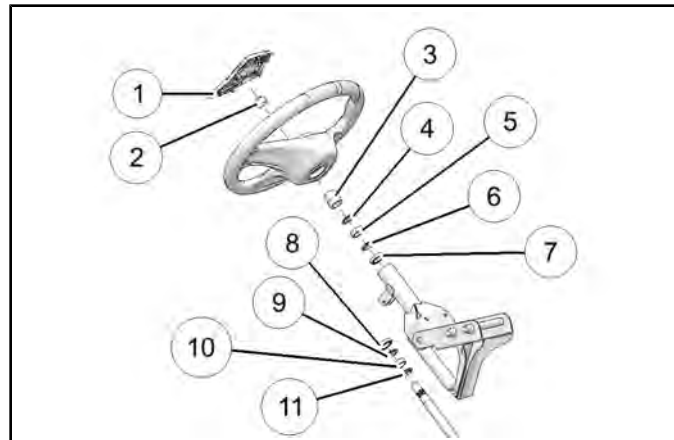
2. Remove the fastener retaining the upper portion of the steering wheel tilt shock to the pivot tube.
3. Remove the two fasteners that retain the pivot tube.
4. Remove the steering shaft, pivot tube and steering wheel from the vehicle as an assembly.
5. Refer to steps 11-16 of the Steering Shaft Bearing Replacement, page 8.6 procedure for installation.

## Steering Shaft Bearing Replacement

**NOTE: Replacement pivot tube assembly comes with new upper and lower bearings installed. Use this procedure if replacing just the bearings only.**

1. Perform the "Steering Shaft Removal" procedure.
2. Remove the steering wheel cap and retaining nut.
3. Press steering shaft out of the steering wheel and pivot tube.
4. Note the order and location of the washers and spacers between the steering wheel and pivot tube.
5. Drive the bearings out of the pivot tube using a drift punch.
6. Inspect the pivot tube bearing surfaces for signs of excessive wear or damage.
7. Apply Loctite® 271™ (Red) to the outer circumference of the new lower bearing race. Slide the new lower bearing onto the steering shaft and install the steering shaft through the pivot tube.

**NOTE: Use care not to allow any of the Loctite® to get in the bearing.**



① Cap	⑦ Bearing
② Nut	⑧ Bearing
③ Steering Hub Insert	⑨ Bushing
④ Bushing	⑩ Bushing
⑤ Bushing	⑪ Bushing
⑥ Bushing	

**Be sure the lower washers and spacers are still on the steering shaft.**

## STEERING / SUSPENSION

8. Apply Loctite® 271™ (Red) to the outer circumference of the new upper bearing race. Slide the new upper bearing onto the steering shaft and press it into the pivot tube by hand.

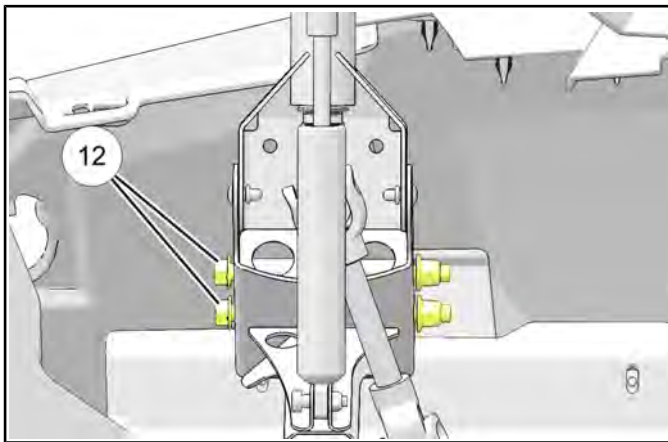
**NOTE: Use care not to allow any of the Loctite® to get in the bearing. Bearings will be seated in the pivot housing upon tightening the steering wheel nut in step 14.**

9. Reinstall the upper washers and spacers in the order in which they were removed.
10. Install the steering wheel and hand tighten the nut. Apply Loctite® 271™.
11. Reinstall the steering shaft assembly in the vehicle. Install the lower portion of the steering shaft onto the steering gear box assembly (see Figure 5-16). Torque the lower pinch bolt to specification.



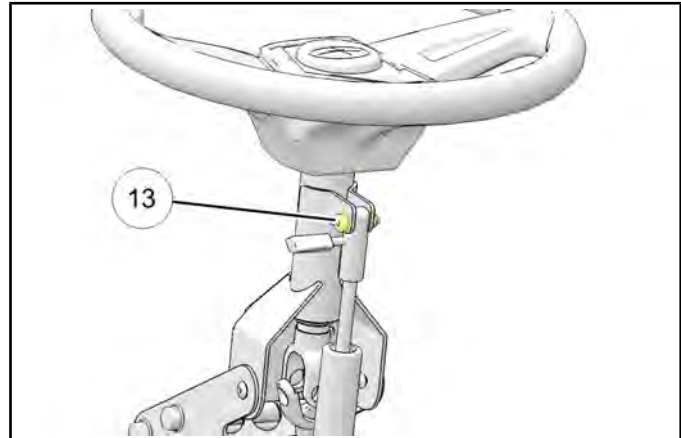
Steering Shaft to Rack Pinch Bolt:  
**48 ft-lb (65 Nm)**

12. Install the two fasteners 12 that retain the pivot tube. Torque fasteners to specification.



Pivot Tube Bolts:  
**40 ft-lb (54 Nm)**

13. Install the fastener 13 retaining the upper portion of the steering wheel tilt shock to the pivot tube. Torque fastener to specification.



Tilt Shock Bolt:  
**7 ft-lb (10 Nm)**

14. Be sure the front wheels are facing straight forward. Remove the steering wheel and align as needed. Torque the steering wheel nut to specification. Apply Loctite® 271™.



Steering Wheel Nut:  
**65 ft-lbs (88 Nm)**

15. Wipe the pivot tube clean of any excess Loctite®.

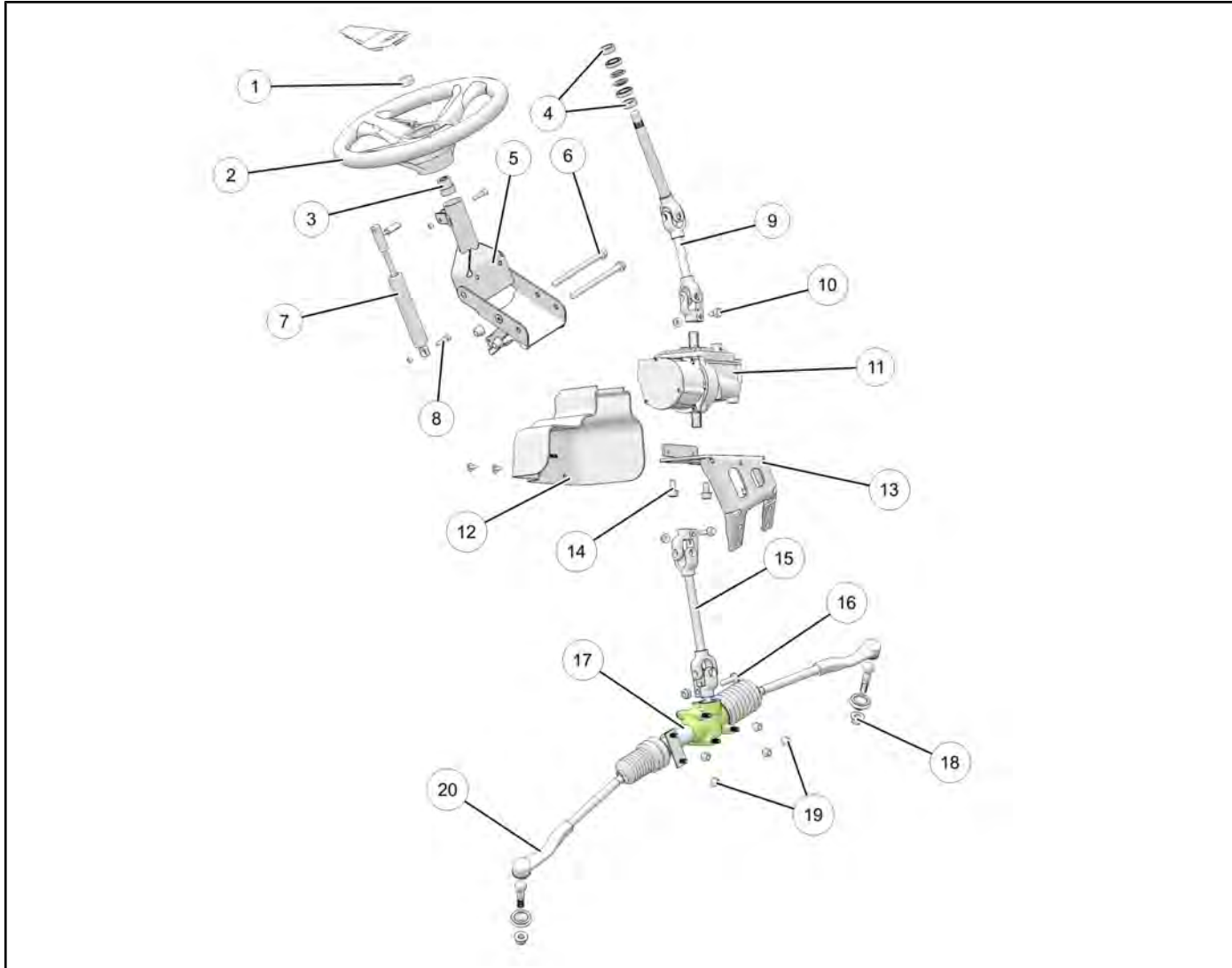
16. Install steering wheel cap and field test steering operation.



# STEERING / SUSPENSION

## STEERING ASSEMBLY (EPS)

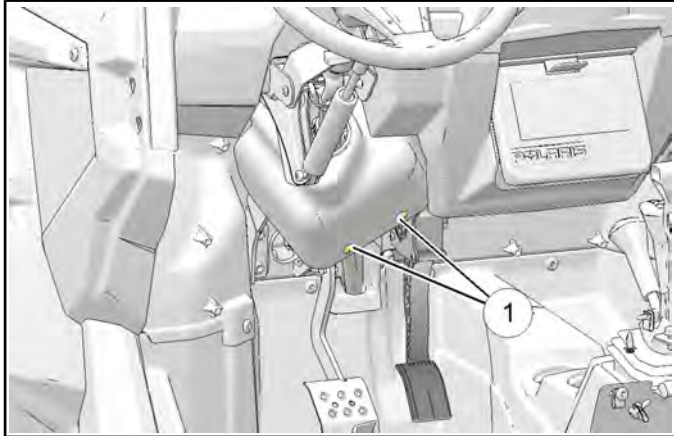
### Steering Assembly View (EPS)



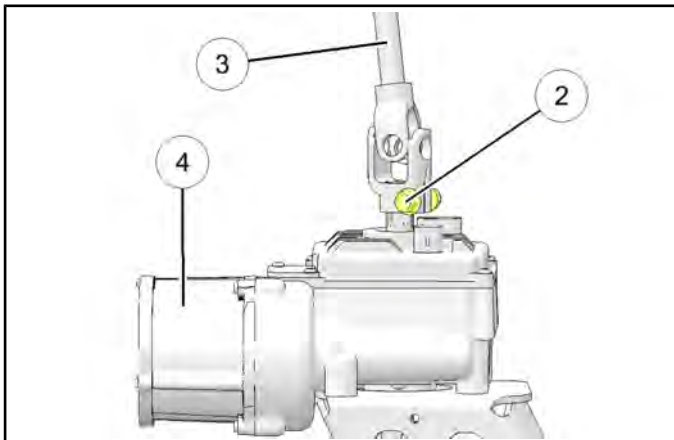
① Steering Wheel Nut	⑧ Shock Fasteners <b>7 ft-lb (10 Nm)</b>	⑮ Lower Steering Shaft
② Steering Wheel	⑨ Upper Steering Shaft	⑯ Shaft to Rack Fastener <b>48 ft-lb (65 Nm)</b>
③ Bushing	⑩ Shaft to EPS Fasteners <b>15 ft-lbs (20 Nm)</b>	⑰ Steering Rack
④ Bearing	⑪ EPS	⑱ Tie Rod End Nut <b>30 ft-lbs (41 Nm) + 90°</b>
⑤ Steering Pivot	⑫ EPS Cover	⑲ Rack Mounting Fasteners <b>16 ft-lbs (22 Nm)</b>
⑥ Pivot Fasteners <b>40 ft-lb (54 Nm)</b>	⑬ EPS Mounting Bracket	⑳ Tie Rod End
⑦ Tilt Locking Shock	⑭ Bracket Fasteners <b>30 ft-lb (41 Nm)</b>	

### Upper Steering Shaft Removal

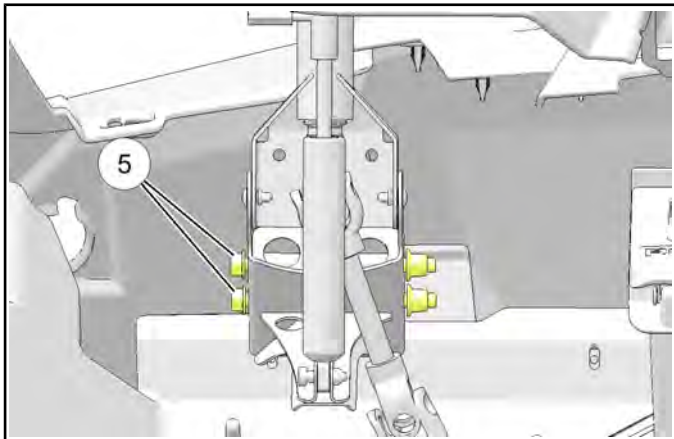
1. Remove the two Torx fasteners ① retaining the black plastic cover and remove the cover from the vehicle.



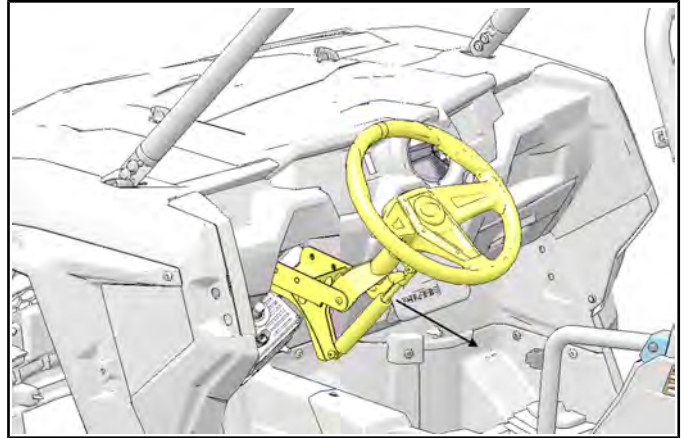
2. Remove the pinch bolt ② retaining the upper steering shaft ③ to the power steering unit ④.



3. Lift the steering wheel up and remove the four fasteners ⑤ that retain the pivot tube.



4. Remove the steering shaft, pivot tube and steering wheel from the vehicle as an assembly.



5. If replacing the upper steering shaft or steering wheel, see Chapter 8 – Steering Wheel Removal (EPS), page 8.10

# STEERING / SUSPENSION

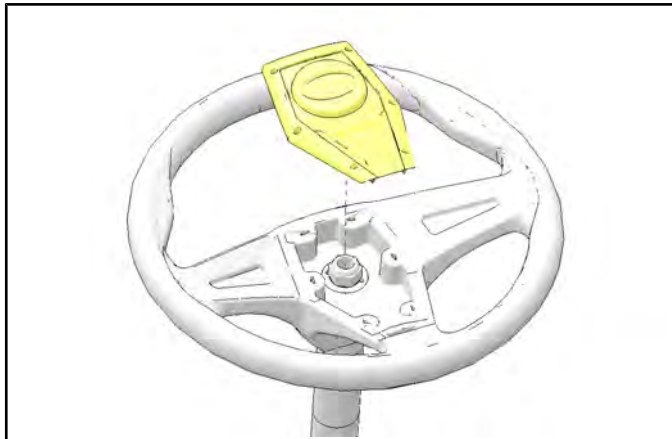
## Steering Wheel Removal (EPS)

1. Remove the upper steering shaft, pivot tube and steering wheel as an assembly *before* attempting to remove the steering wheel. See Chapter 8 – Upper Steering Shaft Removal, page 8.9

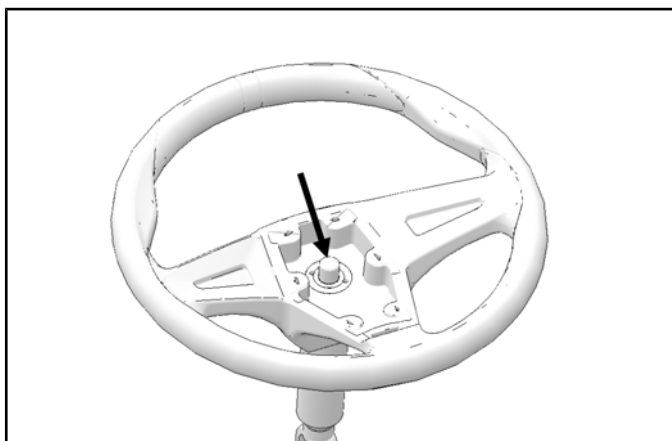
### CAUTION

Striking the steering wheel or steering shaft while installed in the vehicle can permanently damage the EPS unit and cause a Power Steering Fault.

2. Remove the steering wheel cap.



3. Loosen the nut and back it half way off the steering shaft.
4. Place the assembly in a vise.
5. Using a large bronze drift and hammer, strike the steering shaft nut to pop the steering wheel off the shaft taper.



6. Once the steering wheel pops loose, completely remove the nut and lift the steering wheel off the shaft.

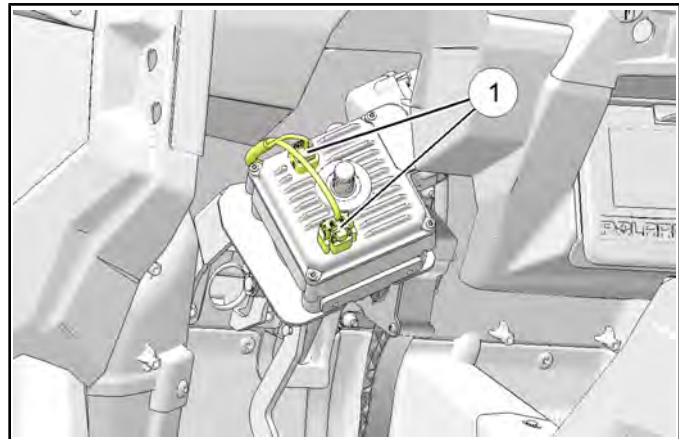
## Power Steering Unit Removal

1. Remove the upper steering shaft, pivot tube and steering wheel from the vehicle as an assembly. See Chapter 8 – Upper Steering Shaft Removal, page 8.9

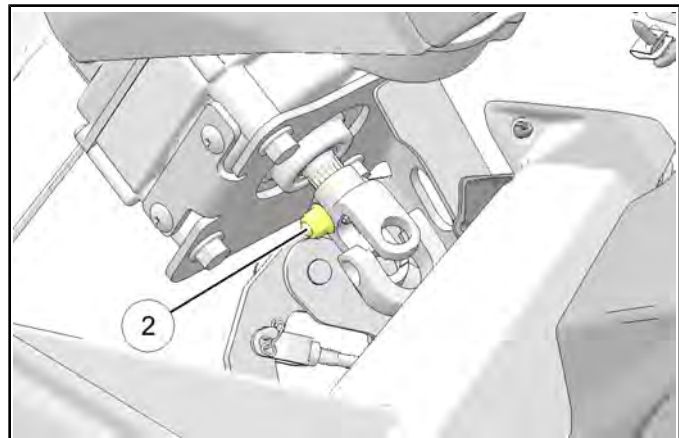
### CAUTION

Striking the steering wheel or steering shaft while installed in the vehicle can permanently damage the EPS unit and cause a power steering fault.

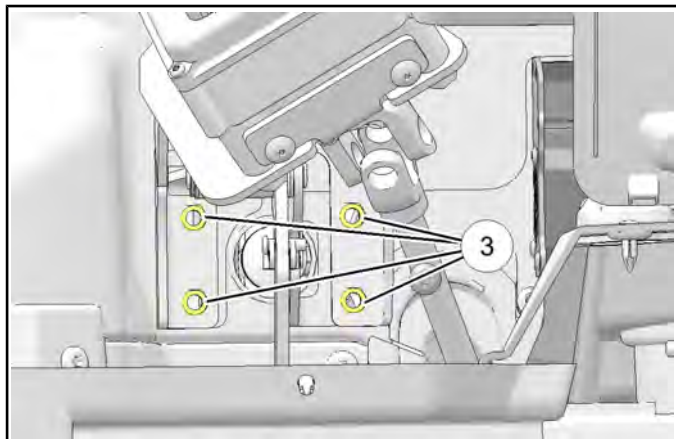
2. Disconnect the two electrical harnesses ① from the power steering unit.



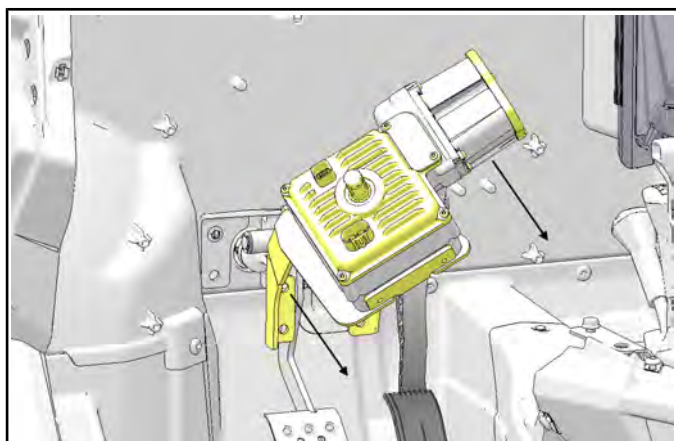
3. Remove the pinch bolt ② retaining the lower steering shaft to the power steering unit.



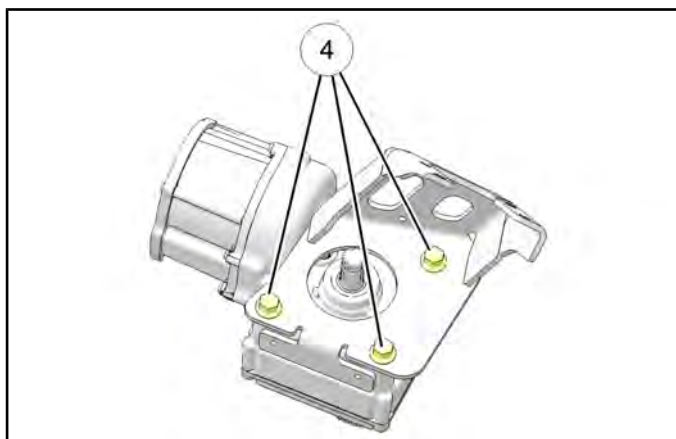
4. While supporting the power steering unit, remove the four nuts ③ from the mount bracket.



5. Carefully remove the power steering unit and mount bracket from the vehicle as an assembly.



6. If replacing the power steering unit, remove the three bolts ④ that retain the power steering unit to the mount bracket.

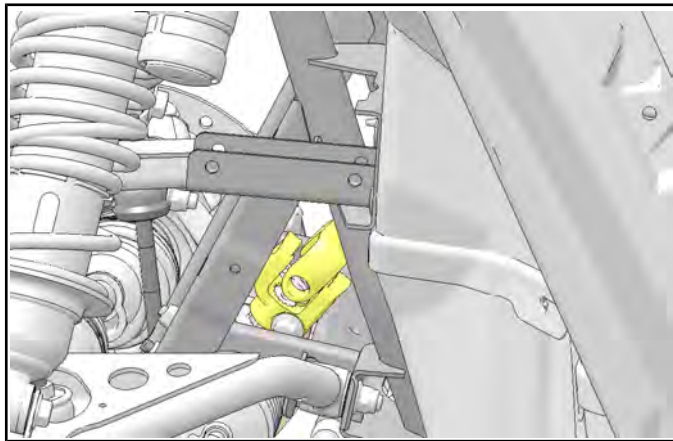


**IMPORTANT:** Electronic Power Steering (EPS) units are programmed to be vehicle specific and are not interchangeable between product lines.

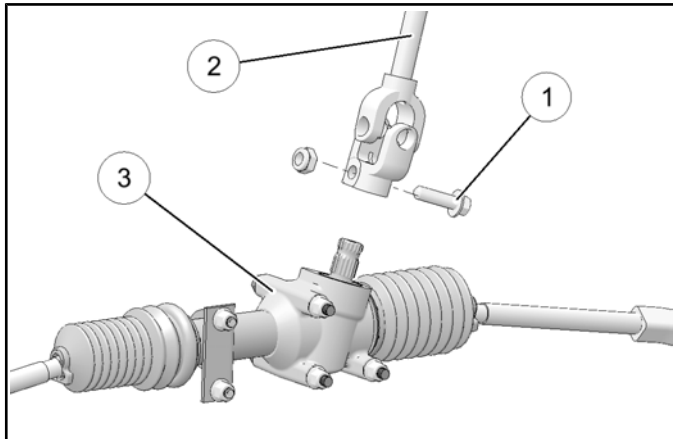
## STEERING / SUSPENSION

### Lower Steering Shaft Removal

1. Use the steering wheel to position the front wheels so they point straight ahead.
2. Locate the lower steering shaft through the left front wheel well. Mark the lower steering shaft, gear box stub shaft and gear box to aid in installation.



3. Remove the power steering unit (see Chapter 8 – Power Steering Unit Removal, page 8.10).
4. Remove the pinch bolt ① retaining the lower steering shaft ② to the steering gear box assembly ③.



5. Lift up on the shaft and remove it through the floor panel.

### Lower Steering Shaft Installation

1. Install the lower steering shaft onto the gear box and align the marks made during step 2 of the “Lower Steering Shaft Removal (EPS Models)” procedure.
2. Install the pinch bolt that retains the lower steering shaft to the steering rack assembly and torque to specification.



Lower Steering Shaft Pinch Bolt:  
**48 ft-lb (65 Nm)**

3. Install the power steering unit and reassemble the vehicle (see Chapter 8 – Power Steering Unit Removal, page 8.10).

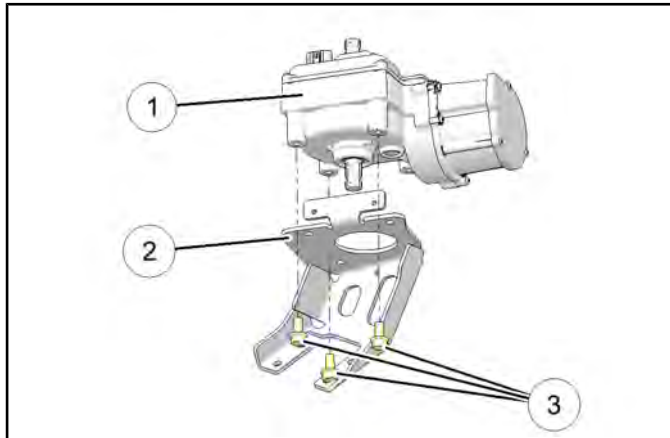


## Power Steering Unit Installation

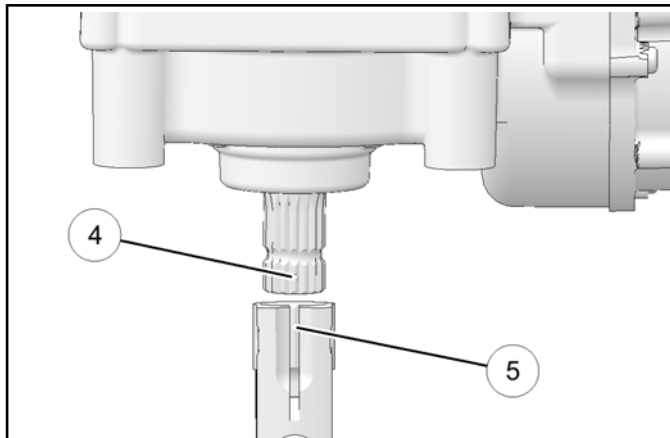
1. If the power steering unit ① was removed from the mount bracket ②, reinstall it prior to vehicle installation. Torque the mounting bolts ③ to specification.



Power Steering Unit Mounting Bolts:  
**30 ft-lb (41 Nm)**

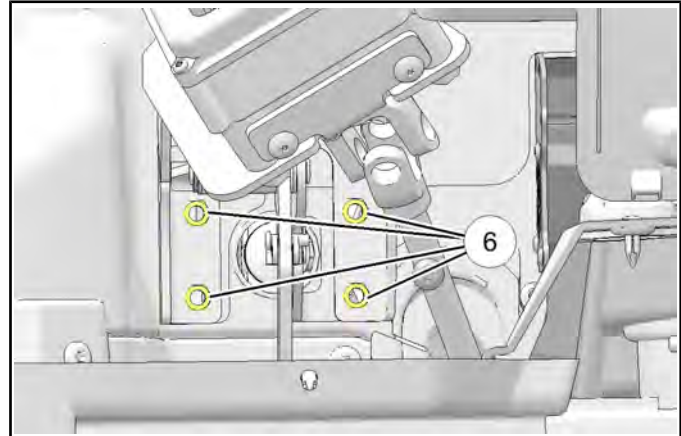


2. Install the power steering unit into the vehicle and align the skip-tooth spline ④ on the power steering stub shaft with the opening in the lower steering shaft ⑤.



3. Place the power steering mount bracket over the top of the brake pedal mount studs and finger tighten the four nuts.

4. Torque the four mount bracket nuts ⑥ to specification.



Power Steering Unit Mount Bracket Nuts:  
**16 ft-lb (22 Nm)**

5. Position the lower steering shaft on the power steering unit stub shaft and install the pinch bolt. Torque to specification.



Lower Steering Shaft to EPS Unit Pinch Bolt:  
**15 ft-lbs (20 Nm)**

6. See Chapter 8 – Upper Steering Shaft Installation, page 8.14 to complete the installation procedure.



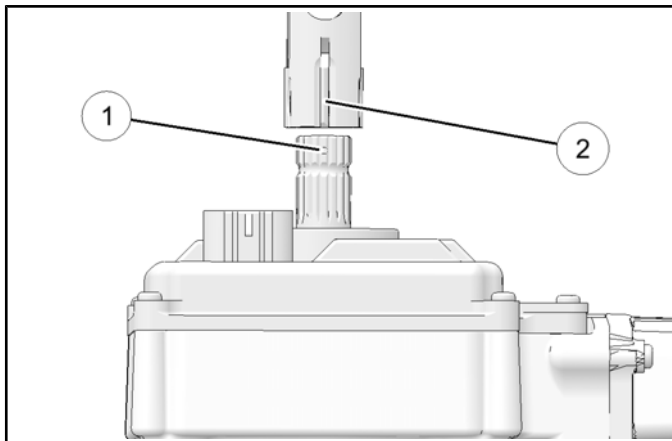
# STEERING / SUSPENSION

## Upper Steering Shaft Installation


**NOTE:** If steering wheel was removed, follow this procedure to ensure the upper steering shaft is properly positioned on the power steering stub shaft.

<b>CAUTION</b>
Striking the steering wheel or steering shaft can permanently damage the EPS unit and cause a Power Steering Fault.


1. Install the upper steering shaft and align the skip-tooth spline ① on the power steering stub shaft with the opening ② in the upper steering shaft.




2. Install the pivot tube and torque fasteners to specification.

 = T
Pivot Tube Fasteners: <b>40 ft-lb (54 Nm)</b>


3. Install the tilt shock and torque fastener to specification.

 = T
Tilt Shock Fastener: <b>7 ft-lb (10 Nm)</b>

4. Be sure the front wheels are pointing straight ahead and install the steering wheel and retaining nut. Torque the nut to specification and reinstall the plastic wheel cover.

 = T
Steering Wheel Nut: <b>65 ft-lbs (88 Nm)</b>

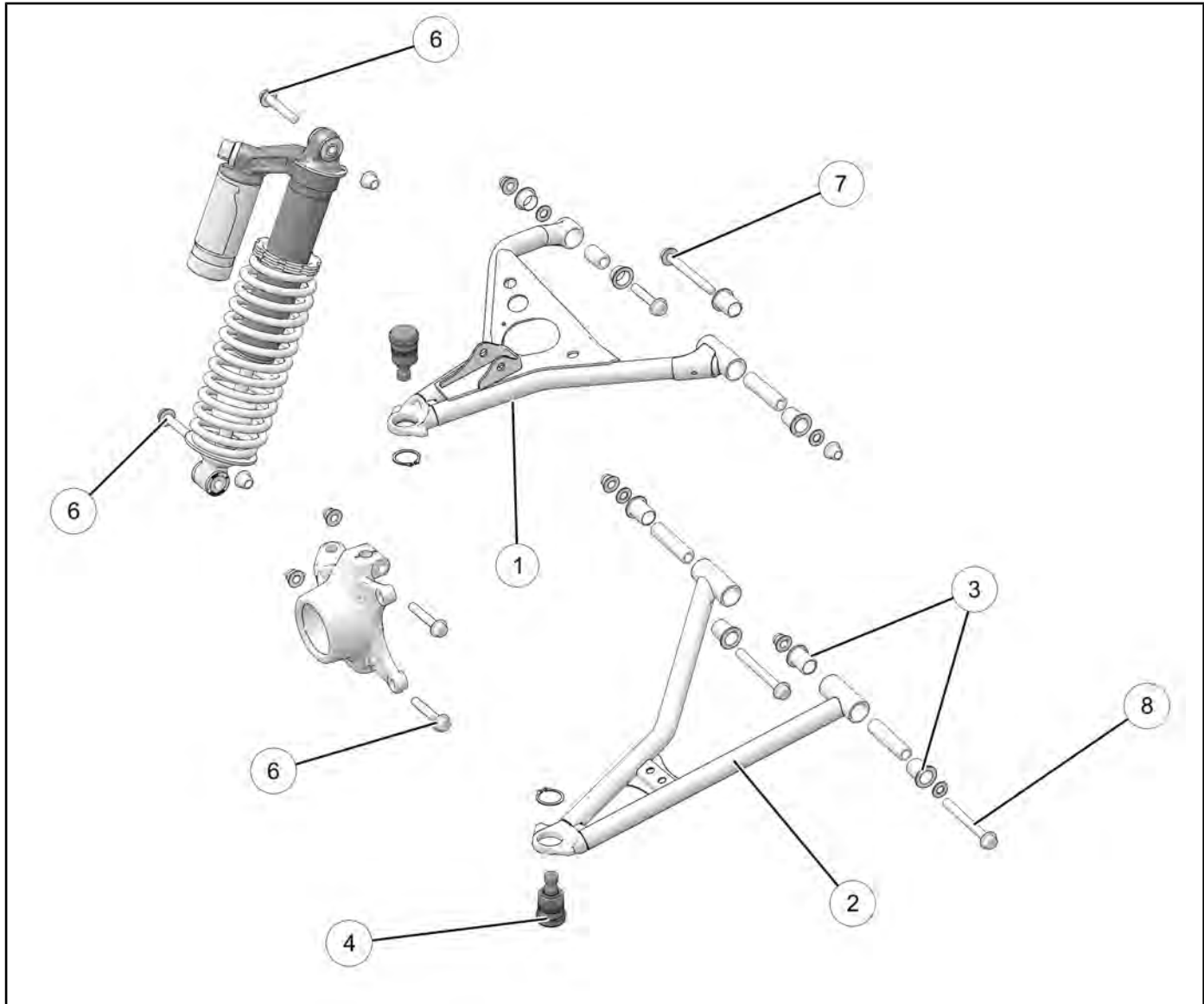
5. Install a new upper steering shaft pinch bolt and nut. Torque pinch bolt to specification.

 = T
Upper Steering Shaft Pinch Bolt: <b>15 ft-lbs (20 Nm)</b>

6. Reconnect both electrical harnesses onto the power steering unit. Be sure the connectors snap into place.
7. Reinstall the black plastic cover over the power steering unit and install the two Torx fasteners.
8. Turn the key switch on and test EPS operation.

## FRONT SUSPENSION

### Front Suspension Assembly View



① Upper A-arm	⑤ Shock Assembly
② Lower A-arm	⑥ Shock Fasteners <b>42 ft-lb (57 Nm)</b>
③ Bushings	⑦ Ball Joint Fasteners <b>42 ft-lb (57 Nm)</b>
④ Ball Joint	⑧ Control Arm Bolt <b>42 ft-lb (57 Nm)</b>

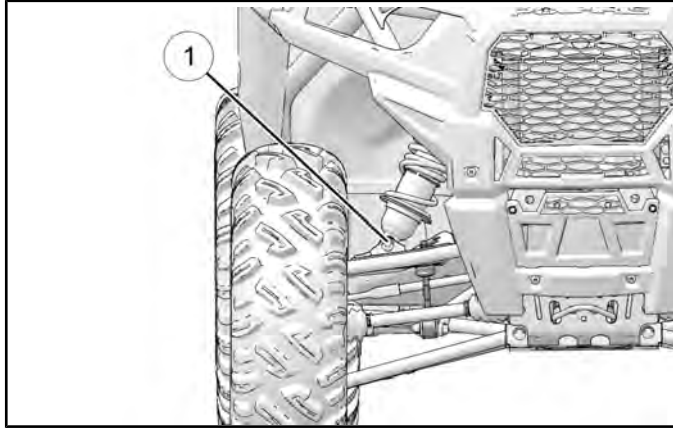
# STEERING / SUSPENSION

## Front Control Arm Replacement

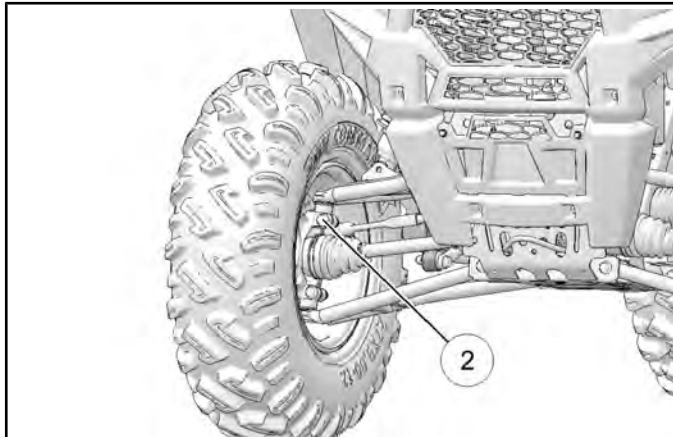
The following procedure details upper and lower A-arm removal and replacement on one side of the vehicle.

### Upper Control Arm

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

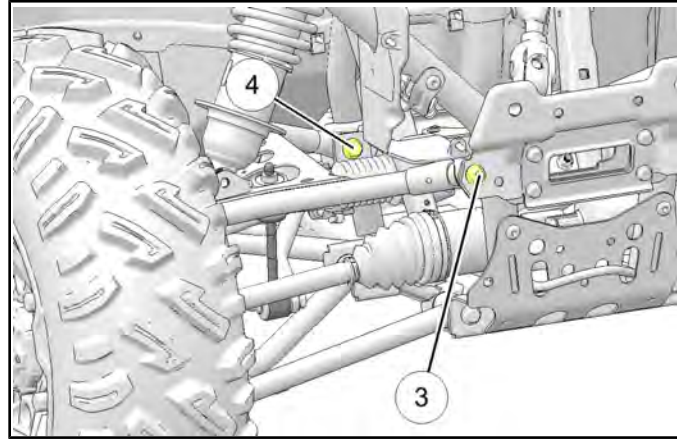


3. Remove upper ball joint pinch bolt ② from bearing carrier.



4. Using a soft face hammer, tap on bearing carrier to loosen the upper A-arm ball joint end while lifting upward on the upper control arm. Completely remove the ball joint end from the bearing carrier.
5. Remove the front bumper to allow A-arm bolt removal.

6. Loosen and remove the upper control arm front through-bolt fastener ③ and rear through-bolt fastener ④. Remove the upper control arm from the vehicle.



7. Examine A-arm bushings and pivot tube. Replace if worn. Discard 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 control arm, thoroughly clean the control arm and pivot tube.
9. Install new ball joint into control arm. (see Ball Joint Removal, page 8.18 and Ball Joint Installation, page 8.18.)
10. Insert new control arm bushings and pivot tube into new control arm.
11. Install new upper control arm assembly onto vehicle frame. Torque new bolt to specification.



Front Upper Control Arm Bolts:  
**42 ft-lb (57 Nm)**

12. Insert upper control arm ball joint end into the bearing carrier. Install upper ball joint pinch bolt into the bearing carrier and torque bolt to specification.



Front Ball Joint Pinch Bolts:  
**42 ft-lb (57 Nm)**

## STEERING / SUSPENSION

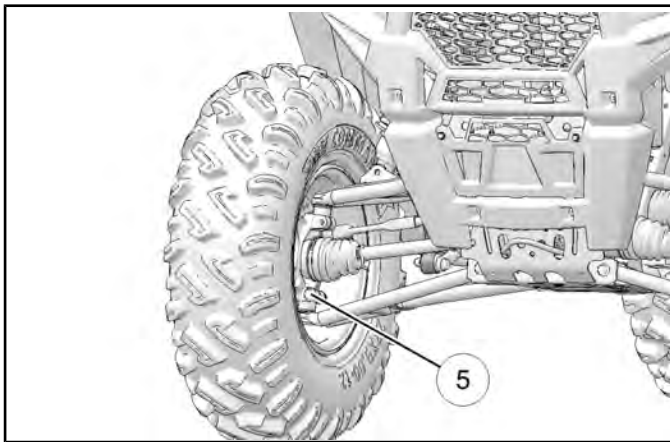
13. Attach shock to control arm with fastener. Torque lower shock bolt to specification.



Front Shock Mounting Bolts:  
**42 ft-lb (57 Nm)**

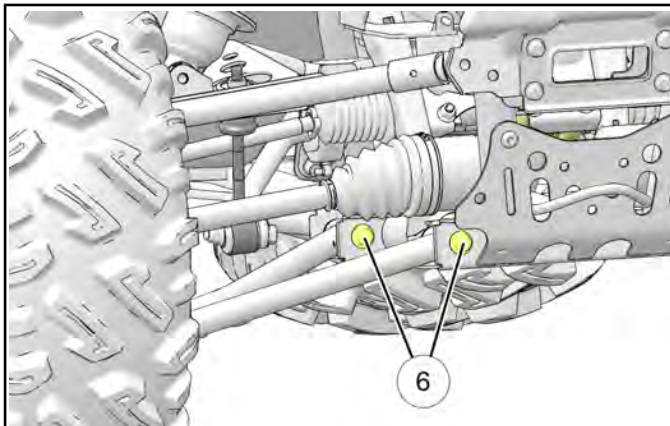
### Lower A-Arm

14. Remove lower ball joint pinch bolt ⑤ from bearing carrier.



15. Using a soft face hammer, tap on bearing carrier to loosen the lower control arm ball joint end while pushing downward on the lower control arm. Completely remove the ball joint end from the bearing carrier.

16. Loosen and remove the lower control arm front through-bolt fastener and rear through-bolt fastener ⑥. Remove the lower control arm from the vehicle.



17. Examine A-arm bushings and pivot tube. Replace if worn. Discard hardware.

18. If not replacing the control arm, thoroughly clean the control arm and pivot tube.

19. Install new ball joint into control arm. Refer to "Ball Joint Replacement" section.

20. Insert new control arm bushings and pivot tube into new control arm. A light press force may be needed.

21. Install new lower control arm assembly onto vehicle frame. Torque new bolt to specification.

22. Insert lower control arm ball joint end into the bearing carrier. Install lower ball joint pinch bolt into the bearing carrier and torque bolt to specification.



Upon control arm installation, test vehicle at low speeds before putting into service.



Lower Control Arm Bolts:  
**42 ft-lb (57 Nm)**

Front Ball Joint Pinch Bolts:  
**42 ft-lb (57 Nm)**

# STEERING / SUSPENSION

## Ball Joint Removal

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

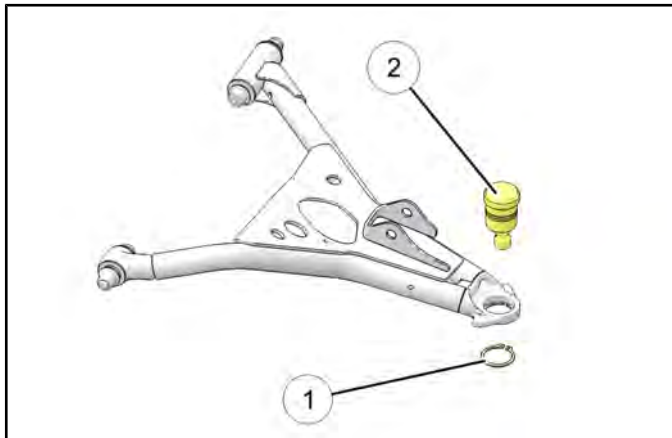
1. Properly lift and support the vehicle by the frame.
2. Remove the appropriate front wheel.

### To service the upper ball joint:

3. Remove and discard the two front brake caliper mounting bolts and remove the caliper from the brake disc (see Chapter 9 – Front Caliper / Pad Removal, page 9.16).
4. Remove and discard the upper ball joint pinch bolt.
5. If necessary, remove the lower front shock fastener from the A-arm.
6. Remove the upper A-Arm to frame mounting bolts and remove the A-arm from the chassis.

### To service the lower ball joint:

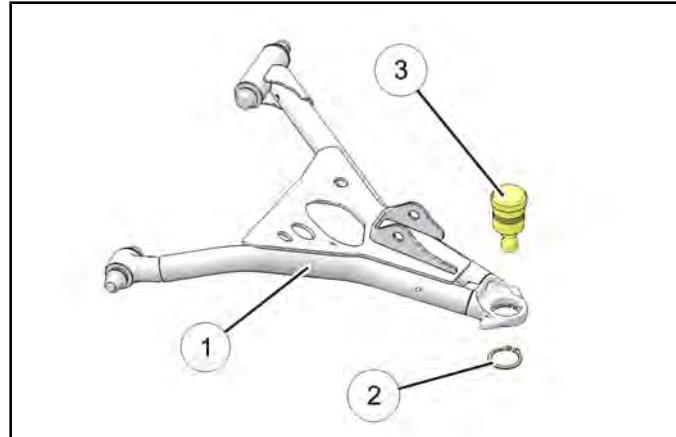
7. Remove and discard the lower ball joint pinch bolt.
8. Remove both A-arm to frame mounting bolts and remove the A-arm from the chassis.
9. Remove the retaining ring ① from the ball joint ②.



10. Place a proper sized driver on the ball joint and place the A-arm in a press.
11. Carefully press the ball joint out of the A-arm and discard the ball joint.

## Ball Joint Installation

1. By hand, install the NEW ball joint into the A-arm.
2. Using a press, carefully drive in the new ball joint into the A-arm.
3. After the new ball joint ③ is fully installed into the A-arm ①, install a new retaining ring ②.



4. Repeat the ball joint service procedure for any additional A-arm ball joint replacements.
5. Insert upper / lower A-arm ball joint end into the bearing carrier. Install new pinch bolts and nuts. Torque to specification.
6. If needed, install new brake caliper mounting bolts and torque to specification.

### CAUTION

New bolts have a pre-applied locking agent which is destroyed upon removal. Always use new brake caliper mounting bolts upon assembly.

7. Install wheel and four wheel nuts. Torque wheel nuts to specification.



Front Ball Joint Pinch Bolts:  
**42 ft-lb (57 Nm)**

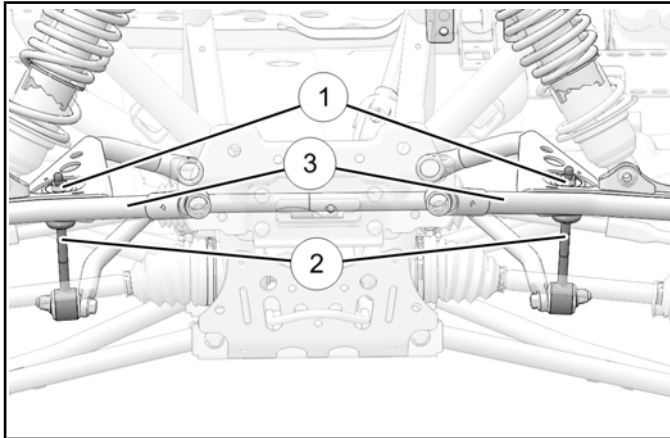
Front Shock Mounting Bolts:  
**42 ft-lb (57 Nm)**

Front Caliper Mounting Bolts:  
**30 ft-lb (42 Nm)**

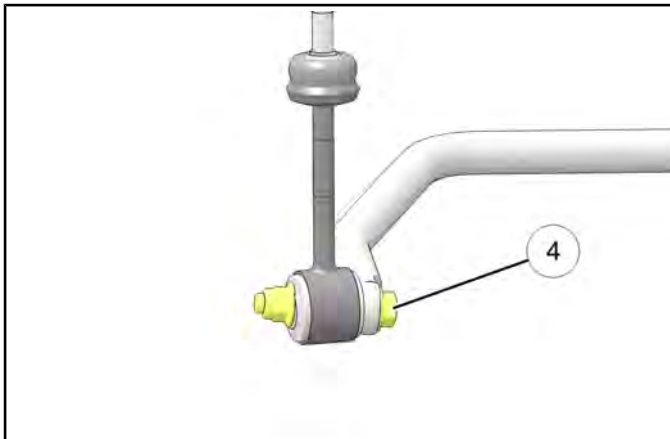
Wheel Nuts (Alum):  
**Aluminum: 120 ft-lbs (163 Nm)**  
**Steel: 60 ft-lb (81 Nm)**

### Front Stabilizer Bar Replacement (50" & XC)

1. Remove the nut ① retaining the front stabilizer bar link ② to the upper control arm ③ on both sides.



2. Remove the Fasteners retaining the stabilizer bar mount to the frame.
3. Remove the stabilizer bar out the side of the vehicle.
4. Remove the fasteners ④ retaining the stabilizer bar link to the stabilizer bar.



5. To install, reverse procedure and torque fasteners to specification



Stabilizer Bar Link Fasteners:  
**40 ft-lb (54 Nm)**

Stabilizer Bar Mount Fasteners:  
**17 ft-lb (23 Nm)**

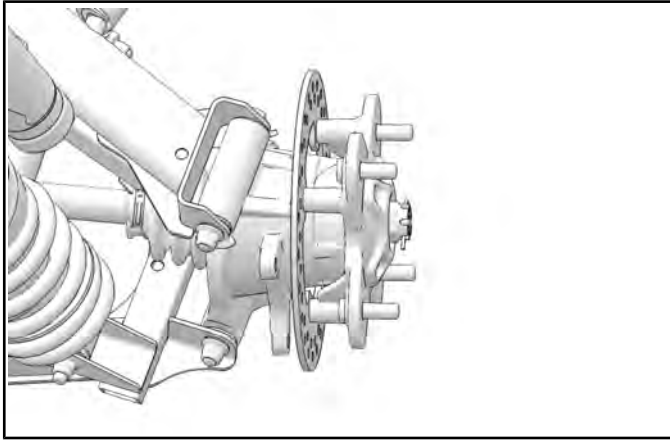


# STEERING / SUSPENSION

## REAR SUSPENSION

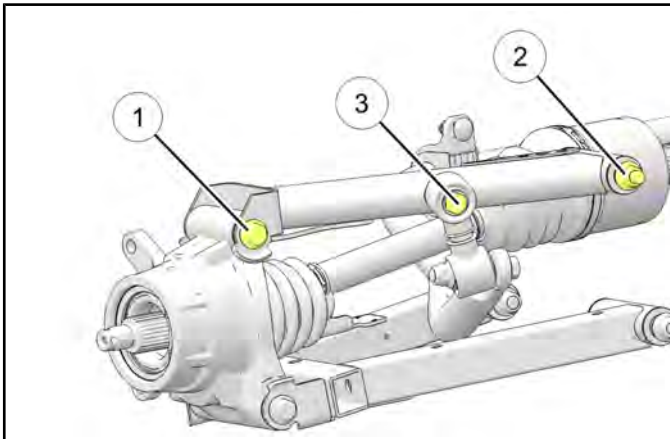
### Rear Control Arm Removal

1. Elevate and safely support the rear of the vehicle off the ground.
2. Remove the wheel nuts, and rear wheel.



### Upper Control Arm Removal

1. (RZR 50" and XC ONLY) Remove the fasteners retaining the stabilizer bar linkage to the upper control arm.
2. Remove the fastener ① attaching the upper A-arm to the bearing carrier.



3. Remove fastener ② retaining the upper A-arm to the frame.
4. Remove fastener ③ retaining the stabilizer bar link to the upper A-arm and remove the upper A-arm from the vehicle.
5. Examine bushings and pivot tubes. Replace if worn. Discard hardware.
6. If not replacing the A-arm, thoroughly clean the a-arm and pivot tubes.

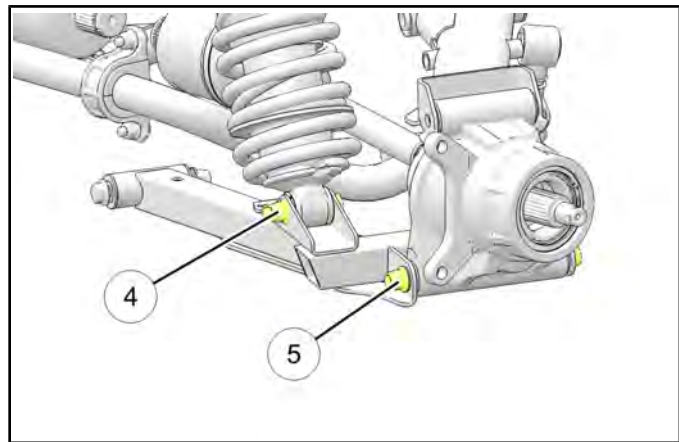
### WARNING

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.

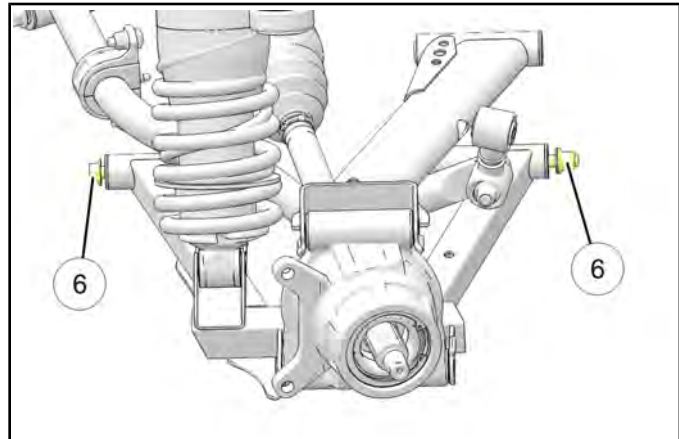
7. Insert new bushings and pivot tubes into new A-arm.

### Lower A-arm Removal

1. (RZR 60" ONLY) While holding the stabilizer bar linkage, remove the lower nut retaining the linkage to the lower A-arm.
2. Remove the fastener ④ retaining the lower portion of the shock to the lower A-arm.



3. Remove the fastener ⑤ retaining the lower A-arm to the bearing carrier.
4. Remove the two fasteners ⑥ retaining the lower A-arm to the frame. Remove the A-arm from the vehicle.



5. Examine bushings and pivot tubes. Replace if worn. Discard hardware.

## STEERING / SUSPENSION

6. If not replacing the A-arm, thoroughly clean the A-arm and pivot tubes.
7. Insert new bushings and pivot tubes into new A-arm.

### Rear Control Arm Installation

1. Install lower control arm assembly onto vehicle frame. Torque new fasteners to specification.
2. Attach lower control arm to bearing carrier. Torque new fastener to specification.
3. (RZR 60" ONLY) Mount stabilizer bar to lower control arm. Torque fasteners to specification.
4. Route brake line on top of the lower control arm.
5. Install upper A-arm assembly onto vehicle frame. Torque new fastener to specification.
6. Install the lower portion of the shock to the lower control arm. Torque shock fastener to specification.
7. (RZR 50" and XC ONLY) Mount stabilizer bar to upper control arm. Torque fasteners to specification.
8. Attach upper A-arm to bearing carrier. Torque new fastener to specification.
9. Install wheel and torque wheel nuts to specification.



**CAUTION**

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



= T

Rear Upper / Lower A-arm Bolts:  
**42 ft-lb (57 Nm)**



= T

Lower Rear Bearing Carrier Bolts:  
**42 ft-lb (57 Nm)**



= T

Stabilizer Linkage Fasteners:  
**40 ft-lbs (54 Nm)**



= T

Shock Mounting Bolts:  
**42 ft-lb (57 Nm)**



= T

Upper Rear Bearing Carrier Bolts:  
**42 ft-lb (57 Nm)**

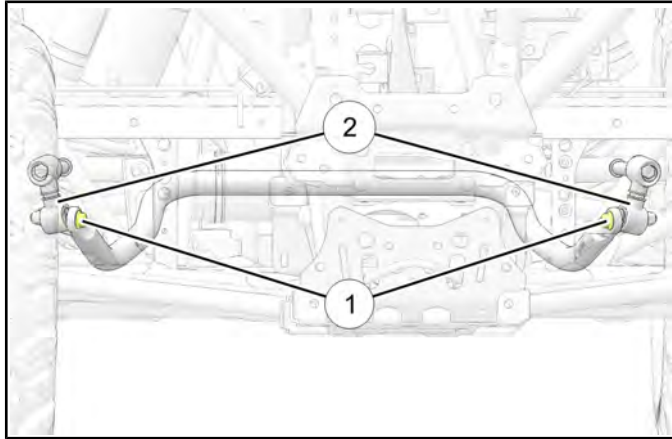
8

# STEERING / SUSPENSION

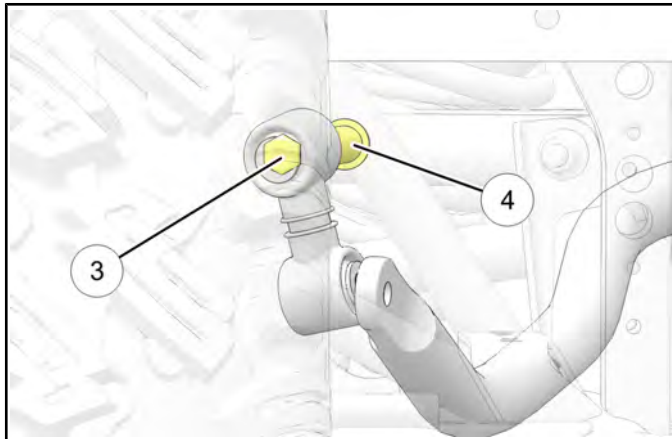
## Rear Stabilizer Bar Replacement

**NOTE:** Although the rear stabilizer bar mounting varies by model, the replacement procedure is the same.


1. Lift and support the rear of the vehicle by the frame.
2. Remove the fasteners retaining the stabilizer bar ① to the linkage ② on both sides of the vehicle.




3. Remove the fasteners ③ retaining the stabilizer bar brackets ④ to the vehicle frame and remove the brackets/bushings.



4. Remove the stabilizer bar from the vehicle.
5. **To Install**, carefully install the stabilizer bar in the vehicle.
6. Fully install the stabilizer bar, bushings, bracket and fasteners. Center stabilizer bar in the frame. Torque mounting fasteners to specification.

 = T
Stabilizer Bar Mounting Bolts: <b>16 ft-lb (22 Nm)</b>

7. Install the stabilizer bar linkage fasteners. Torque fasteners to specification.

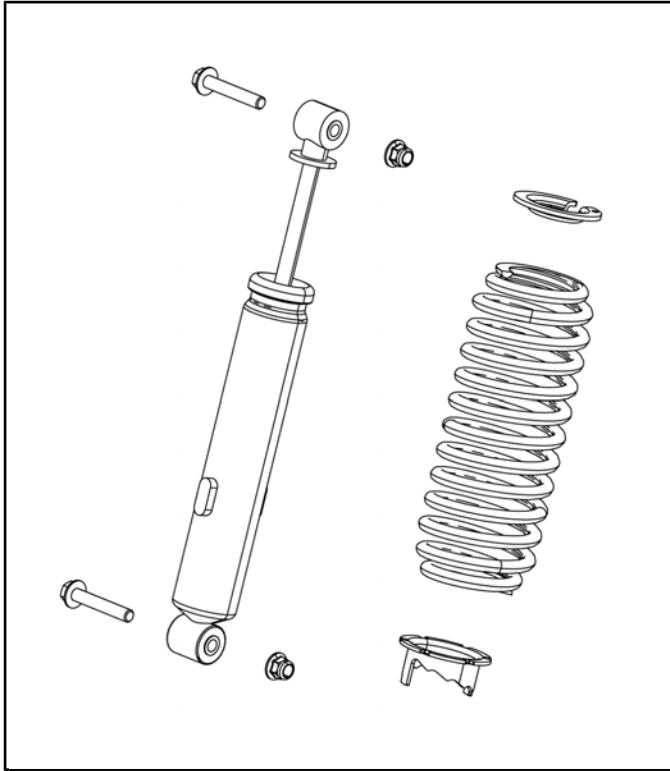
 = T
Stabilizer Bar Linkage Fasteners: <b>40 ft-lbs (54 Nm)</b>

8. Lubricate the stabilizer bar bushings. See Maintenance chapter – Grease Lubrication Points, page 2.8

**SHOCKS / SPRINGS**

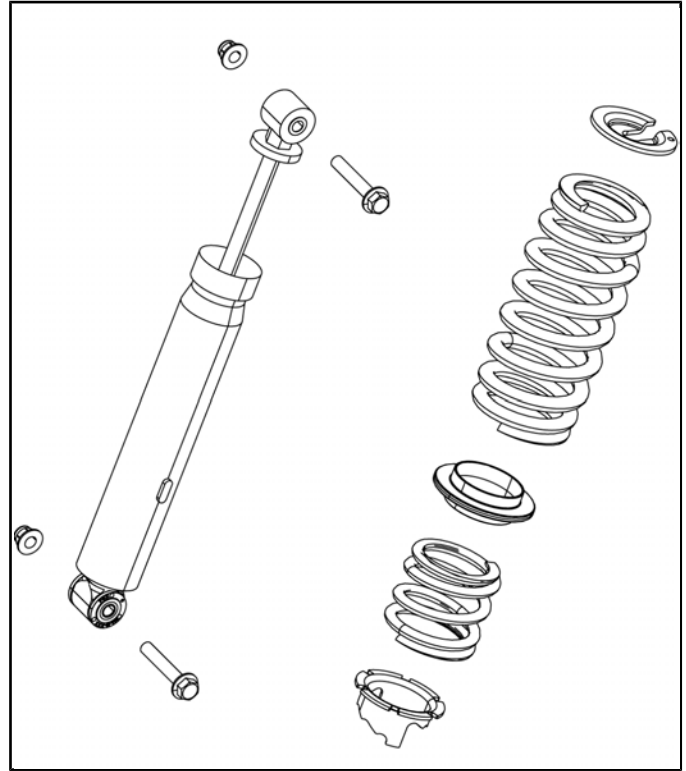
**Front Shock Assembly View**

50" Model

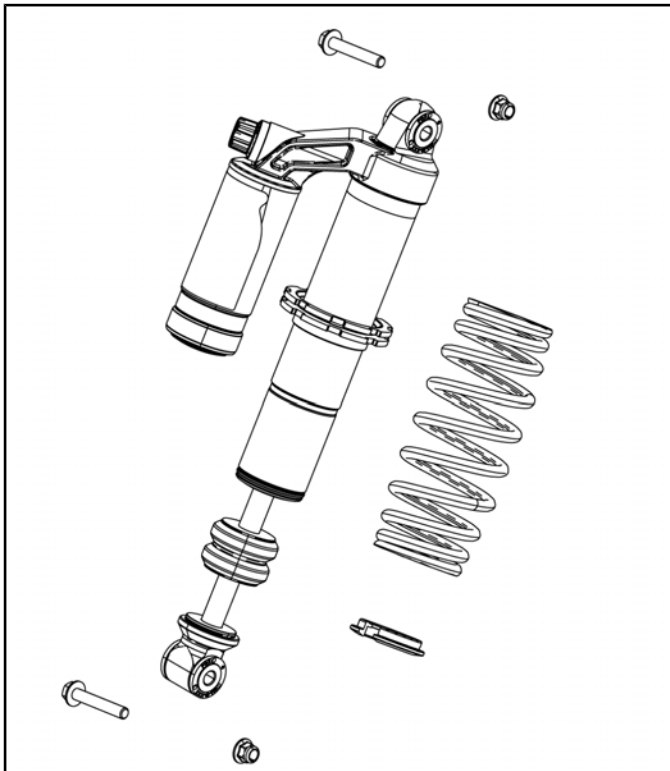


**Rear Shock Assembly View**

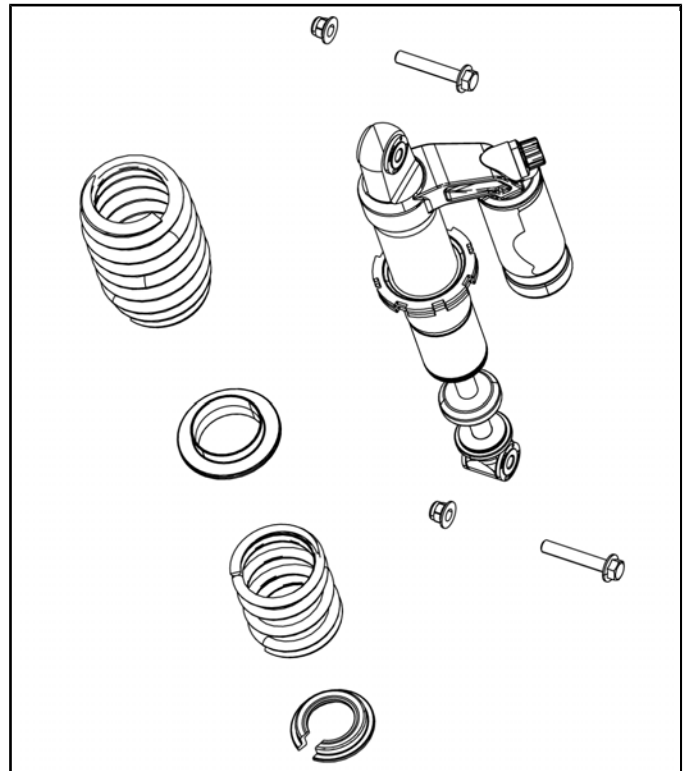
50" Model



XC & 60" Model



XC & 60" Model



## STEERING / SUSPENSION

---

### Shock Removal / Installation

1. Elevate the vehicle off the ground to relieve suspension load.
2. Support the vehicle under the lower control arm.
3. Remove the upper and lower fasteners retaining the shock and remove the shock from the vehicle. Discard nuts and replace with new upon installation.
4. Reverse the procedure to reinstall the shock. Torque new fasteners to specification.



Shock Mounting Fasteners:  
**42 ft-lb (57 Nm)**

### Shock / Spring Replacement

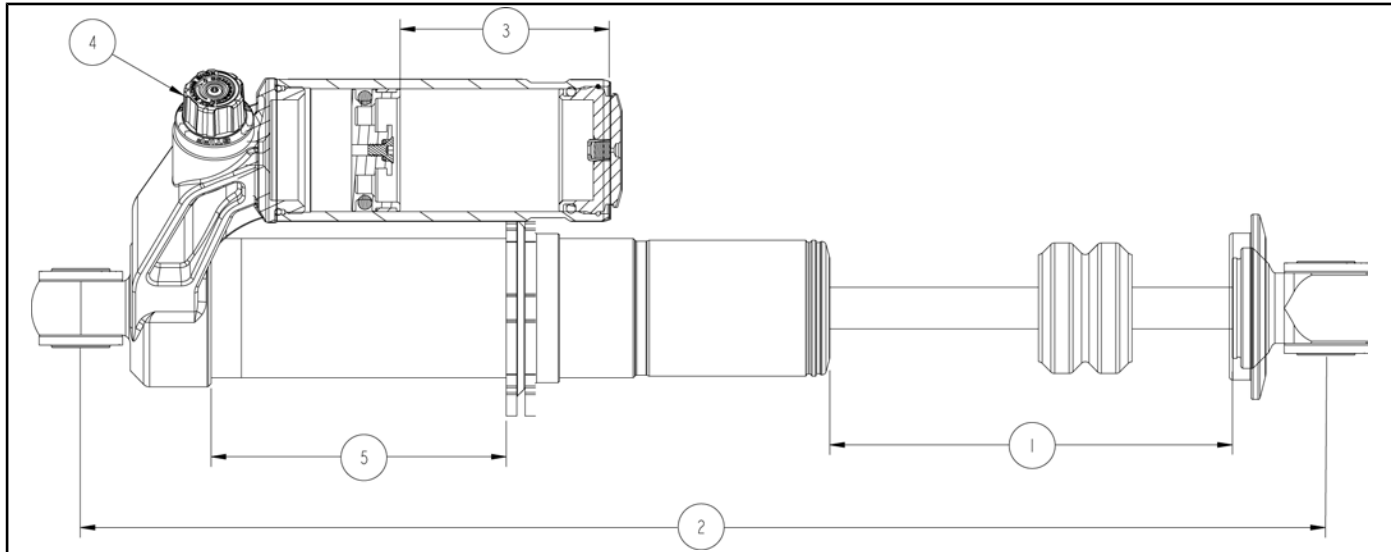
1. Remove the shock and note where the spring adjustment setting is set at.
2. Loosen jam nut (if applicable) and adjustment ring until the spring is loose. If needed, use a spring compressor to compress the spring far enough to remove the spring retainer.
3. Remove the spring and spring retainer from the existing shock and install components onto the new shock.
4. Install the spring(s) and spring retainer

**NOTE: The spring retainer gap should be 180° from the end of the spring upon installation.**

5. Tighten the spring adjustment ring to set the spring height distance as instructed in step 1. (see Shock Specifications (FOX), page 8.25 for factory settings.
6. Reinstall the shock onto the vehicle

## FOX SHOCK SERVICE

### Shock Specifications (FOX)



#### XC model

	FRONT	REAR
Shock Travel ①	6.02" (15.29 cm)	6.42" (16.31 cm)
Extended Length ②	18.62" (47.29 cm)	19.47" (49.45 cm)
IFP Depth ③	3.13" (7.95 cm)	3.13" (7.95 cm)
Nitrogen Pressure	100 PSI 100 PSI (690 kPa)	
Gas Shock Oil	2874124 (qt)	
Compression Adjustment (factory) ④	12 clicks CCW from full stop	
Spring Adjustment Setting (factory) ⑤	4.41" (11.20 cm)	0.56" (1.42 cm)

8

#### XC Front Shock Valving

COMPRESSION	REBOUND
1.600 x .008 DB	1.425 x .008
1.600 x .008	1.425 x .008
1.600 x .008	1.425 x .008
1.600 x .008	0.800 x .006
0.750 x .008	1.425 x .010
1.600 x .012	1.350 x .010
1.425 x .012	1.250 x .010
1.350 x .012	1.100 x .010
1.250 x .012	0.950 x .010
1.100 x .012	1.230 x .082 Top Out
0.950 x .012	0.750 x .100 Back Up
1.570 x .128 Top Out	

#### XC Rear Shock Valving

COMPRESSION	REBOUND
1.600 x .008 DB	1.425 x .008
1.600 x .008	1.425 x .008
1.600 x .008	1.425 x .008
1.600 x .008	0.950 x .006
1.600 x .008	1.425 x .012
1.600 x .008	1.425 x .012
0.900 x .008	1.425 x .012
1.600 x .012	1.425 x .012
1.425 x .012	1.250 x .015
1.350 x .012	1.230 x .082 Top Out
1.250 x .012	0.750 x .100 Back Up
1.100 x .012	
0.900 x .012	
1.570 x .128 Top Out	



## STEERING / SUSPENSION

### 60" (S) model

	FRONT	REAR
Shock Travel <sup>①</sup>	6.72" (17.07 cm)	7.52" (19.10 cm)
Extended Length <sup>②</sup>	22.52" (57.20 cm)	22.47" (57.07 cm)
IFP Depth <sup>③</sup>	3.00" (7.62 cm)	3.20" (8.13 cm)
Nitrogen Pressure	100 PSI (690 kPa)	
Gas Shock Oil	2874124 (qt)	
Compression Adjustment (factory) <sup>④</sup>	12 clicks CCW from full stop	
Spring Adjustment Setting (factory) <sup>⑤</sup>	7.39" (18.77 cm)	2.80" (7.11 cm)

### 60" (S) Front Shock Valving

COMPRESSION	REBOUND
1.600 x .008 DB	1.425 x .008
1.600 x .008	1.425 x .008
1.600 x .008	1.425 x .008
1.600 x .008	0.800 x .006
0.750 x .008	1.425 x .012
1.600 x .012	1.350 x .012
1.600 x .012	1.250 x .012
1.600 x .012	1.100 x .012
1.600 x .012	0.950 x .012
1.600 x .012	1.230 x .082 Top Out
1.600 x .012	0.750 x .100 Back Up
1.100 x .006	
1.570 x .128 Top Out	

### 60" (S) Rear Shock Valving

COMPRESSION	REBOUND
1.600 x .006 DB	1.425 x .010
1.600 x .010	1.425 x .010
1.600 x .010	1.425 x .008
1.600 x .010	0.950 x .006
1.050 x .006	1.425 x .020
1.600 x .015	1.425 x .020
1.600 x .015	1.425 x .020
1.425 x .015	1.425 x .020
1.425 x .015	1.250 x .015
1.350 x .015	1.230 x .082 Top Out
1.350 x .015	
1.250 x .015	
1.250 x .015	
1.100 x .015	
1.570 x .128 Top Out	

### FOX Shock Disassembly

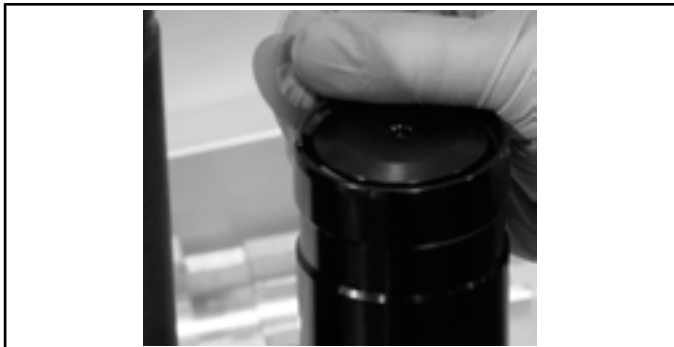
1. Clamp the shock body cap securely in clamp blocks, shaft side up. Be sure to use SOFT JAWS to prevent damage to the shock body cap. (Alternately, a clean towel can be used in the vice jaws to protect the body cap.)



2. Discharge nitrogen pressure from reservoir chamber.



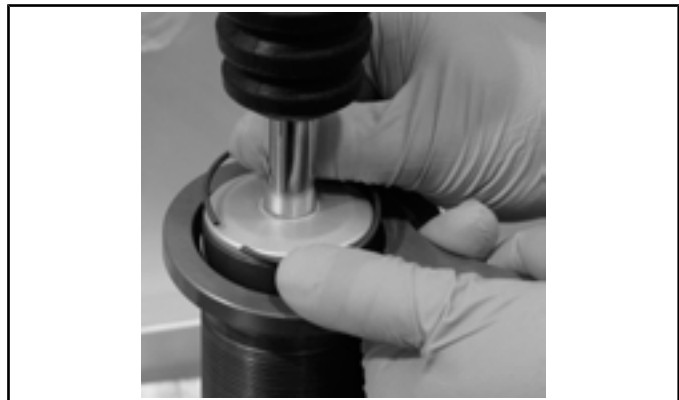
3. Once nitrogen pressure has been released, depress reservoir cap and remove retaining ring. Typically a valve shim can be used.



4. Remove the end cap using the appropriate extractor tool.



5. Place the bearing cap removal tool around the body and install retaining ring.



6. Tap bearing cap removal tool up with dead blow hammer.



## STEERING / SUSPENSION

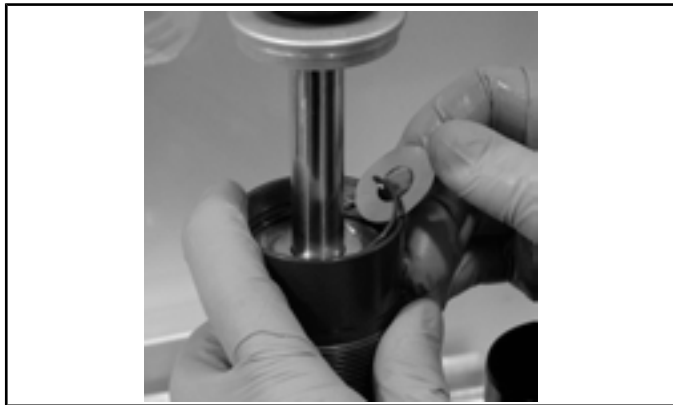
7. Remove the bearing cap removal tool and retaining ring.



8. Press the bearing assembly down with your fingers. At the same time push the IFP tool upwards with your thumbs.



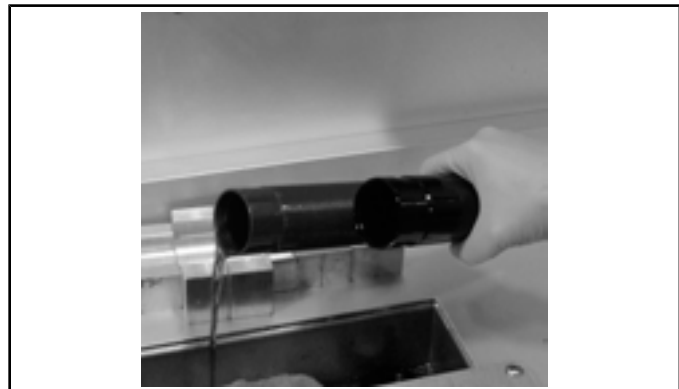
9. Remove retaining ring with a valve shim.



10. Remove shock shaft assembly by pushing down on the IFP removal tool while pulling up on shock shaft assembly.



11. Dump out used oil.

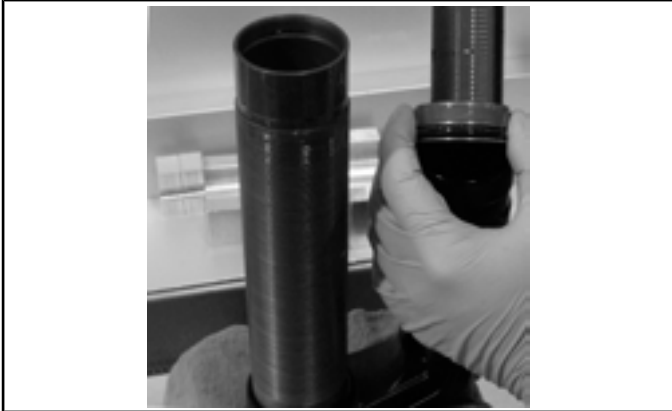


12. Using a 9/16" open end wrench and a 1/8" Hex Tee handle wrench, remove the bleed screw.

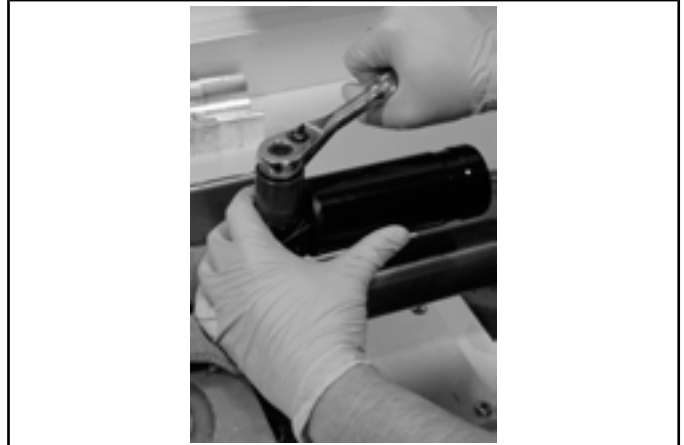


## STEERING / SUSPENSION

13. Remove the IFP and dump out remaining oil.



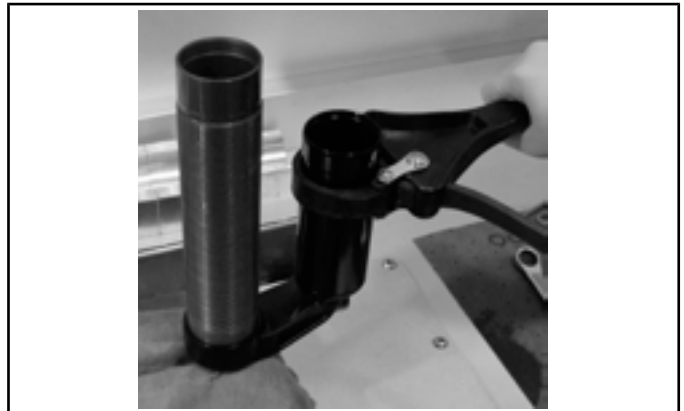
16. Remove the DSC using a DSC removal socket.



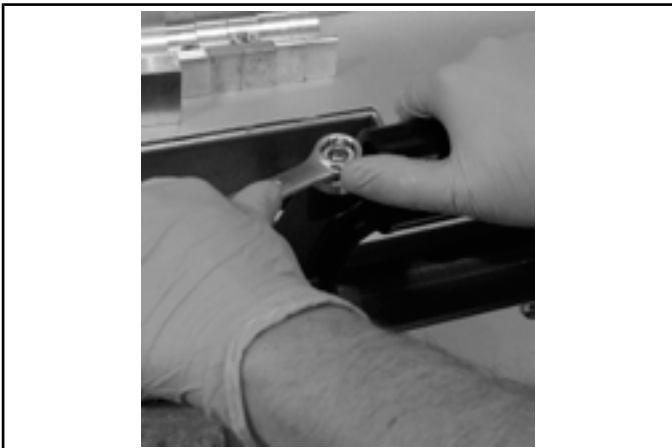
14. LSC equipped shocks will require the cap to be removed with a torx bit driver.



17. Remove the reservoir with a rubber belted strap wrench.



15. Remove the LSC using a 5/8" wrench.



18. Before putting the body into the clamp blocks, partially insert an old or used bearing assembly in the body ( This will prevent over tightening and deforming the body).



8

## STEERING / SUSPENSION

19. To assist in breaking the bond with the Loctite® adhesive, apply heat to the body cap.



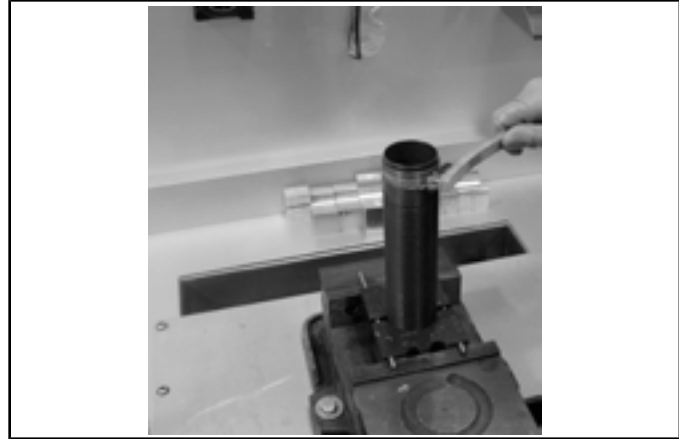
20. Use torque cap socket or adjustable wrench to remove body cap.



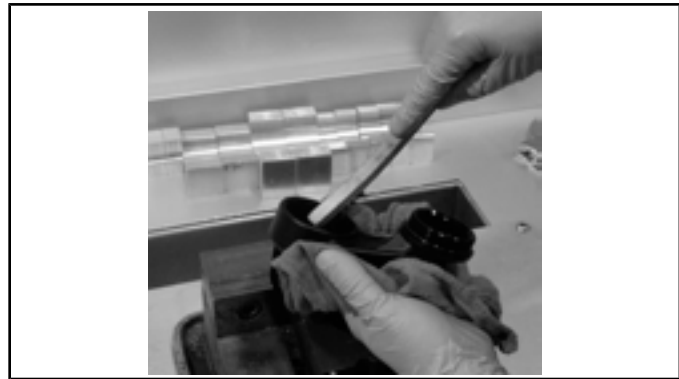
 **CAUTION**

Body Cap will be hot.

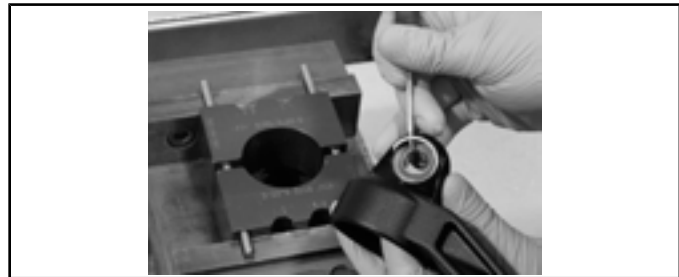
21. Discard all O-rings and clean Loctite® residue completely out of threads of the body.



22. Clean body cap using a wire brush and pick.



23. Remove both retaining rings in the body cap using a sharp pick.

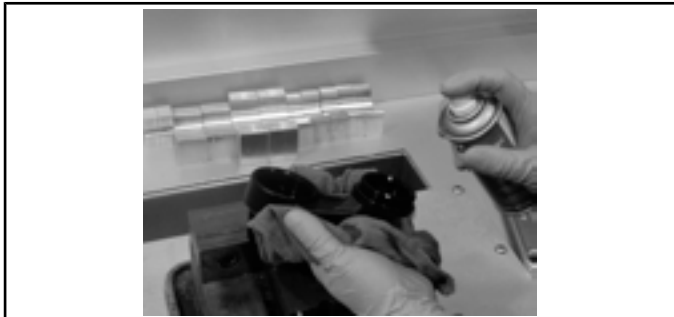


## STEERING / SUSPENSION

24. Press the bearing out of the body cap using (803-00-569) Bearing press set or assorted sockets.



25. Prep the threads on the body cap with Loctite® primer 7649 and set aside.



26. Place shock shaft assembly in clamp blocks and remove nut from non-BOC equipped shaft assembly.



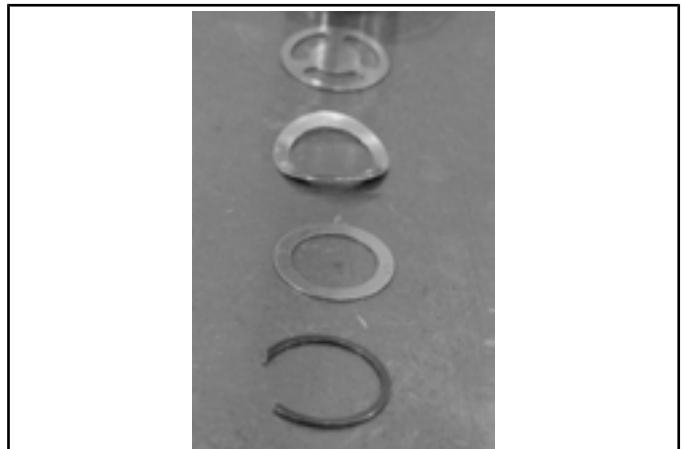
27. For Bottom Out Cup equipped shocks, remove the retaining ring from the Bottom Out Post



28. Remove retaining ring on BOC post assembly with valve.



(Valving laid out in order removed from post.)





## STEERING / SUSPENSION

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29. Remove BOC post.



30. Remove rebound valve stack.



**NOTE:** If you are not changing valve shims you can zip tie the shims together, this will keep valve shim stack in their assembled order.

31. Note the side of the piston as it comes off the shock shaft. Compression side down.

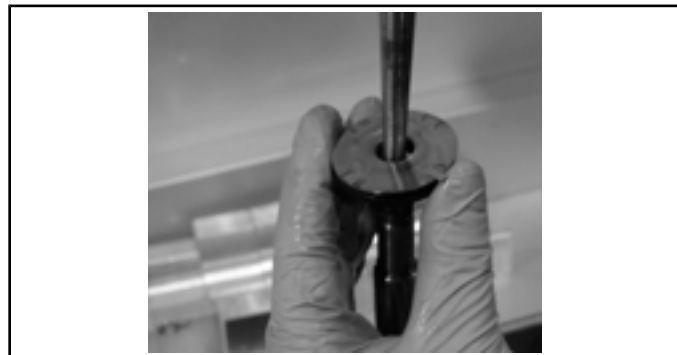


32. Remove the piston bearing if it shows any signs of damage or wear.

33. Remove piston O-ring.



34. Take note if you have a bleed shim when removing compression valve stack .

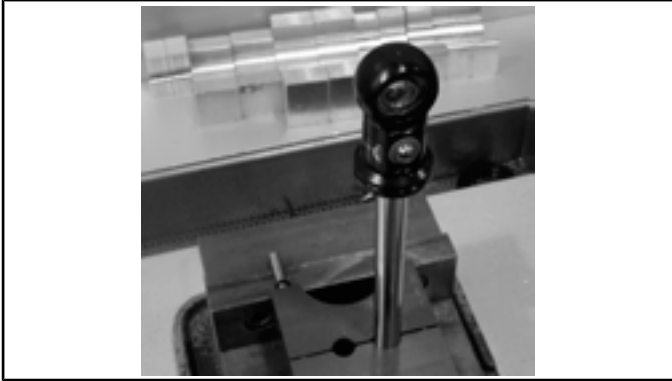


35. Remove bearing assembly and bearing cap.



## STEERING / SUSPENSION

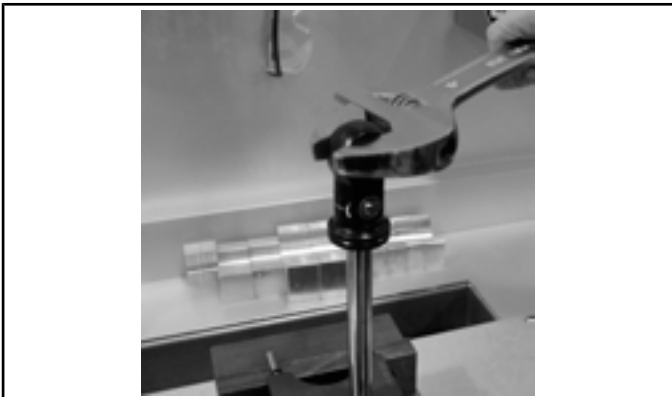
36. Place shock shaft in clamp blocks (803-00-892).



37. Apply heat with a propane torch to the bottom of shock eyelet.



38. Remove eyelet using an adjustable wrench or Body Cap socket (398-00-626).



 **CAUTION**

Eyelet will be Hot.

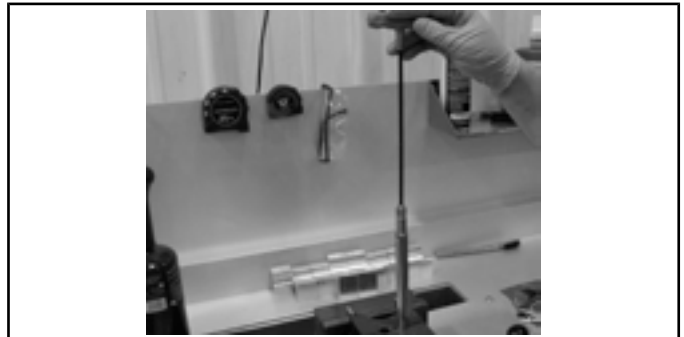
39. Clean Loctite® residue out from threads of the eyelet.



40. Remove Loctite® residue from shock shaft.



41. Remove Jet/Check Valve with Hex T-handle wrench.



8

## STEERING / SUSPENSION

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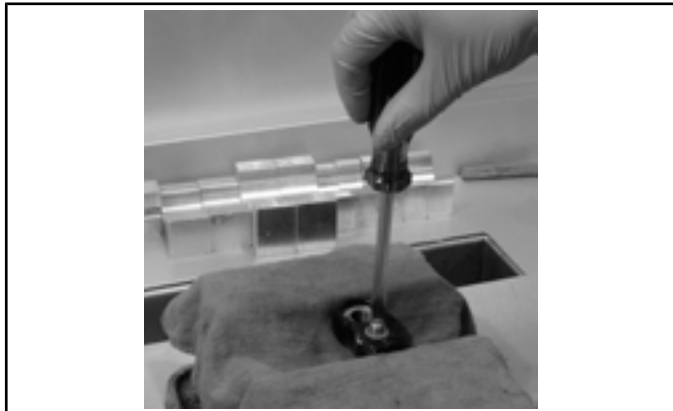
42. Push needle out of shock shaft using a metering rod and Hex T-handle wrench.



43. Remove O-ring from needle.



44. Back out rebound adjuster with flat head screw driver.



45. Keep a magnet close to catch ball and spring when the round adjuster is almost out.



46. Remove dust boot.



47. Remove both retaining rings from the eyelet and press out bearing.



## STEERING / SUSPENSION

For DX bushing and seal style eyelet, follow the removal procedures below.

1. Remove both dust seals from the eyelet.

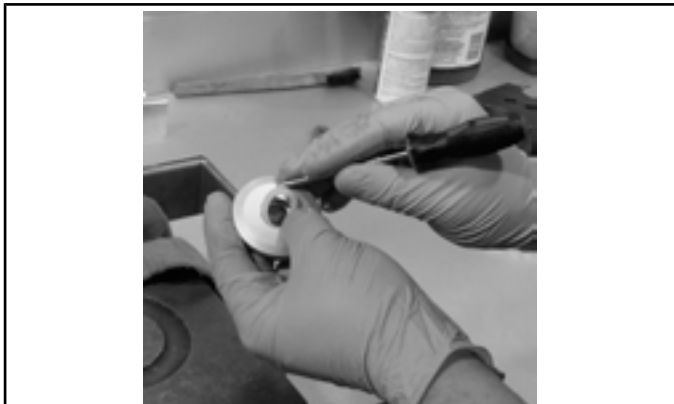


2. Press out DX bushing using DX Bushing Press Kit (803-00-935).



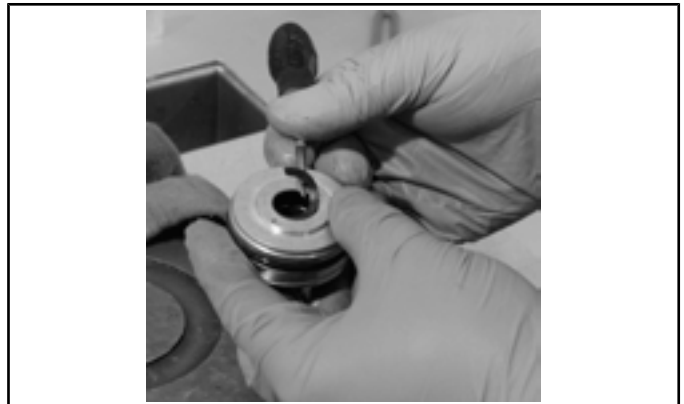
**NOTE: DX Bushing style eyelets have larger bore diameters than conventional eyelets.**

3. Remove dust seal from bearing cap.

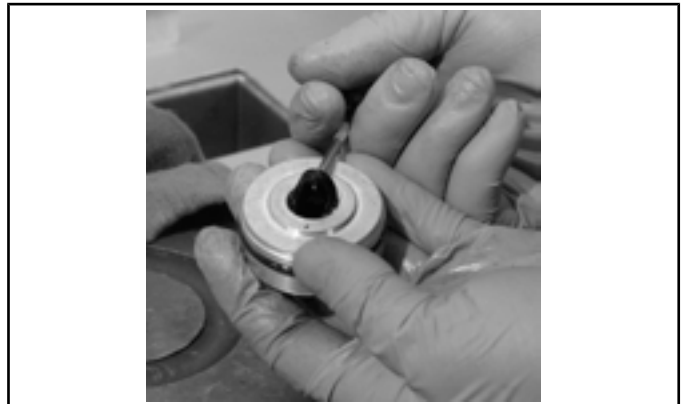


**NOTE: On some models the seal may be in the bearing assembly.**

4. Remove low friction seal pack from bearing assembly.



5. Remove U-Cup seal from bearing assembly. Note the direction seal was installed.



6. Remove external O-ring from bearing assembly.



**NOTE: If internal bearing is damaged, replace with complete bearing assembly.**

## STEERING / SUSPENSION

### FOX Shock Assembly

1. Install one retaining ring in the eyelet.



2. Press bearing into the eyelet using Bearing Press (803-00-569).



3. Install second retaining ring.



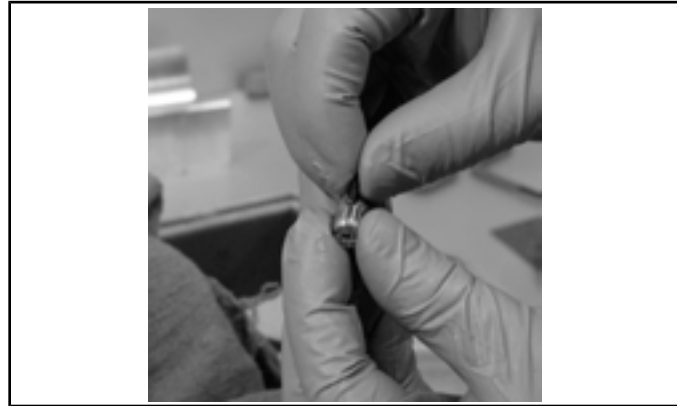
4. Install Dust Plug.



5. Apply shock oil to rebound adjuster.



6. Insert spring.



7. Put the steel ball on the spring with a dab of shock oil.



## STEERING / SUSPENSION

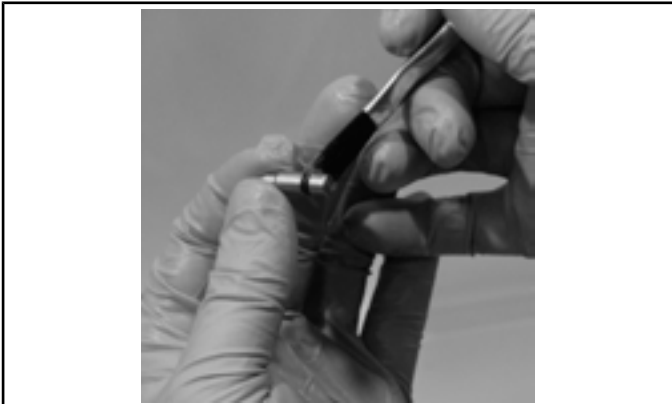
8. Install rebound knob into eyelet, holding steel ball in place with fingers.



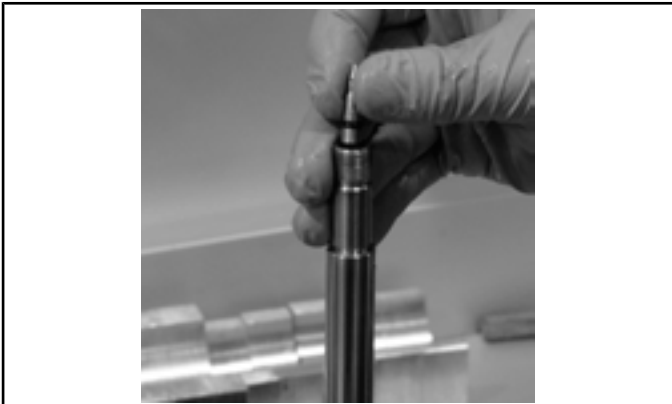
9. Ensure rebound knob threads into eyelet correctly, and you can feel the detents click.

**NOTE: Adjust rebound knob to allow metering rod to obtain maximum travel in eyelet.**

10. Install new O-ring on needle and apply thin layer of Slick Honey.



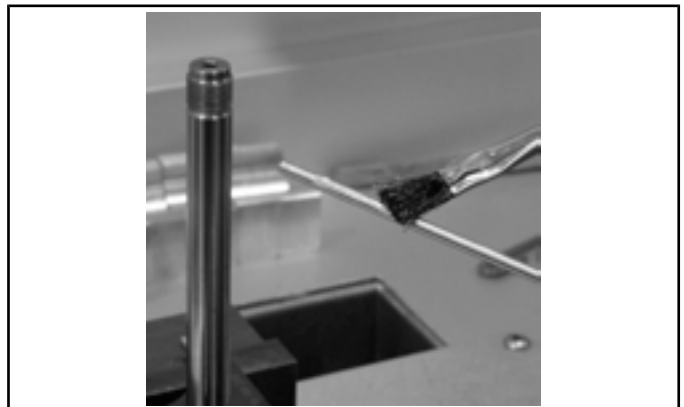
11. Place shock shaft in clamp blocks and insert needle into shock shaft.



12. Thread in the damping jet and torque to specification.



13. Reverse shock shaft in clamp blocks and apply a thin layer of Slick Honey to metering rod.



14. Apply specified Loctite® two threads down and two threads wide 360° around shock shaft threads.





## STEERING / SUSPENSION

15. Place shaft back in clamp blocks, apply loctite® primer to eyelet, and Torque eyelet to shock shaft. See specifications.

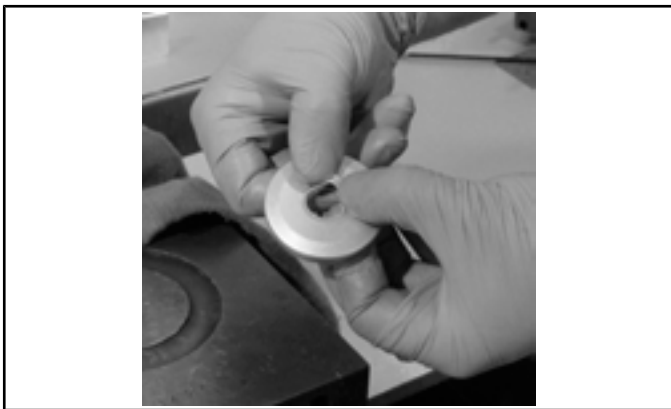


16. Reverse shock shaft in clamp blocks and install air side shaft spacers (if equipped) and jounce bumper.

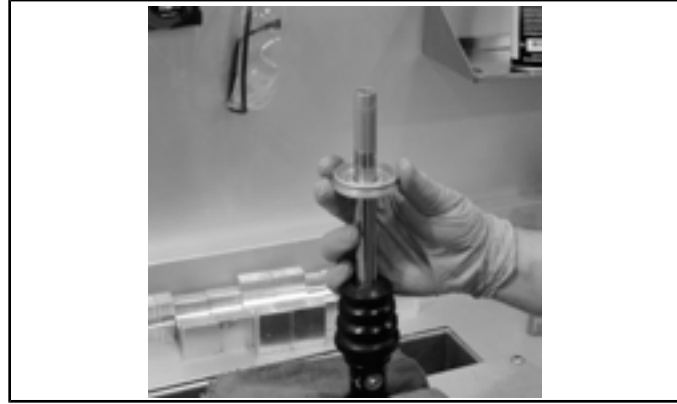


17. Install wiper seal in body cap (if equipped).

18. Apply thin layer of shock oil to seal.

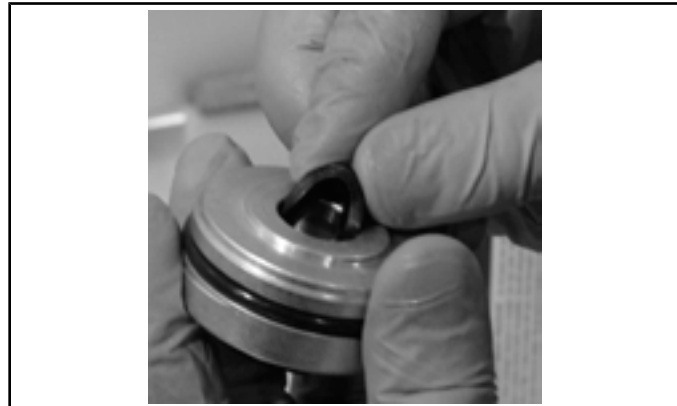


19. Install body cap.

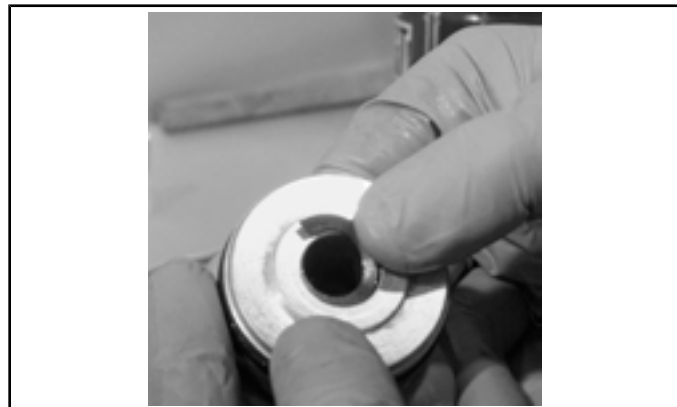


There are two different sides on the U-Cup seal. When seal is installed, energizing side should be facing internal bearing.

20. Install U-Cup seal.



21. Install back-up washer.



## STEERING / SUSPENSION

22. Apply thin layer of shock oil to washer.



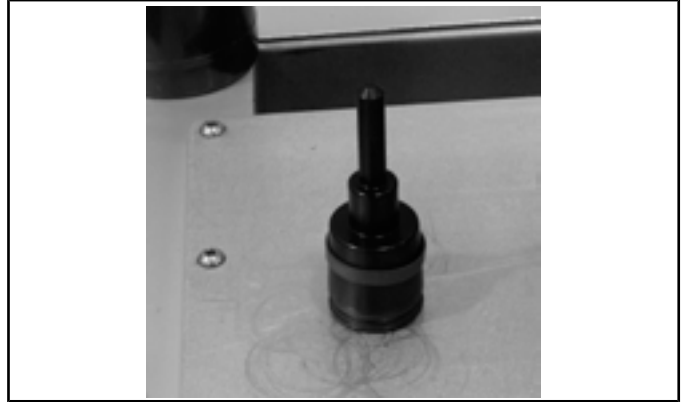
23. Install bearing assembly using the appropriate bullet tool.



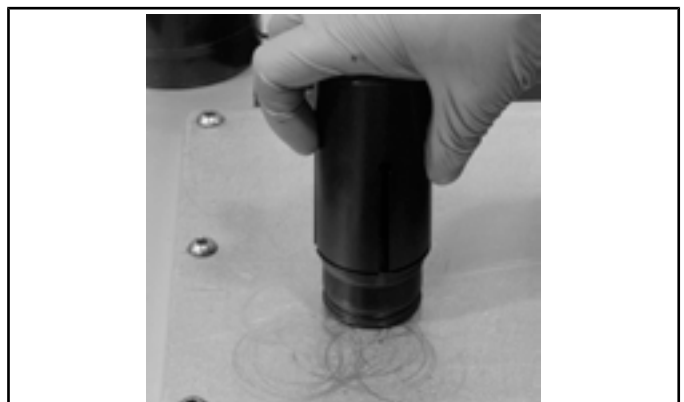
24. Install piston O-ring if applicable.



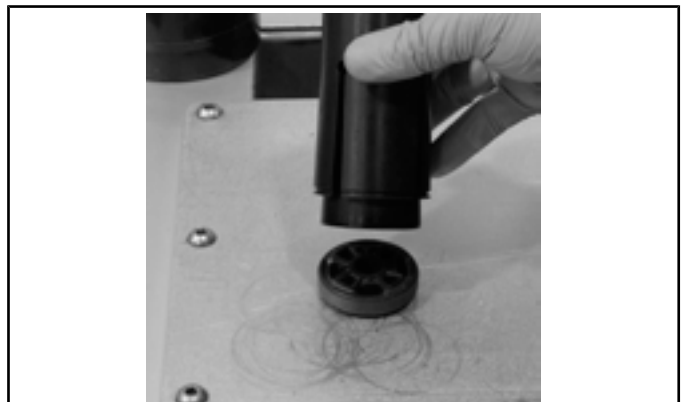
25. Install piston bearing on installation tool (803-00-187).



26. Place installation tool assembly on top of the piston and push down to install bearing.



**NOTE:** Bearing will be fully seated around piston when done correctly.



8

## STEERING / SUSPENSION

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27. Install compression side valve stack.



**NOTE:** When installing bleed shim, ensure the tab is lined up with compression port.

28. Install rebound valve stack with required top out washer.



29. Apply a thin layer of float fluid to the threads, nut, or BOC post and torque to 22 ft-lbs (30 Nm).

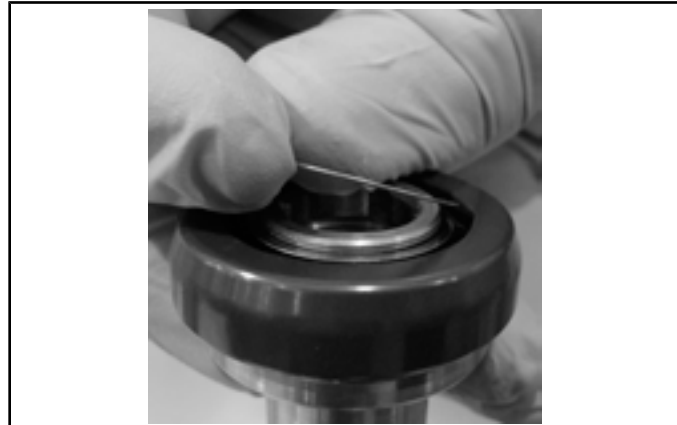


30. Install BOC post valving.



**NOTE:** Ensure retaining ring is fully installed and secure.

31. Install BOC piston and retaining ring.



32. Apply Loctite® primer to the body cap threads.



## STEERING / SUSPENSION

33. Install appropriate O-ring and apply a thin layer of shock oil to the O-ring ONLY.



34. Install Bottom Out Cup into the body cap prior to installing body (if equipped).



35. Apply Loctite® 638 to body two threads down and two threads wide 360° around body.



36. Place body in clamp blocks and torque body cap to 100 ft-lbs (136 Nm) using body cap socket.



37. Place body in block clamps parallel to the ground.



38. Replace both O-rings on DSC or LSC.



39. Torque DSC to 35 ft-lbs (47 Nm) or LSC to 12 ft-lbs (16 Nm).



40. Apply Loctite® to LSC screw (if equipped).



## STEERING / SUSPENSION

41. Install LSC knob and torque screw to specification.



42. Install reservoir O-ring.



43. Apply thin layer of shock oil to O-ring.



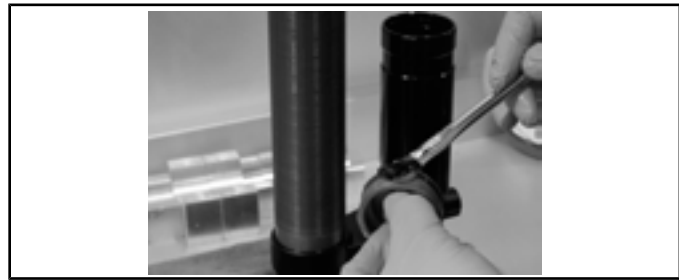
44. Thread down reservoir with strap wrench and torque to specification.



45. Ensure LSC or DSC high and low speed adjusters are fully open before filling reservoir with oil.



46. Install IFP bearing and O-ring on the IFP and apply a thin layer of shock oil to bearing and O-ring.

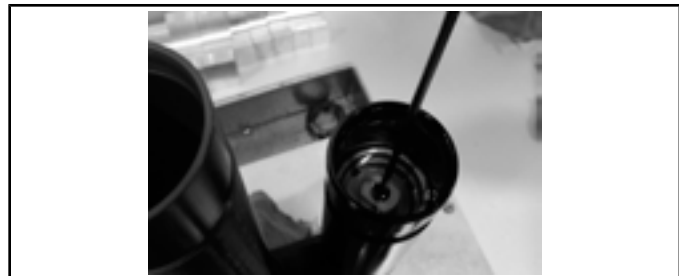


47. Install IFP assembly without bleed screw using the IFP installation tool.

**NOTE: Push IFP into reservoir about 1.500" with hand on top of tool. If you do not place hand on top of tool, you will be wearing oil.**



48. Ensure oil is 0.250" above IFP and install bleed screw with O-ring.



## STEERING / SUSPENSION

49. Fill body with oil about 0.750" from top, or about 1.250" from top on cup shocks.



50. Quickly pass a propane torch over oil to eliminate any micro air bubbles.



51. Install the shock shaft assembly so the piston assembly is just below the retaining ring groove in the body.



52. Slowly compress the bearing assembly to release any air that may be trapped below the bearing assembly.



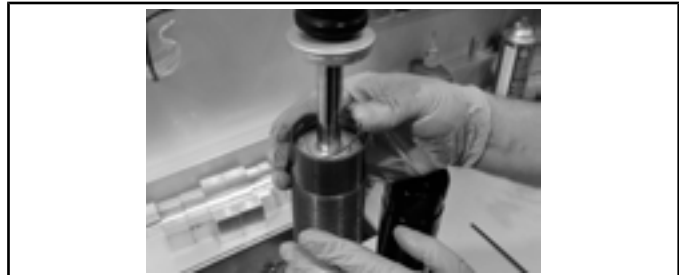
53. Apply a thin layer of shock oil to the bearing assembly's external O-ring.



54. Push bearing assembly in with your finger tips.



55. Install retaining ring.



56. Use IFP tool to push down on IFP and fully extend the shock shaft assembly.





## STEERING / SUSPENSION

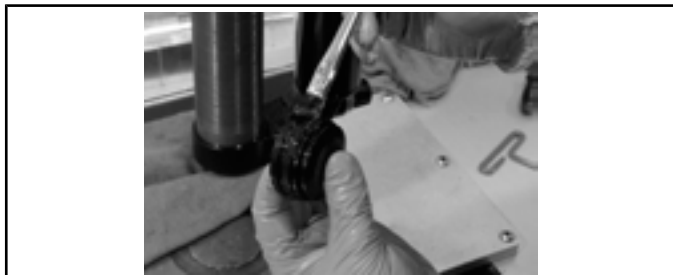
57. Remove bleed screw and set IFP to the appropriate height.



58. While holding the IFP, install bleed screw with O-ring using a 9/16" open end wrench.



59. Install reservoir cap O-ring on cap and apply a thin layer of shock oil to side and O-ring.



60. Install reservoir cap and retaining ring.



61. With shock shaft fully extended, charge reservoir to the appropriate nitrogen pressure.

100 PSI (690 kPa)



62. Ensure rebound and compression adjuster are fully functioning by hand actuating the shock absorber.



**NOTE: Check for any leaks or faults in the shock absorber's functionality.**

63. Tap body cap into position.



# CHAPTER 9 BRAKE SYSTEM

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# BRAKE SYSTEM

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# BRAKE SYSTEM

## GENERAL INFORMATION

## SPECIAL TOOLS

PART NUMBER	TOOL DESCRIPTION
2870975	Mity Vac™ Pressure Test Tool

**Bosch Automotive Service Solutions:**  
1-800-345-2233 or <http://polaris.service-solutions.com/>

## TORQUE SPECIFICATIONS

ITEM	TORQUE
Caliper Mounting Bolts (Front)	30 ft-lb (42 Nm)
Caliper Mounting Bolts (Rear)	46 ft-lb (62 Nm)
Brake Line Flare	15 ft-lb (20 Nm)
Brake Line Banjo Bolts	15 ft-lb (20 Nm)
Brake Switch	15 ft-lb (20 Nm)
Brake Bleeder Screw	48 in-lb (5 Nm)
Brake Disc to Hub Bolts	18 ft-lb (24 Nm)
Master Cylinder Mounting Bolts	23 ft-lbs (31 Nm)
Brake Pedal Mounting Bracket to Frame	18 ft-lb (24 Nm)
Park Brake Disc Mounting Bolt	14 ft-lb (20 Nm)
Park Brake Lever Mount Bolts	16 ft-lb (22 Nm)
Park Brake Caliper Assembly Bolts	37 ft-lb (50 Nm)
Wheel Hub Castle Nuts	110 ft-lbs (149 Nm)
Wheel Lug Nuts	Aluminum: 120 ft-lbs (163 Nm) Steel: 60 ft-lb (81 Nm)

## GENERAL SPECIFICATIONS

FRONT BRAKE SYSTEM		
Item	Standard	Service Limit
Front Brake Pad Thickness	0.297 ± .007" (7.54 ± .178 mm)	.180" (4.6 mm)
Front Brake Disc Thickness	0.188" (4.78 mm)	.170" (4.32 mm)
Front Brake Disc Runout	-	.010" (.254 mm)

REAR BRAKE SYSTEM		
Item	Standard	Service Limit
Rear Brake Pad Thickness	.298 ± .007" (7.57 ± .178 mm)	.180" (4.6 mm)
Rear Brake Disc Thickness	.188" (4.78 mm)	.170" (4.32 mm)
Rear Brake Disc Runout	-	.010" (.254 mm)

PARK BRAKE SYSTEM (INT'L MODEL)		
Item	Standard	Service Limit
Park Brake Pad Thickness	Inboard - 0.300" (7.62 mm)	0.240" (6.10 mm)
	Outboard - 0.250" (6.35 mm)	0.190" (4.83 mm)
Park Brake Disc Thickness	0.175" - 0.185" (4.44 - 4.70 mm)	0.150" (3.81 mm)

9

# BRAKE SYSTEM

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## BRAKE SYSTEM SERVICE NOTES

Disc brake systems are light weight, low maintenance, and perform well in the conditions this vehicle will routinely encounter. There are a few things to remember when replacing disc brake pads or performing brake system service to ensure proper system function and maximum pad service life.

- DO NOT over-fill the master cylinder fluid reservoir.
- Make sure the brake pedal returns freely and completely.
- Adjust stop pin on brake caliper(s) after pad service.
- Check and adjust master cylinder reservoir fluid level after pad service.
- Make sure atmospheric vent on reservoir is unobstructed.
- Test for brake drag after any brake system service and investigate cause if brake drag is evident.
- Make sure caliper moves freely on guide pins (where applicable).
- Inspect caliper piston seals for foreign material that could prevent caliper pistons from returning freely.
- Perform a brake burnishing procedure after installing new pads to maximize service life.
- DO NOT lubricate or clean the brake components with aerosol or petroleum products. Use only approved brake cleaning products.

## HYDRAULIC BRAKE SYSTEM OPERATION

The Polaris brake system consists of the following components or assemblies: brake pedal, master cylinder, hydraulic brake lines, brake calipers, brake pads, and brake discs, which are secured to the drive line.

When the foot activated brake lever is applied it applies pressure on the piston within the master cylinder. As the master cylinder piston moves inward it closes a small opening (compensating port) within the cylinder and starts to build pressure within the brake system. As the pressure within the system is increased, the pistons located in the brake calipers move outward and apply pressure to the moveable brake pads. These pads contact the brake discs and move the calipers in their floating bracket, pulling the stationary side pads into the brake discs. The resulting friction reduces brake disc and vehicle speed.

The friction applied to the brake pads will cause the pads to wear. As these pads wear, the piston within the caliper moves further outward and becomes self adjusting. Fluid from the reservoir fills the additional area created when the caliper piston moves outward.

Brake fluid level is critical to proper system operation. Too little fluid will allow air to enter the system and cause the brakes to feel spongy. Too much fluid could cause brakes to drag due to fluid expansion.

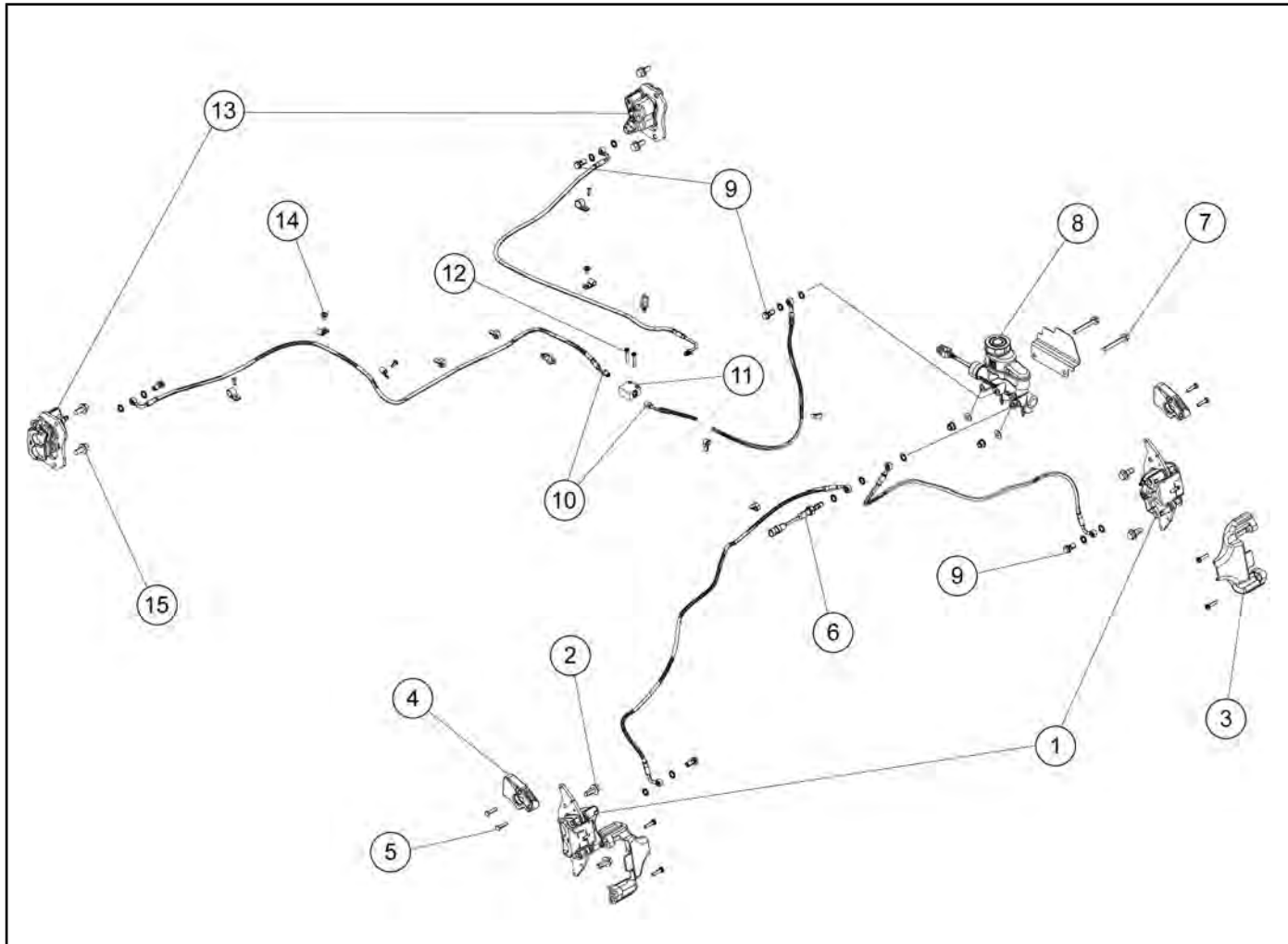
Located within the master cylinder is the compensating port which is opened and closed by the master cylinder piston assembly. As the temperature within the hydraulic system changes, this port compensates for fluid expansion or contraction. Due to the high temperatures created within the system during heavy braking, it is very important that the master cylinder reservoir have adequate space to allow for fluid expansion. **Never overfill the reservoir! Do not fill the reservoir beyond the MAX LEVEL line!**

When servicing Polaris brake systems use only **Polaris DOT 4 Brake Fluid (PN 2872189)**.

**WARNING: Once a bottle is opened, use what is necessary and discard the rest in accordance with local laws. Do not store or use a partial bottle of brake fluid. Brake fluid is hygroscopic, meaning it rapidly absorbs moisture. This causes the boiling temperature of the brake fluid to drop, which can lead to early brake fade and the possibility of serious injury.**

## BRAKE SYSTEM ASSEMBLY VIEW

RZR 900



① Front Caliper	⑨ Banjo Bolt <b>15 ft-lb (20 Nm)</b>
② Front Caliper Bolts <b>30 ft-lb (42 Nm)</b>	⑩ Brake Fittings <b>15 ft-lb (20 Nm)</b>
③ Caliper Mount / CV Shield	⑪ Junction Block
④ Brake Disc Scraper	⑫ Junction Block Bolts <b>35 in-lb (4 Nm)</b>
⑤ Scraper Bolts <b>7 ft-lb (11 Nm)</b>	⑬ Rear Caliper
⑥ Brake Switch <b>15 ft-lb (20 Nm)</b>	⑭ Brake Line Retainers <b>35 in-lb (4 Nm)</b>
⑦ Master Cylinder Mounting Fasteners <b>23 ft-lbs (31 Nm)</b>	⑮ Rear Caliper Bolts <b>46 ft-lb (62 Nm)</b>
⑧ Master Cylinder	

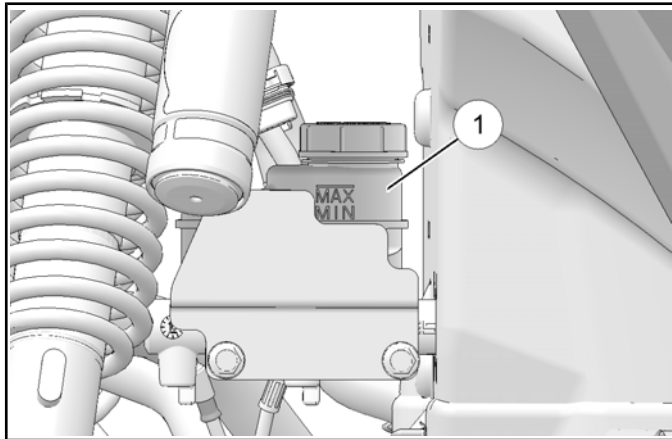


# BRAKE SYSTEM

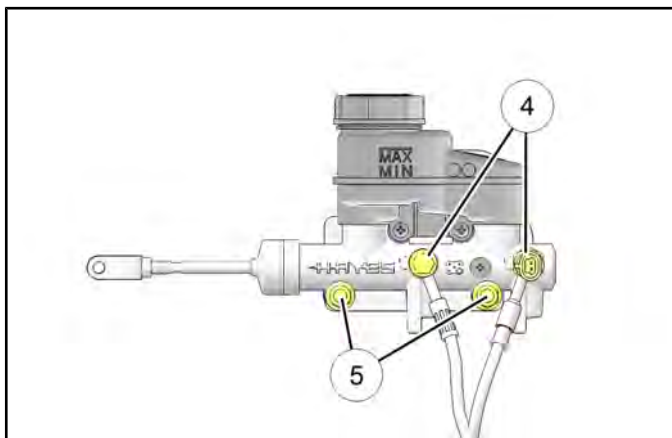
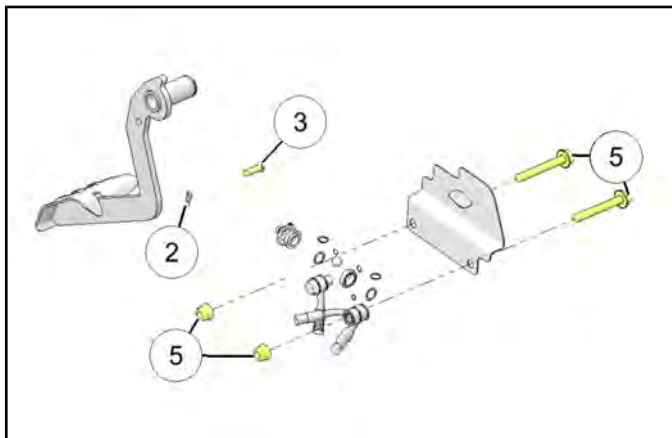
## MASTER CYLINDER

### Master Cylinder Removal

1. Locate the master cylinder ① above the left front tire in the wheel well area.



2. Remove the clip ② from the clevis pin ③ that attaches the master cylinder to the brake pedal lever.



3. Place a container to catch brake fluid under the master cylinder brake line banjo bolts ④.

### CAUTION

Brake fluid will damage finished surfaces.  
Do not allow brake fluid to come in contact  
with finished surfaces.

**NOTE:** Make note of front and rear brake line locations to master cylinder.

4. Loosen the brake line banjo bolts and allow fluid to drain.

**NOTE:** Dispose of fluid properly. Do not re-use.

5. Remove the two mounting fasteners ⑤ that secure the master cylinder to the frame.

### Master Cylinder Installation

1. Reverse Steps 1-5 for master cylinder installation.



Banjo Bolts  
15 ft-lb (20 Nm)

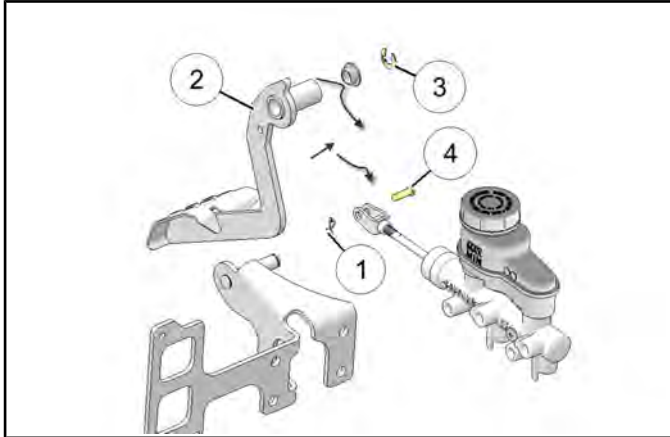
Master Cylinder Mounting Fasteners  
23 ft-lbs (31 Nm)

2. After installing the foot brake check pedal free-play. Pedal free-play should not exceed .090" (2.286 mm).

## BRAKE PEDAL

### Brake Pedal Lever Removal

1. Locate the brake pedal lever ② and remove the clip ① and master cylinder clevis pin ④.
2. Remove the E-clip ③ from the pedal mount and remove the brake pedal lever from the vehicle.



### Brake Pedal Installation

Reverse the "Removal" steps to install brake pedal lever. Excessive free-play may be caused by loose brake pedal bushings, worn master cylinder or low brake fluid level in the master cylinder. To measure the brake pedal free-play, measure the distance from the back of the brake pedal to the floor behind the brake pedal. Then, push on the brake pedal until the free-play is gone and measure the distance from the back of the pedal to the floor behind the pedal. The difference in the two numbers will give you the free-play.

**Brake Pedal Free-play:  
1/4-3/8" (6.35-9.53 mm)**

# BRAKE SYSTEM

## BRAKE BLEEDING / FLUID CHANGE

**NOTE:** When bleeding the brakes or replacing the fluid always start with the furthest caliper from the master cylinder. This procedure should be used to change fluid or bleed brakes during regular maintenance.

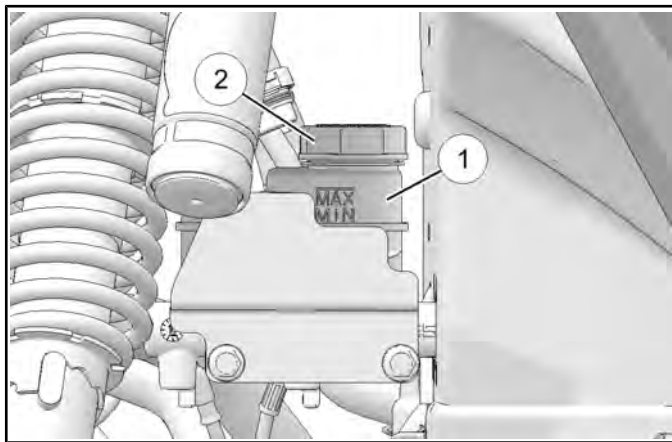
### CAUTION

Always wear safety glasses when handling chemicals and fluids.

### CAUTION

Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces.

1. Clean master cylinder reservoir cover thoroughly and remove the cover ②.



2. If changing fluid, remove old fluid from reservoir ① with a Mity Vac™ pump or similar tool.

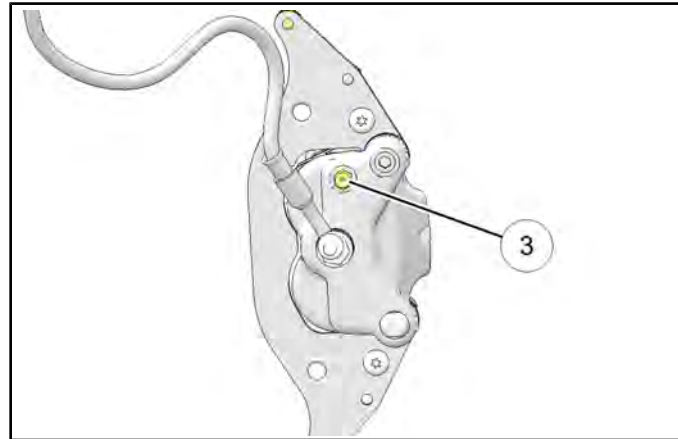
**Mity Vac™: PN 2870975**

3. Add brake fluid to the indicated MAX level of reservoir.

**Polaris DOT 4 Brake Fluid  
(PN 2872189)**

4. Begin bleeding procedure with the caliper that is farthest from the master cylinder. Install a box end wrench on caliper bleeder screw. Attach a clean, clear hose to fitting and place the other end in a clean container. Be sure the hose fits tightly on fitting.

5. Have an assistant slowly pump foot pedal until pressure builds and holds.
6. Hold brake pedal down to maintain pedal pressure, and open bleeder screw ③. Close bleeder screw and release pedal.



**NOTE:** Do not release foot pedal before bleeder screw is tight or air may be drawn into master cylinder.

7. Repeat procedure until clean fluid appears in bleeder hose and all air has been purged. Add fluid as necessary to maintain level in reservoir.

### CAUTION

Maintain at least 1/2"(1.27 cm) of brake fluid in the reservoir to prevent air from entering the master cylinder.

8. Tighten bleeder screw securely and remove bleeder hose. Torque bleeder screw to specification.



Bleeder Screw:  
**48 in-lb (5 Nm)**

9. Repeat steps 5 - 8 for the remaining calipers.
10. Add brake fluid to MAX level inside reservoir.

### Master Cylinder Fluid Level

**Between MIN and MAX lines on reservoir.**

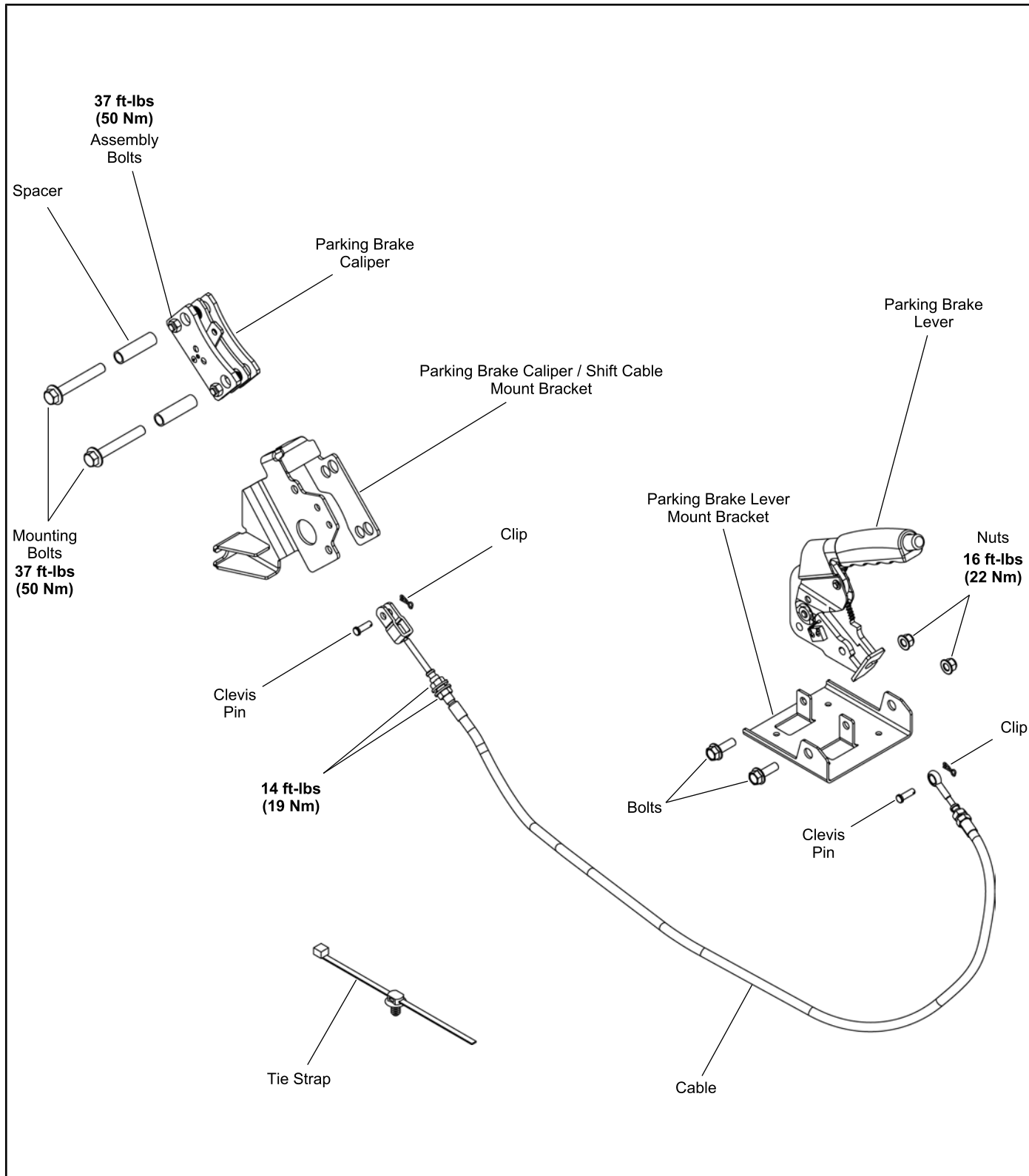
11. Install master cylinder reservoir cover.

12. Field test machine at low speed before putting into service. Check for proper braking action and pedal reserve. With pedal firmly applied, pedal reserve should be no less than 1/2"(1.3 cm).
13. Check brake system for fluid leaks.

# BRAKE SYSTEM

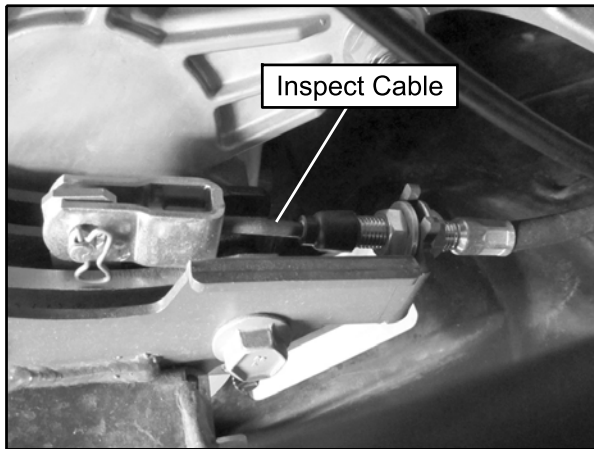
## PARKING BRAKE (INT'L)

### Parking Brake Assembly View



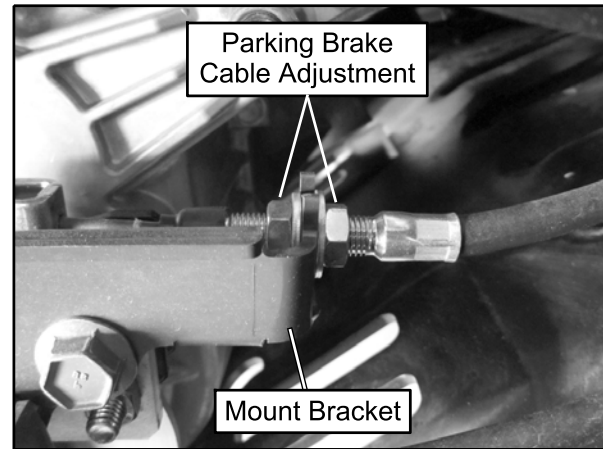
## Parking Brake Inspection

1. Inspect parking brake cable and brake pads for wear.
2. Refer to Parking Brake Cable Adjustment, page 9.11 if adjustment is necessary. Refer to Parking Brake Caliper, page 9.12 for brake pad replacement.



## Adjustment Procedure

5. Place the vehicle in neutral on a flat level surface.
6. Locate the parking brake cable adjustment area where the cable attaches to the caliper mount bracket.



## Parking Brake Cable Adjustment

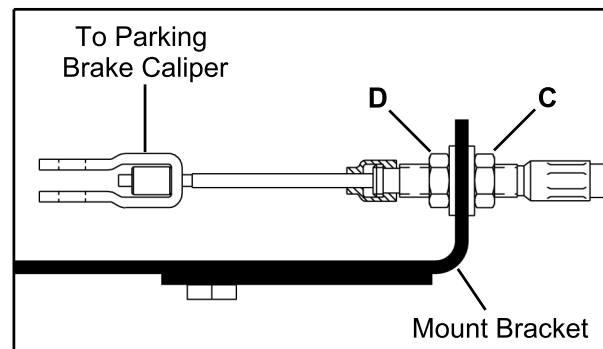
When the parking brake is fully engaged and “BRAKE” is displayed on the instrument cluster, engine speed is limited to 1500 RPM while in gear. If throttle is applied, this limiting feature prevents operation, which protects the parking brake pads from excessive wear.

**NOTE: Inspect parking brake cable tension after the first 25 hours of operation and every 100 hours of operation afterwards to ensure proper cable tension.**

Loss of tension in the parking brake cable will cause illumination of the parking brake indicator and activation of the limiting feature. If this occurs, inspect and adjust parking brake cable tension. If performing this service is difficult due to conditions or location, temporarily disconnect the parking brake switch electrical connector. Reconnect the connector as soon as practicable and adjust the parking brake cable to proper tension.

1. Pull back on parking brake lever (located in the dash).
2. After 3 to 4 clicks “BRAKE” should display on the instrument cluster and the wheels should not rotate when turning by hand. After 8 full clicks of lever travel, the vehicle should not roll while parked.
3. If the vehicle moves, adjustment is necessary.
4. Adjust the parking brake cable where it attaches to the caliper mount / shift cable bracket. The mount bracket is located on the right-hand side of the transmission.

7. Use two open-end wrenches and loosen the outer jam nut (D). Back out the outer jam nut (D) 1 1/2 turns.



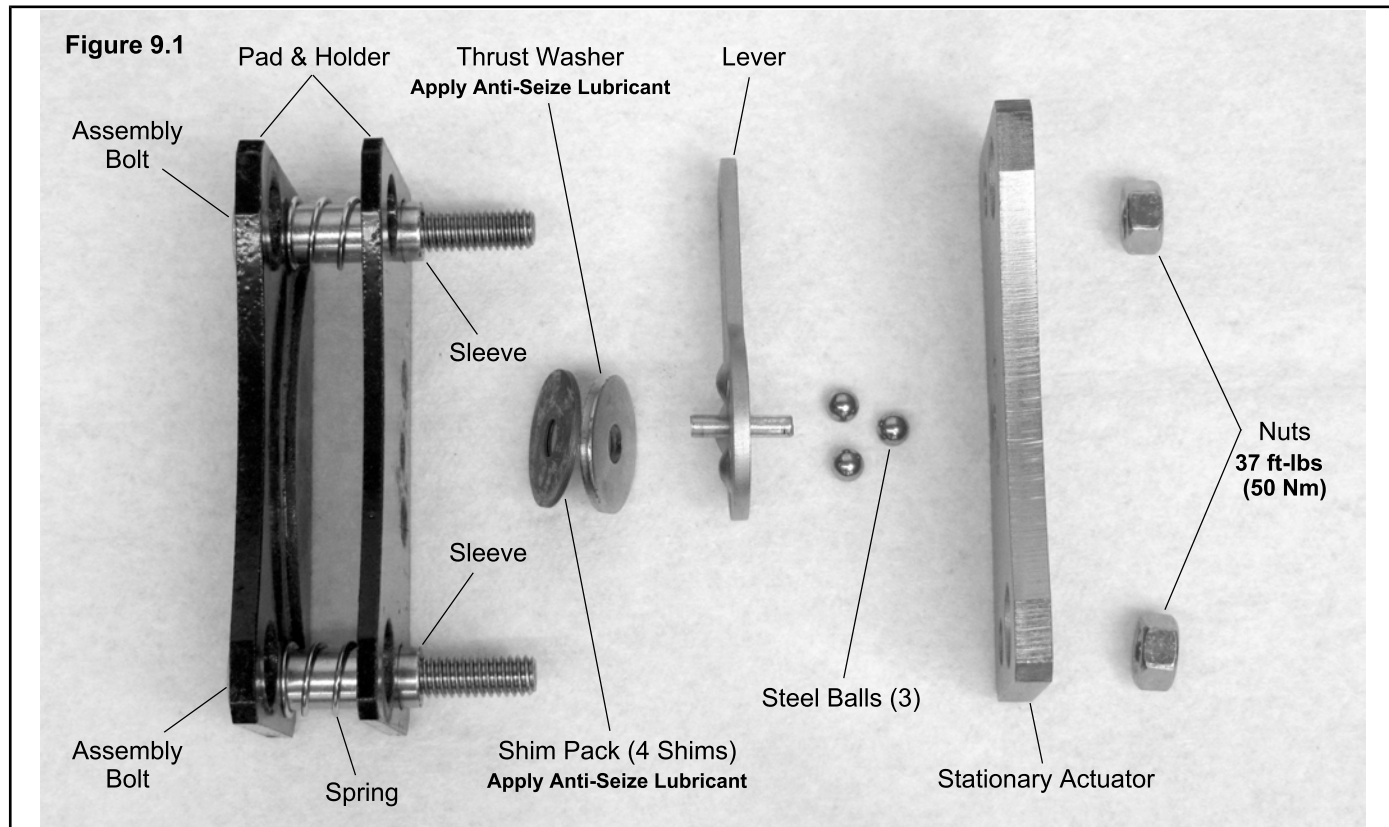
8. Now hold the outer jam nut (D) and turn in the inner jam nut (C) clockwise, until the jam nut is tight against the bracket.
9. Repeat Step 3 and Step 4 until the proper adjustment is obtained for the parking brake.

**NOTE: See Chapter 10 – Parking Brake Switch (INT’L Model), page for more information on the parking brake switch.**



# BRAKE SYSTEM

## Parking Brake Caliper



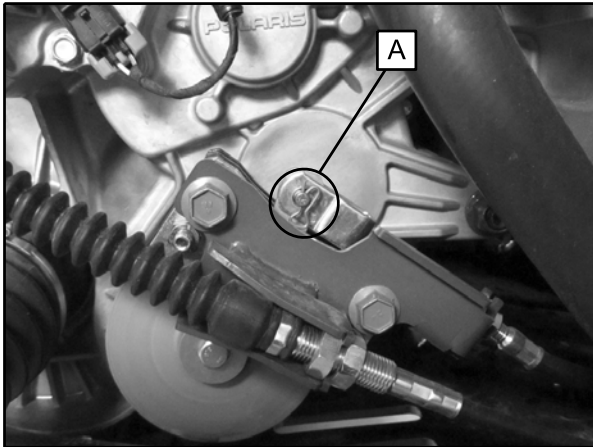
# BRAKE SYSTEM

## Caliper Removal

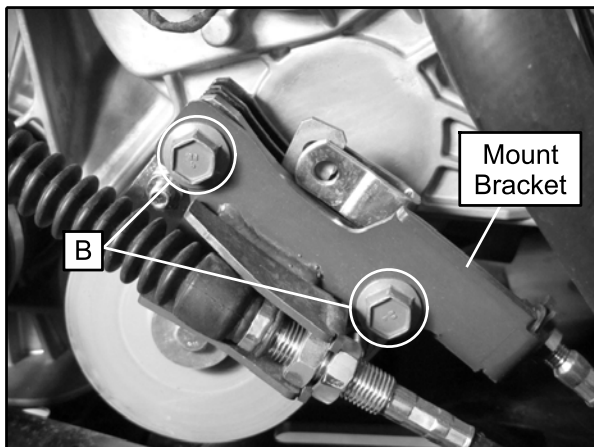
**NOTE:** Do not get oil, grease, or fluid on the parking brake pads. Damage to or contamination of the pads may cause the pads to function improperly.

1. Remove the clip pin and pin (A) from the parking brake cable.

**NOTE:** Be sure the parking brake is not engaged.



2. Remove the two fasteners (B) retaining the parking brake caliper mount / shift cable bracket.

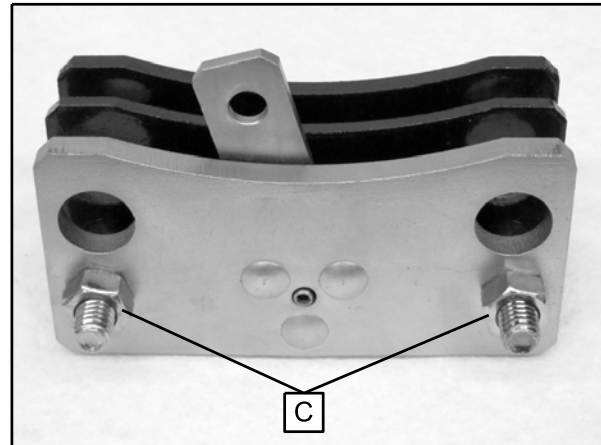


3. Lift the parking brake caliper off the brake disc and remove it from the vehicle.

## Caliper Disassembly / Inspection

**NOTE:** Refer to the "Electronic Parts Catalog" for parking brake caliper replacement parts information.

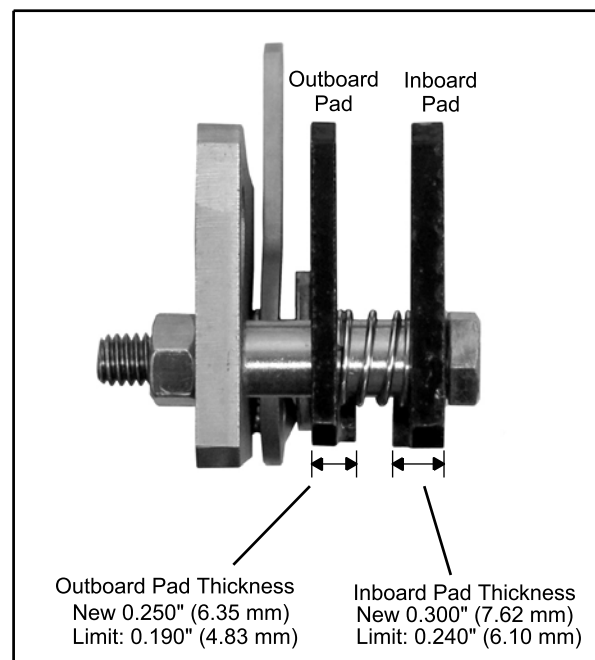
1. Remove the two caliper assembly bolts (C).



2. Slide the brake pads and springs from the assembly.

**NOTE:** Retain the lever and ball bearings for reassembly.

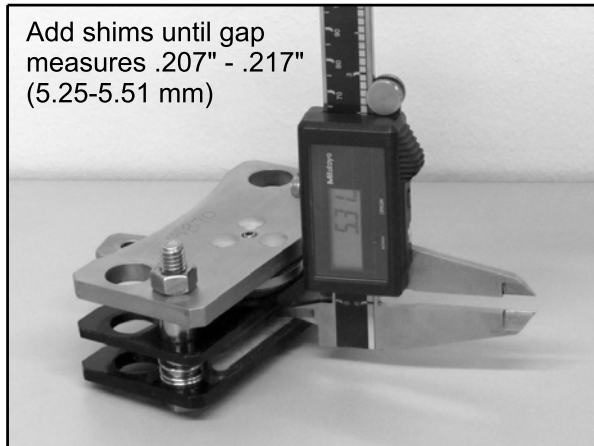
3. Inspect brake pads for excessive wear. Replace as needed.
4. Check the three steel balls for any signs of cracking. Replace as needed.
5. Check ball seats in lever and stationary actuator. If excessively worn, replace parts as needed.
6. Measure thickness of the rear caliper parking brake pads. Replace assembly or pads as needed. Refer to the following image for brake pad specifications.




# BRAKE SYSTEM

## New Pad Installation

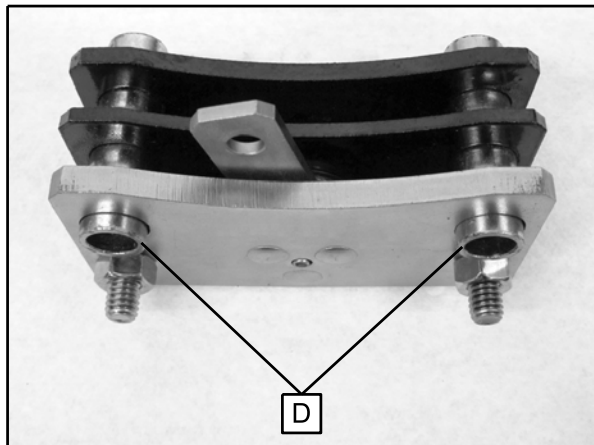
1. Install new pads and assemble the caliper with one shim.
2. Measure gap for the brake disc and compare to gap specification. Disassemble and add shim(s) between thrust washer and the inside brake pad as needed to close the gap to .207-.217 in. (5.25-5.51 mm).



3. Once you have determined the correct amount of shims to use, reassemble the caliper and apply an Anti-Seize Lubricant to the thrust washer and shims.
4. Torque the caliper assembly bolts to specification.

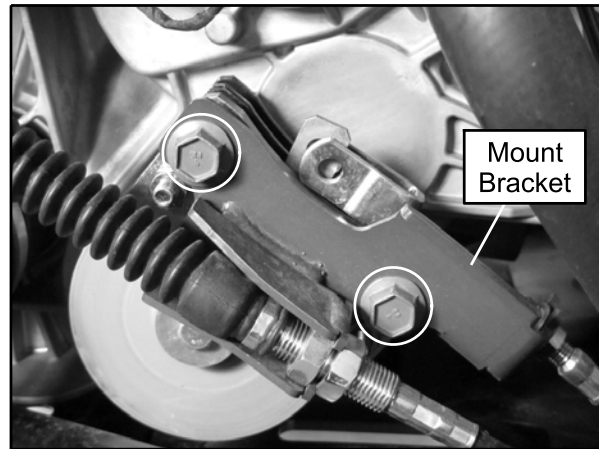
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<b>Parking Brake Caliper - Assembly Bolts: 37 ft-lb (50 Nm)</b>


5. Ensure the parking brake assembly functions properly by actuating the lever. Install the mounting sleeves (D) before installation.



## Brake Caliper Installation

1. Install the parking brake caliper over the brake disc. Align the caliper mounting sleeves with the holes in the mount bracket.
2. Install and tighten the two caliper mount / shift cable bracket fasteners to specification.



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<b>Parking Brake Caliper - Mount Bracket Bolts: 37 ft-lb (50 Nm)</b>

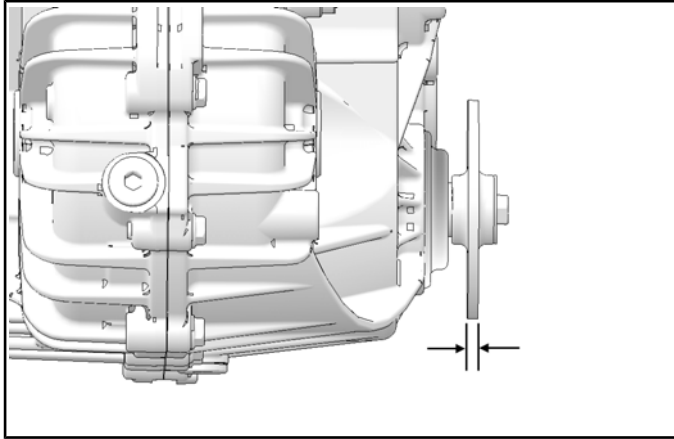
3. Install the cable, pin and clip pin. Test the park brake for proper function.



## Parking Brake Disc

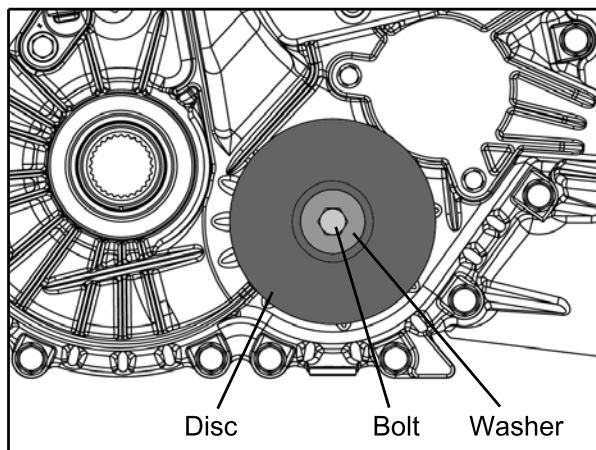
### Disc Inspection

Measure the brake disc with a micrometer. If the thickness of the disc is less than specified, replace the brake disc (see Chapter 9 – Disc Replacement, page ).



### Disc Replacement

1. Remove the parking brake caliper from the disc (see Chapter 9 – ).
2. Using a 1/2" socket and ratchet, remove the brake disc retaining bolt and flat washer.
3. Remove the disc from the transmission shaft.
4. Install the new brake disc. Install the mounting bolt and flat washer. Torque the mounting bolt to specification.



Parking Brake Disc Mounting Bolt:  
**14 ft-lb (20 Nm)**

# BRAKE SYSTEM

## FRONT BRAKE PADS

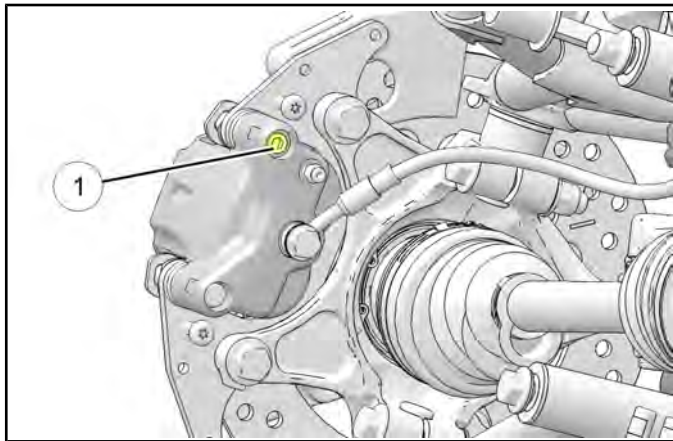
### Front Caliper / Pad Removal

1. Elevate and support front of vehicle.

 **WARNING**

Use care when supporting vehicle so that it does not tip or fall.  
Severe injury may occur if machine tips or falls.

2. Remove the wheel nuts and front wheel.
3. Loosen the pad adjuster screw 2-3 turns ①.



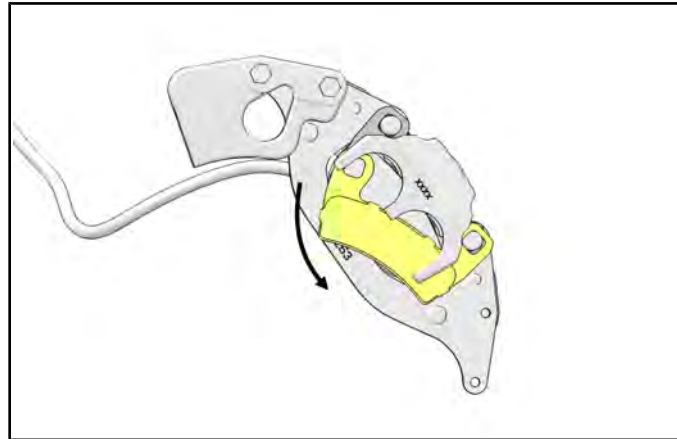
4. Remove the upper and lower caliper mounting bolts and remove the caliper from the front hub.

**NOTE: When removing caliper, use care not to damage brake line. Support caliper to avoid kinking or bending brake line.**

5. Push caliper piston into caliper bore slowly using a C-clamp or locking pliers with pads installed.

**NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.**

6. Push the mounting bracket inward and slip the outer brake pad out between the bracket and caliper body.

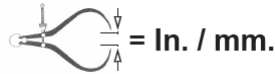
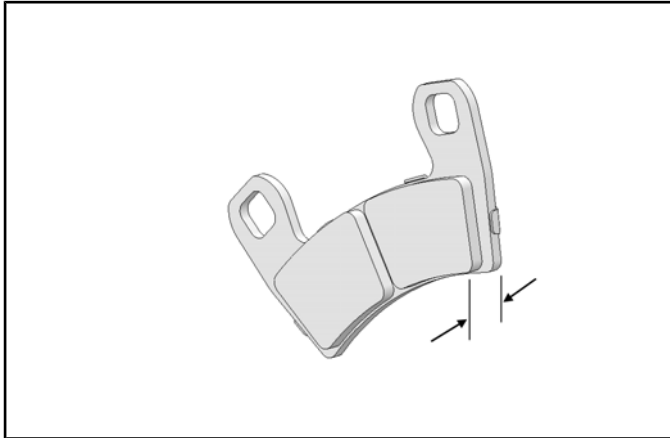


7. Remove the inner pad from the bracket and caliper.

# BRAKE SYSTEM

## Front Pad Inspection

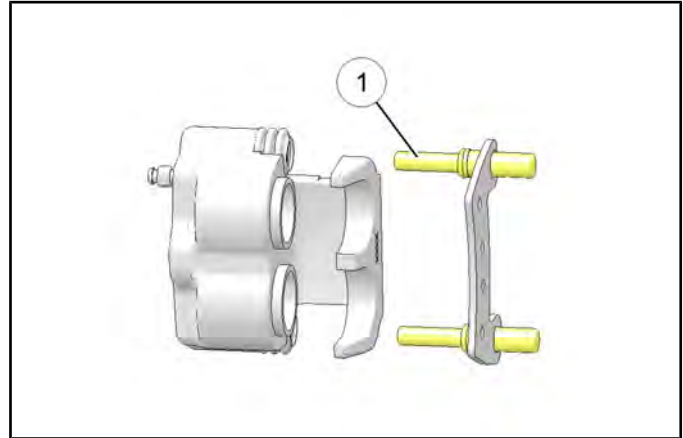
1. Measure the thickness of the pad material. Replace pads if worn beyond the service limit.



Front Brake Pad Thickness:  
**0.297 ± 0.007" (7.5 ± .178 mm)**  
Service Limit: **0.180" (4.6 mm)**

## Front Caliper / Pad Installation

1. Lubricate mounting bracket pins ① with a light film of silicone grease and install rubber dust boots.

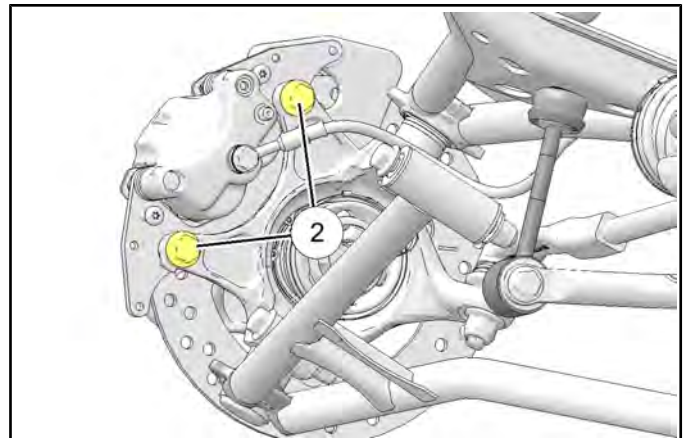


2. Compress mounting bracket and make sure dust boots are fully seated. Install pads with friction material facing each other.

### CAUTION

If brake pads are contaminated with grease, oil, or liquid soaked do not use the pads.  
Use only new, clean pads.

3. Install caliper onto front hub and torque mounting bolts ② to specification.

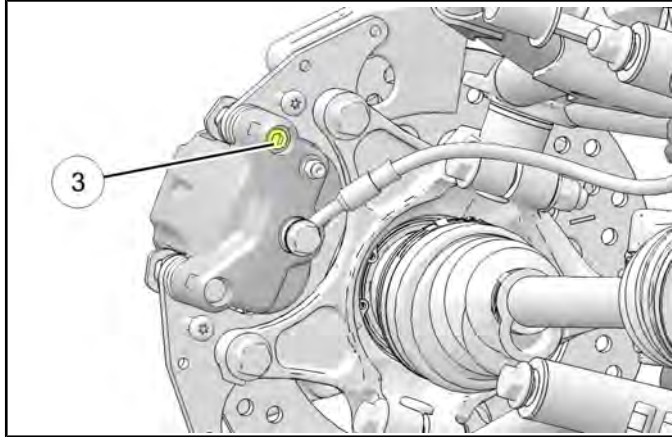


Front Caliper Mount Bolt:  
**30 ft-lb (42 Nm)**



# BRAKE SYSTEM


4. Slowly pump the brake pedal until pressure has been built up. Maintain at least 1/2" (12.7 mm) of brake fluid in the reservoir to prevent air from entering the brake system.
5. Install the adjustment set screw and turn clockwise until stationary pad contacts disc, then back off 1/2 turn (counterclockwise).



6. Verify fluid level in reservoir is up to MAX line inside reservoir and install reservoir cap.

**Master Cylinder Fluid**  
**Up to MAX line inside reservoir**

7. Install wheel and torque wheel nuts to specification.

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Wheel Nuts:  
**Aluminum: 120 ft-lbs (163 Nm)**  
**Steel: 60 ft-lb (81 Nm)**

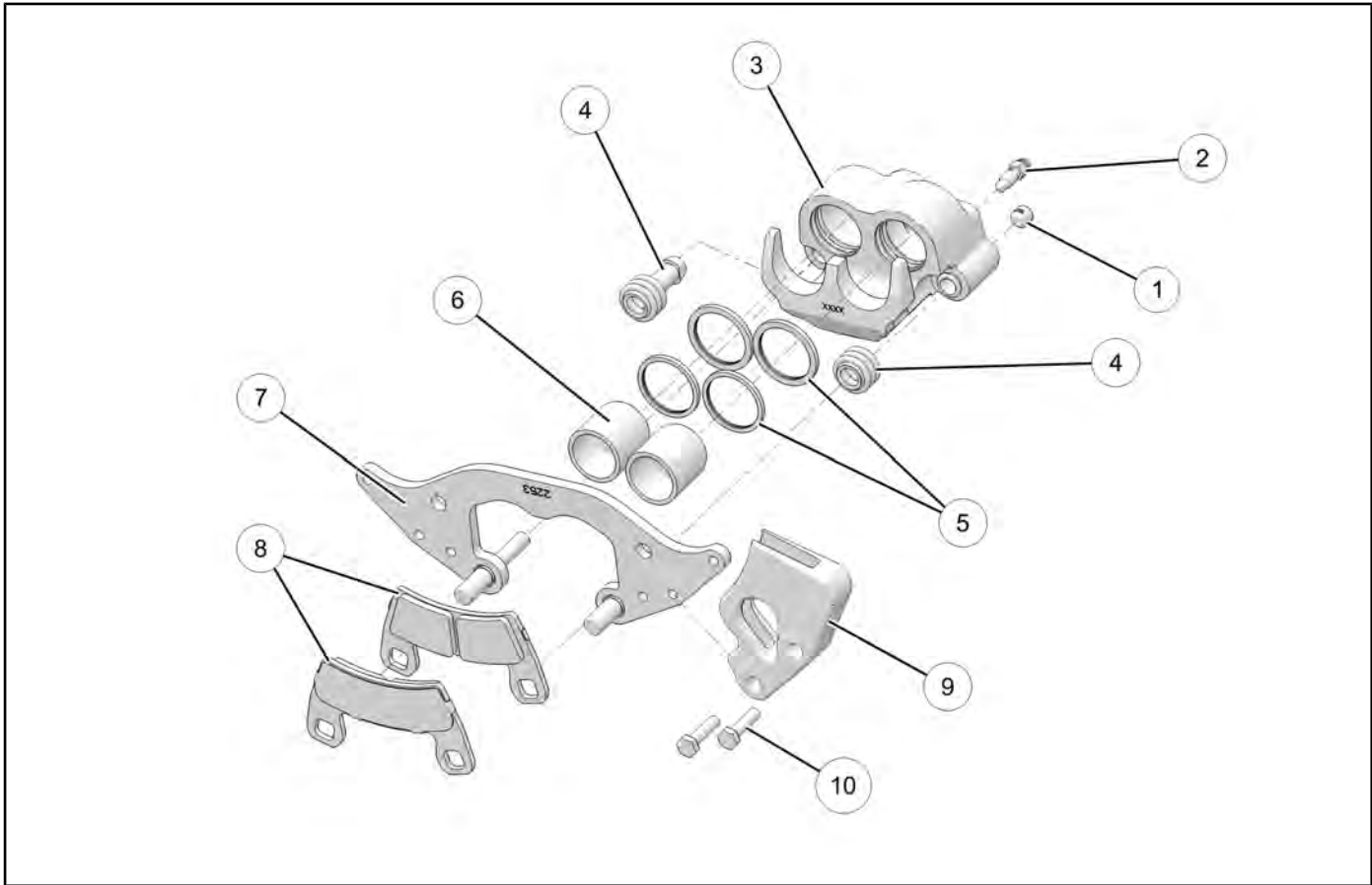
## Brake Burnishing Procedure

It is required that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise.

Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Allow pads and disc to cool sufficiently during the procedure. Do not allow pads or disc to become hot or warping may result. Repeat this procedure 10 times. **Do not make more than 3 stops per 1 mile (1.6 km).**

## FRONT CALIPER SERVICE

### Front Caliper Assembly View

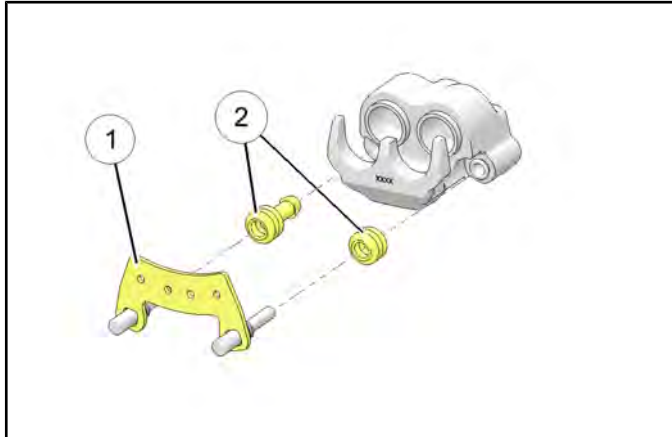


① Socket Set Screw	⑥ Pistons
② Bleeder Screw <b>48 in-lb (5 Nm)</b>	⑦ Caliper Mount
③ Caliper Assembly	⑧ Brake Pads
④ Boots	⑨ Brake Scraper
⑤ Square O-Rings	⑩ Bolts

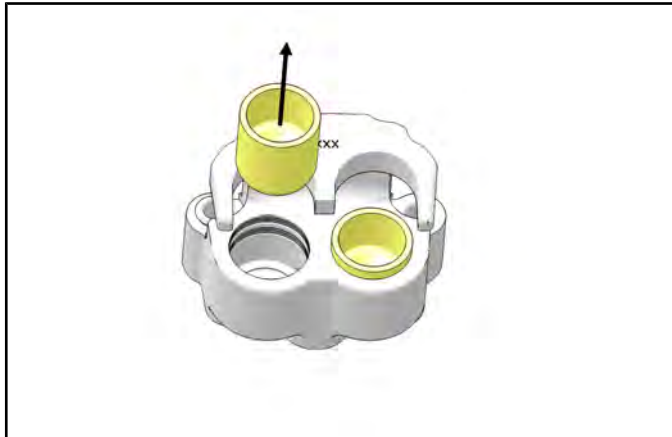
# BRAKE SYSTEM

## Front Caliper Disassembly

1. Remove both brake pads from the caliper (see Chapter 9 – Front Caliper / Pad Removal, page 9.16).
2. Remove mount bracket assembly ① and dust boots ②.

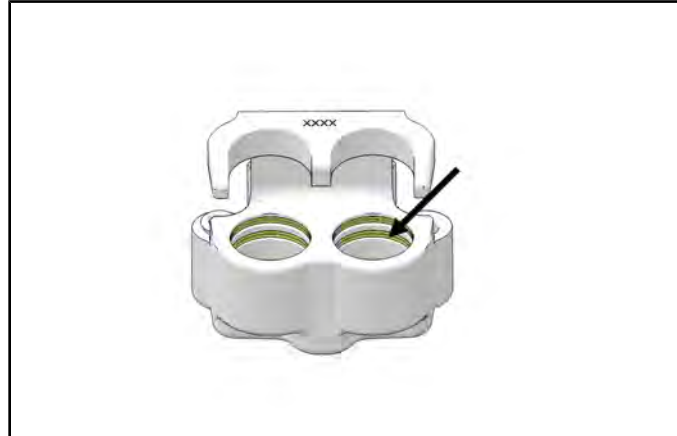


3. Thoroughly clean the caliper before disassembly and prepare a clean work area for disassembly.
4. Use a commercially available caliper piston pliers to extract the pistons from the caliper.

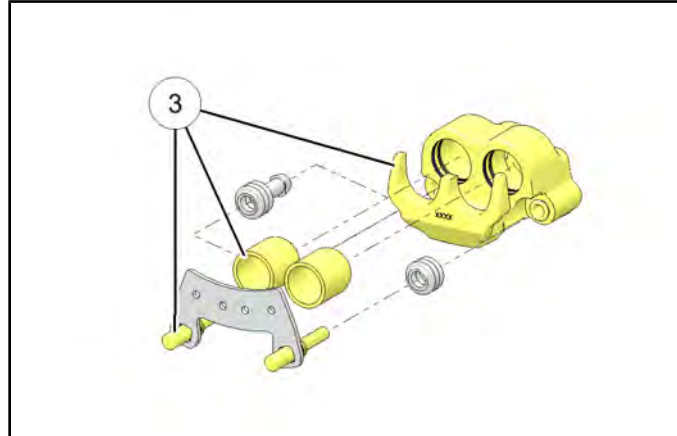


**NOTE:** Do not remove the caliper pistons with a standard pliers. The piston sealing surfaces will become damaged if a standard pliers is used.

5. Once the pistons are removed, use a pick to carefully remove the square O-rings from the caliper. O-rings should be replaced during caliper service.



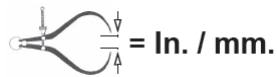
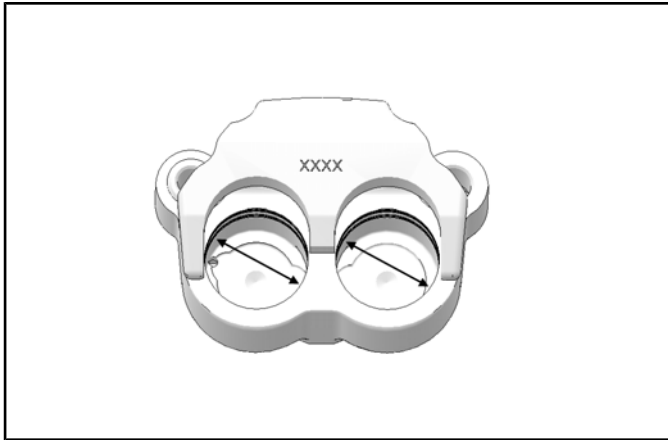
6. Clean the caliper body, pistons and retaining bracket ③ with brake cleaner or alcohol.



**NOTE:** Be sure to clean seal grooves in caliper body.

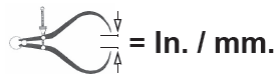
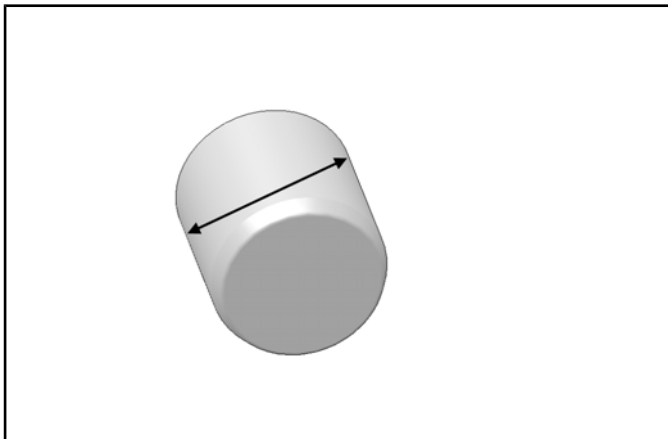
## Front Caliper Inspection

1. Inspect caliper body for nicks, scratches, pitting or wear. Measure bore size and compare to specifications. Replace if damaged or worn beyond service limit.



Front Caliper Piston Bore I.D.:  
**Std: 1.373" (34.87 mm)**  
**Service Limit: 1.375" (34.93 mm)**

2. Inspect piston for nicks, scratches, pitting or wear. Measure piston diameter and replace if damaged or worn beyond service limit.



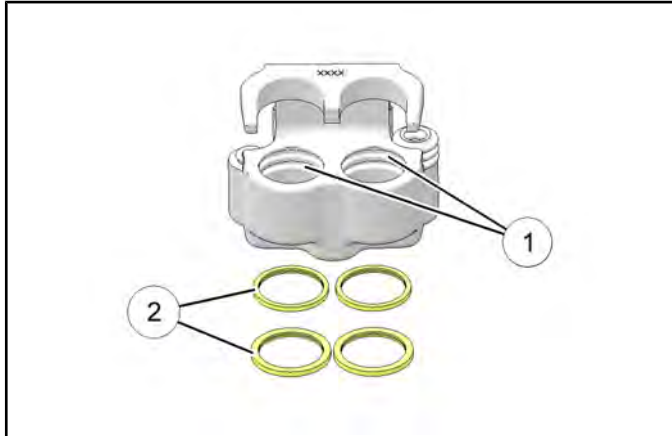
Front Caliper Piston O.D.:  
**Std: 1.370" (34.80 mm)**  
**Service Limit: 1.368" (34.75 mm)**

# BRAKE SYSTEM

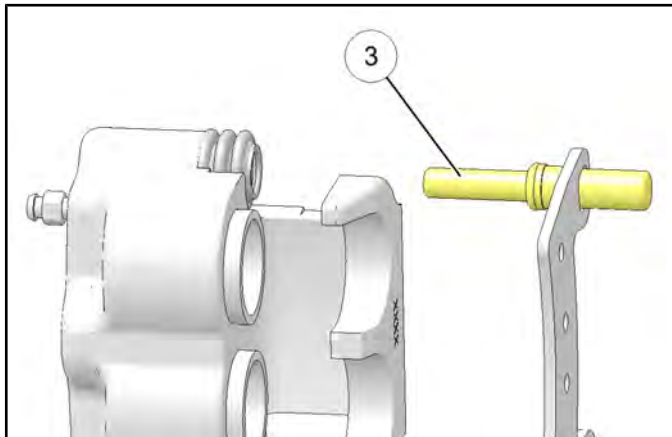
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## Front Caliper Assembly

1. Install new O-rings ② in the caliper body. Be sure the grooves ① are clean and free of residue or brakes may drag upon assembly.



2. Coat pistons with clean Polaris DOT 4 Brake Fluid. Install pistons with a twisting motion while pushing inward. Piston should slide in and out of bore smoothly, with light resistance.
3. Lubricate the mounting bracket pins ③ with silicone grease and install the rubber dust seal boots.

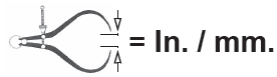
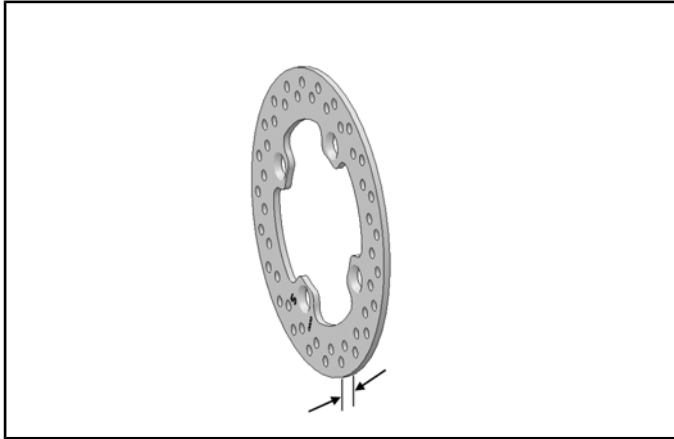


4. Compress the mounting bracket and make sure the dust seal boots are fully seated. Install the brake pads. Clean the disc and pads with brake parts cleaner or denatured alcohol to remove any dirt, oil or grease.

## FRONT BRAKE DISC

### Front Brake Disc Inspection

1. Visually inspect disc for scoring, scratches, or gouges. Replace disc if deep scratches are evident.
2. Use a 0-1" micrometer and measure disc thickness at eight different points around the pad contact surface. Replace disc if worn beyond service limit.

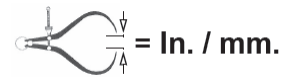
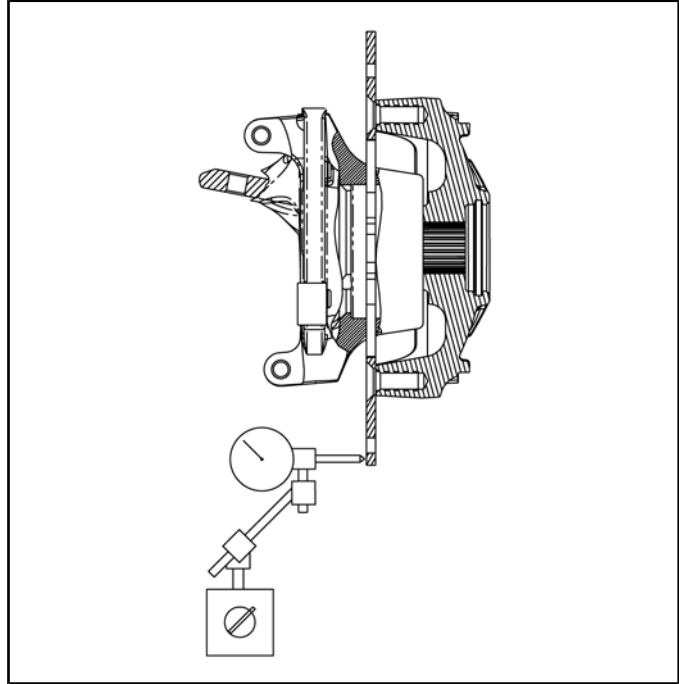


Brake Disc Thickness  
**New: .0188" (4.78 mm)**  
**Service Limit: 0.170" (4.32 mm)**

Brake Disc Thickness Variance  
**Service Limit: 0.002" (.051 mm)**  
 difference between measurements

### Front Brake Disc Runout

Mount dial indicator as shown to measure disc runout. Slowly rotate the disc and read total runout on the dial indicator. Replace the disc if runout exceeds specification.



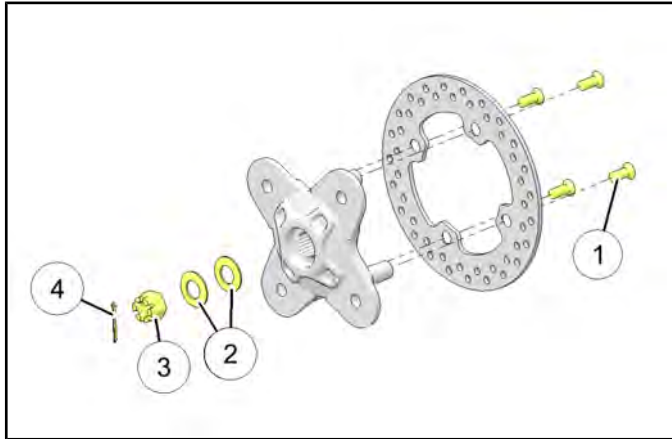
Brake Disc Runout:  
**Service Limit: 0.010" (0.254 mm)**



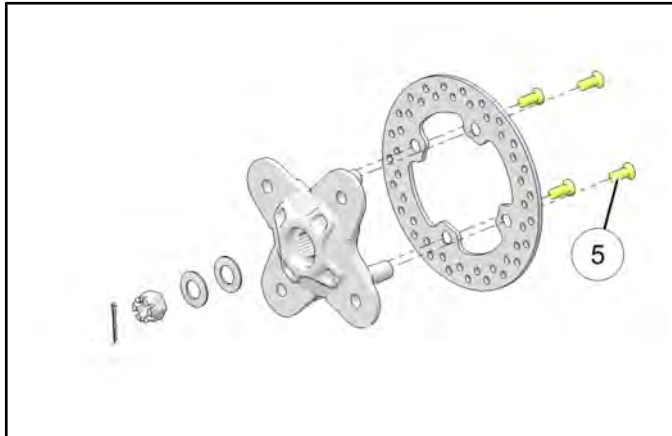
# BRAKE SYSTEM

## Front Disc Replacement

1. Remove the front brake caliper (see Chapter 9 – Front Caliper / Pad Removal, page 9.16).
2. Remove wheel hub cotter pin ④, castle nut ③ and washers ②.
3. Remove the wheel hub assembly from the vehicle and remove the four bolts ① retaining the disc to the hub.



4. Clean the wheel hub mating surface and install new disc on wheel hub.
5. Install new brake disc bolts ⑤ and torque to specification.



Brake Disc Mounting Bolts:  
**18 ft-lb (24 Nm)**

### CAUTION

Always use new brake disc mounting bolts. The bolts have a pre-applied locking agent which is destroyed upon removal.

6. Install wheel hub assembly, washers, and castle nut. Torque castle nut to specification and install a new cotter pin.



Castle Nut:  
**110 ft-lbs (149 Nm)**

7. Install the front brake caliper (see Chapter 9 – FRONT CALIPER SERVICE, page ).
8. Follow bleeding procedure outlined earlier in this chapter.
9. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes. Make sure the brake is not dragging when pedal is released. If the brake drags, re-check assembly and installation.

## REAR CALIPER / BRAKE PADS

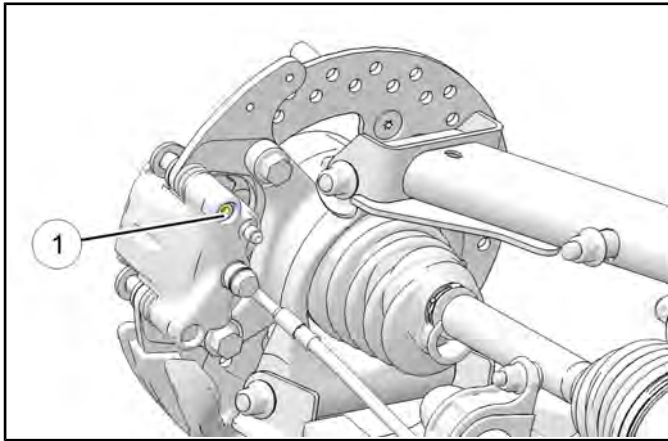
### Rear Caliper / Brake Pad Removal

1. Elevate and support rear of vehicle.

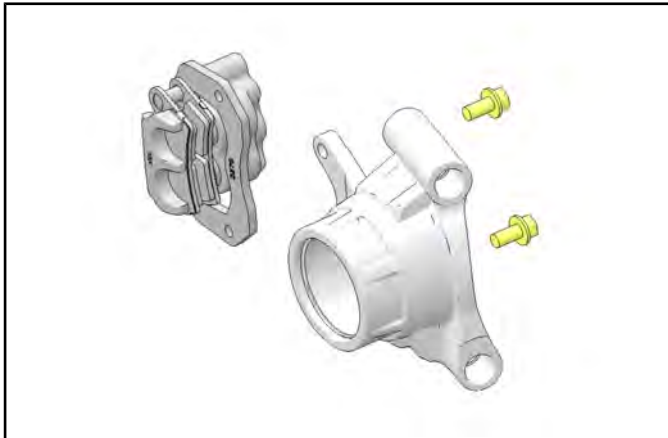
#### WARNING

Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur if machine tips or falls.

2. Remove the rear wheel.
3. Loosen pad adjuster screw ① 2-3 turns.



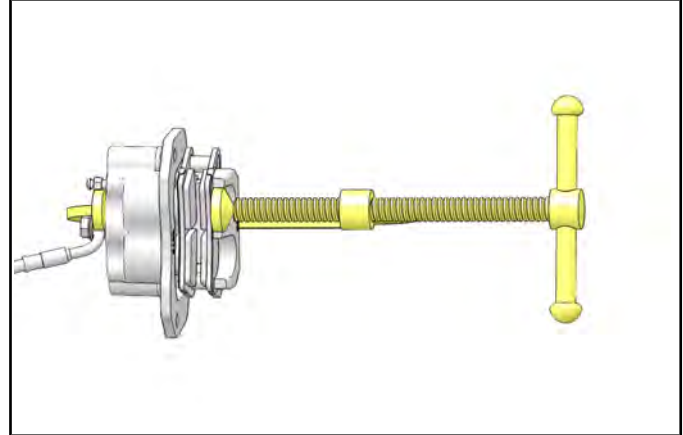
4. Remove the two caliper mounting bolts and lift caliper off the brake disc.



#### CAUTION

When removing caliper, be careful not to damage brake line. Support caliper to avoid kinking or bending brake line.

5. If brake caliper will not come off, push caliper piston into the caliper bore slowly using a C-clamp or locking pliers with pads installed.



**NOTE:** Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

6. Push caliper mounting bracket inward and slip outer brake pad past the edge to remove.

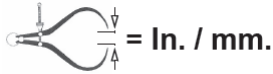
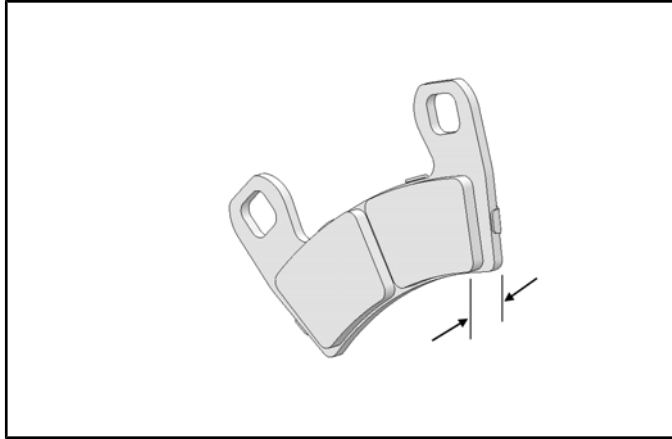


7. Remove the inner brake pad.

# BRAKE SYSTEM

## Rear Brake Pad Inspection

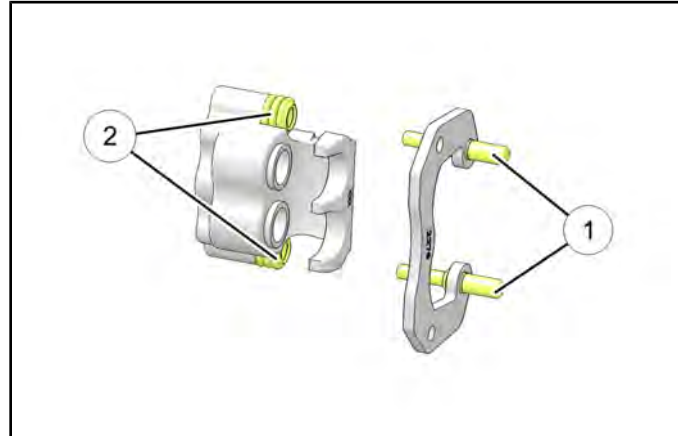
1. Clean the caliper with brake cleaner or alcohol.
2. Measure the thickness of the pad material. Replace pads if worn beyond the service limit.



Rear Brake Pad Thickness:  
**0.298 ± 0.007" (7.57 mm ± .178 mm)**  
Service Limit: **0.180" (4.6 mm)**

## Rear Caliper / Pad Installation

1. Lubricate mounting bracket pins ① with a light film of silicone grease and install rubber dust boots ②.

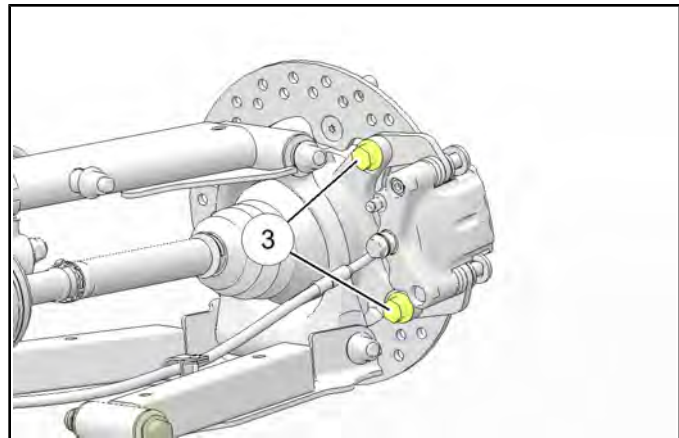


2. Compress mounting bracket and make sure dust boots are fully seated. Install pads with friction material facing each other.

### CAUTION

If brake pads are contaminated with grease, oil, or liquid soaked do not use the pads. Use only new clean pads.

3. Install the caliper and torque the new mounting bolts ③ to specification.



Rear Caliper Mount Bolt :  
**46 ft-lb (62 Nm)**

4. Slowly pump the brake pedal until pressure has been built up. Maintain at least 1/2", (12.7 mm) of brake fluid in the reservoir to prevent air from entering the brake system.
5. Install the adjustment set screw and turn clockwise until the stationary pad contacts the disc, then back off 1/2 turn.
6. Verify fluid level in reservoir is up to the MAX line inside reservoir and install reservoir cap.

**Master Cylinder Fluid:  
Up to MAX line inside reservoir**

7. Install wheel and torque wheel nuts to specification.



Wheel Nuts:  
**Aluminum: 120 ft-lbs (163 Nm)**  
**Steel: 60 ft-lb (81 Nm)**

## Brake Burnishing Procedure

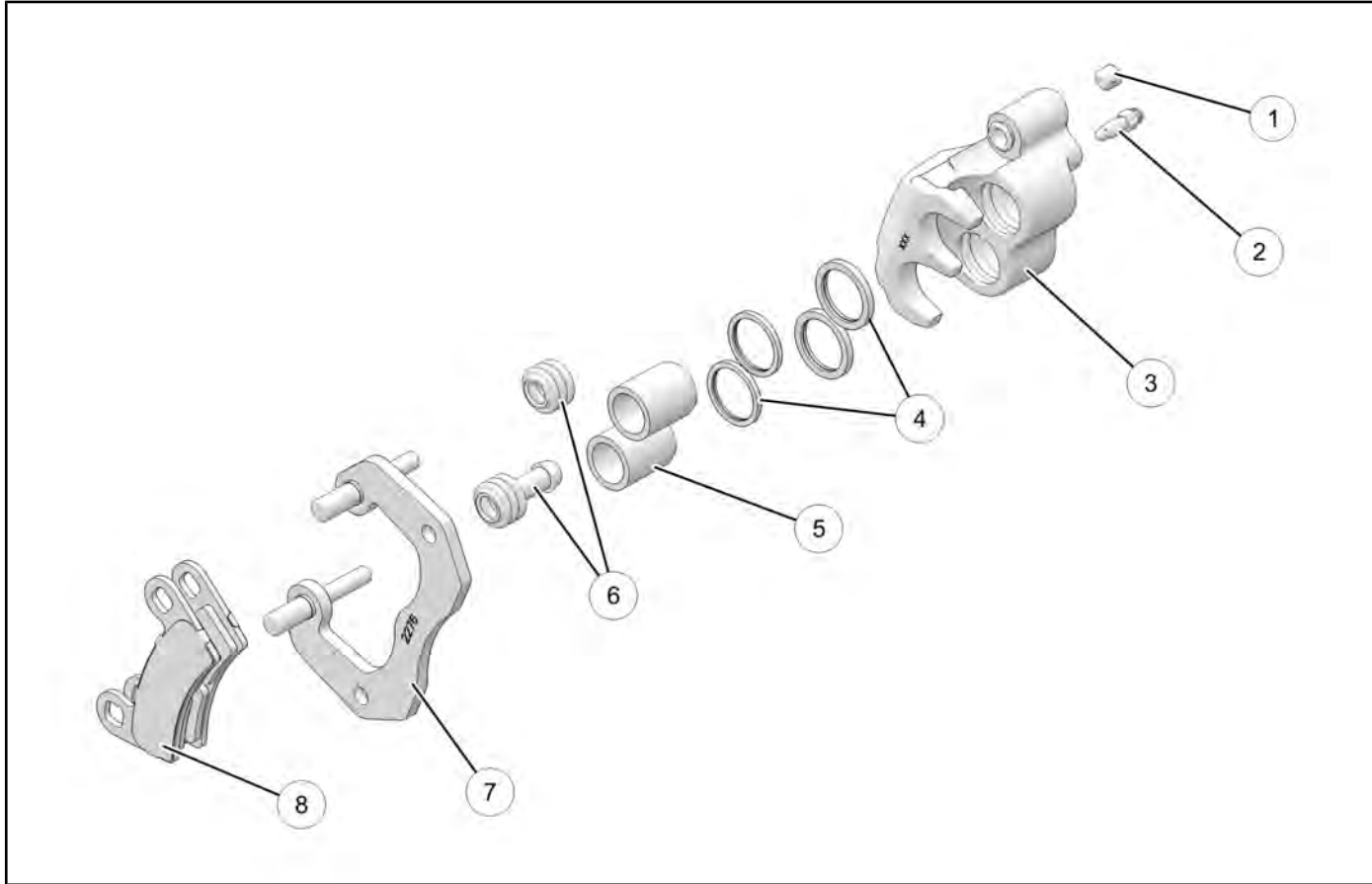
It is required that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise.

Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Allow pads and disc to cool sufficiently during the procedure. Do not allow pads or disc to become hot or warping may result. Repeat this procedure 10 times. **Do not make more than 3 stops per 1 mile (1.6 km).**

# BRAKE SYSTEM

## REAR CALIPER SERVICE

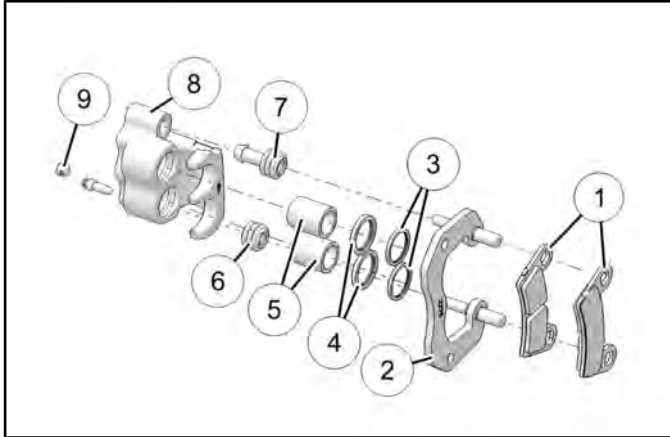
### Rear Caliper Assembly View



① Socket Set Screw	⑤ Pistons
② Bleeder Screw <b>48 in-lb (5 Nm)</b>	⑥ Boots
③ Caliper Assembly	⑦ Caliper Mount
④ Square O-Rings	⑧ Brake Pad

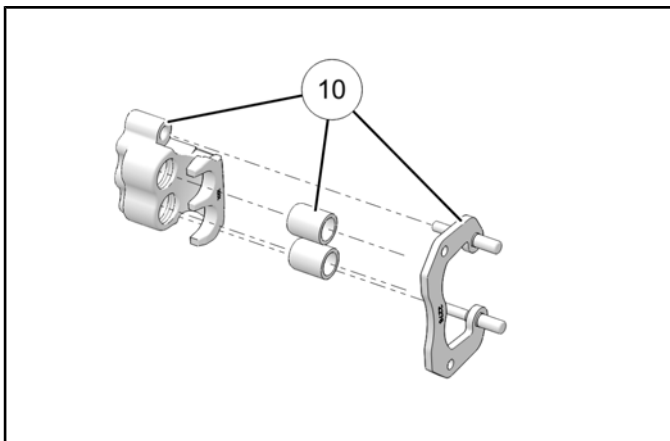
## Rear Caliper Disassembly

1. Remove brake pad adjustment set screw ⑨.
2. Push upper pad retainer pin inward and slip brake pads ① past the edge and remove from the caliper.
3. Remove mount bracket ② and dust boots (⑥ and ⑦).



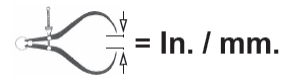
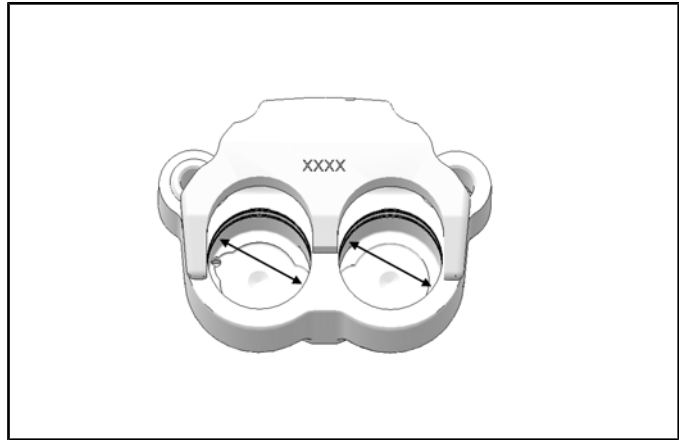
4. Using a hammer and a small punch, remove the pistons ⑤ from the caliper body ⑧. Remove the square O-rings (④ and ③) from the caliper body ⑧.
5. Clean the caliper body, piston, and retaining bracket ⑩ with brake cleaner or alcohol.

**NOTE:** Be sure to clean caliper body seal grooves.



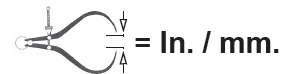
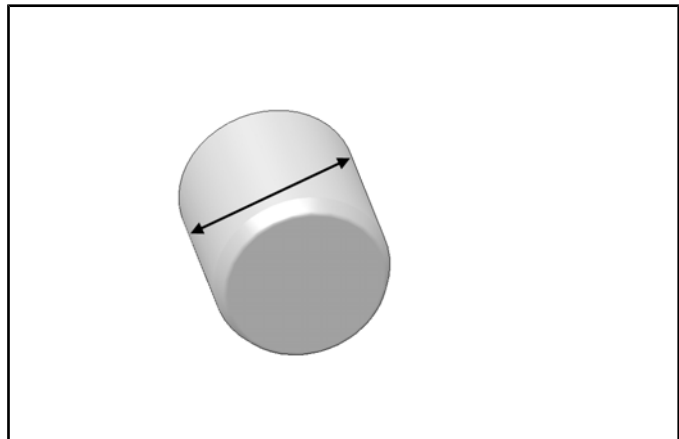
## Rear Caliper Inspection

1. Inspect caliper body for nicks, scratches or wear. Measure bore size and compare to specifications. Replace if damage is evident or if worn beyond service limit.



Rear Caliper Piston Bore I.D.:  
**Standard: 1.505" (38.23 mm)**  
**Service Limit: 1.507" (38.28 mm)**

2. Inspect piston for nicks, scratches, wear or damage. Measure diameter and replace if damaged or worn beyond service limit.



Rear Caliper Piston O.D.:  
**Standard: 1.500" (38.10 mm)**  
**Service Limit: 1.498" (38.05 mm)**



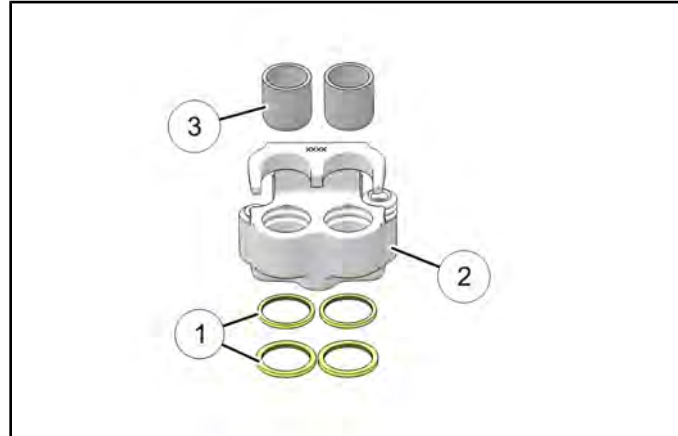
## BRAKE SYSTEM

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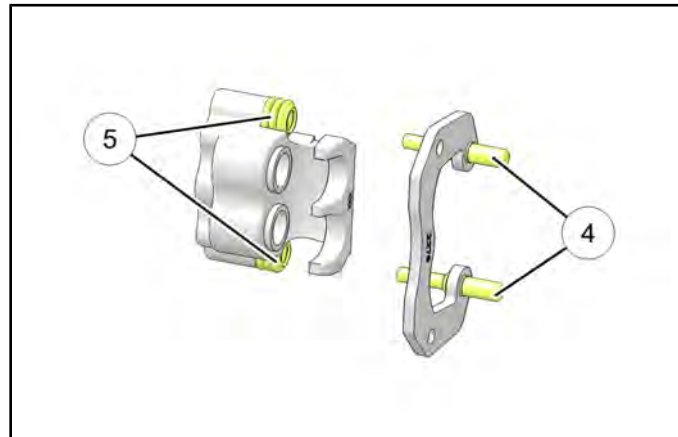
3. Inspect the brake disc and pads as outlined in this chapter.

### Rear Caliper Assembly

1. Install new caliper seals ① in the caliper body ②. Be sure groove is clean and free of residue or brakes may drag upon assembly.



2. Coat piston with clean Polaris DOT 4 Brake Fluid (**PN 2872189**). Install piston ③ with a twisting motion while pushing inward. Piston should slide in and out of bore smoothly with light resistance.
3. Lubricate the mounting bracket pins ④ with silicone grease and install the rubber dust seal boots ⑤.

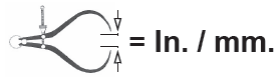
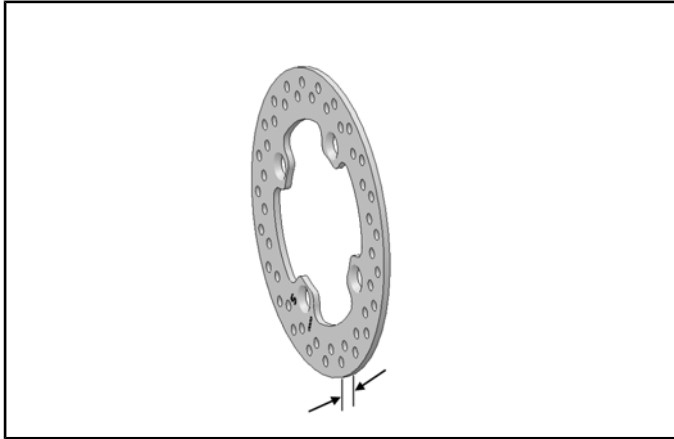


4. Compress the mounting bracket and make sure the dust seals are fully seated. Install the brake pads. Clean the disc and pads with brake parts cleaner or denatured alcohol to remove any dirt, oil or grease.

## REAR BRAKE DISC

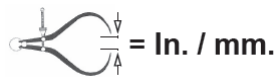
### Rear Disc Inspection

1. Visually inspect disc for scoring, scratches, or gouges. Replace disc if deep scratches are evident.
2. Use a 0-1" micrometer and measure disc thickness at eight different points around the pad contact surface. Replace disc if worn beyond service limit.



Brake Disc Thickness

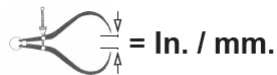
**New: 0.188" (4.78 mm)**  
**Service Limit: 0.170" (4.32 mm)**



Brake Disc Thickness Variance

**Service Limit: 0.002" (0.051 mm)**  
 Difference Between Measurements

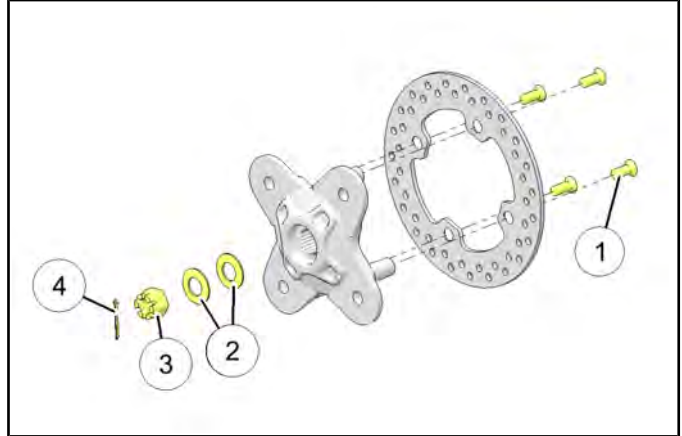
3. Mount a dial indicator and measure disc runout. Slowly rotate the disc and read total runout on the dial indicator. Replace the disc if runout exceeds specifications.



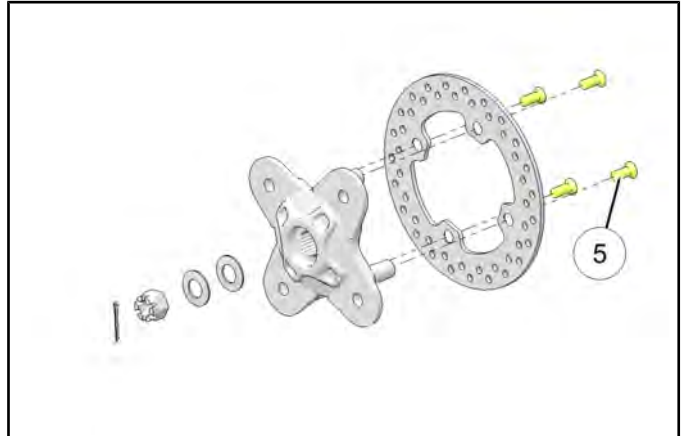
Brake Disc Runout:  
**Service Limit: 0.010" (0.254 mm)**

### Rear Disc Replacement

1. Remove the rear brake caliper. (see Chapter 9 – REAR CALIPER SERVICE, page
2. Remove wheel hub cotter pin ④, castle nut ③ and washers ②.
3. Remove the hub assembly from the vehicle and remove the four bolts ① retaining the disc to the hub.



4. Clean the wheel hub mating surface and install new disc on wheel hub.
5. Install new bolts ⑤ and torque to specification.



## BRAKE SYSTEM

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### CAUTION

Always use new brake disc mounting bolts. The bolts have a pre-applied locking agent which is destroyed upon removal.



Brake Disc Mounting Bolts:  
**18 ft-lb (24 Nm)**

6. Install wheel hub assembly, washers, and castle nut. Torque castle nut to specification and install a new cotter pin.



Rear Wheel Hub Castle Nut:  
**110 ft-lbs (149 Nm)**

7. Install rear caliper (see Chapter 9 – REAR CALIPER SERVICE, page ). Bleed the brake system. (See Chapter 9 – BRAKE BLEEDING / FLUID CHANGE, page 9.8).
8. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes. Make sure brakes do not drag when pedal is released. If the brakes drag, re-check assembly and installation.

## TROUBLESHOOTING

### BRAKE NOISE TROUBLESHOOTING

Dirt or dust buildup on the brake pads and disc is the most common cause of brake noise (squeal caused by vibration). If cleaning does not reduce the occurrence of brake noise, Permatex™ *Disc Brake Quiet* can be applied to the back of the pads. Follow directions on the package. This will keep pads in contact with caliper piston(s) to reduce the chance of squeaks caused by dirt or dust.

#### Brake Noise Troubleshooting

POSSIBLE CAUSE	REMEDY
Dirt, dust, or imbedded material on pads or disc	Spray disc and pads with CRC Brakleen™ or an equivalent non-flammable aerosol brake cleaner. Remove pads and/or disc hub to clean imbedded material from disc or pads.
<b>Pad(s) dragging on disc due to:</b> Improper adjustment Master cylinder reservoir overfilled Master cylinder compensating port restricted Master cylinder piston not returning completely Caliper piston(s) not returning Operator error (riding the brake)	Adjust pad stop (front calipers) Set to proper level Clean compensating port Inspect. Repair as necessary Clean piston(s) seal Educate operator
Loose wheel hub or bearings	Check wheel and hub for abnormal movement.
Brake disc warped or excessively worn	Replace disc
Brake disc misaligned or loose	Inspect and repair as necessary
Noise is from other source (axle, hub, disc or wheel)	If noise does not change when brake is applied check other sources. Inspect and repair as necessary

# **BRAKE SYSTEM**

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## **Poor Brake Performance**

- Air in system
- Water in system (brake fluid contaminated)
- Caliper or disc misaligned
- Caliper dirty or damaged
- Brake line damaged or lining ruptured
- Worn disc and/or friction pads
- Incorrectly adjusted stationary pad
- Worn or damaged master cylinder or components
- Damaged break pad noise insulator
- Brake pads dragging
- Brake caliper dragging

## **Pedal Vibration**

- Disc damaged
- Disc worn (runout or thickness variance exceeds service limit)

## **Caliper Overheats (Brakes Drag)**

- Compensating port plugged
- Pad clearance set incorrectly
- Parking brake lever incorrectly adjusted (INT'L Model)
- Brake pedal binding or unable to return fully
- Parking brake left on (INT'L Model)
- Residue build up under caliper seals
- Operator riding brakes

## **Brakes Lock**

- Alignment of caliper to disc
- Caliper pistons sticking
- Improper assembly of brake system components

# **CHAPTER 10**

## **BODY / FRAME**

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# BODY / FRAME

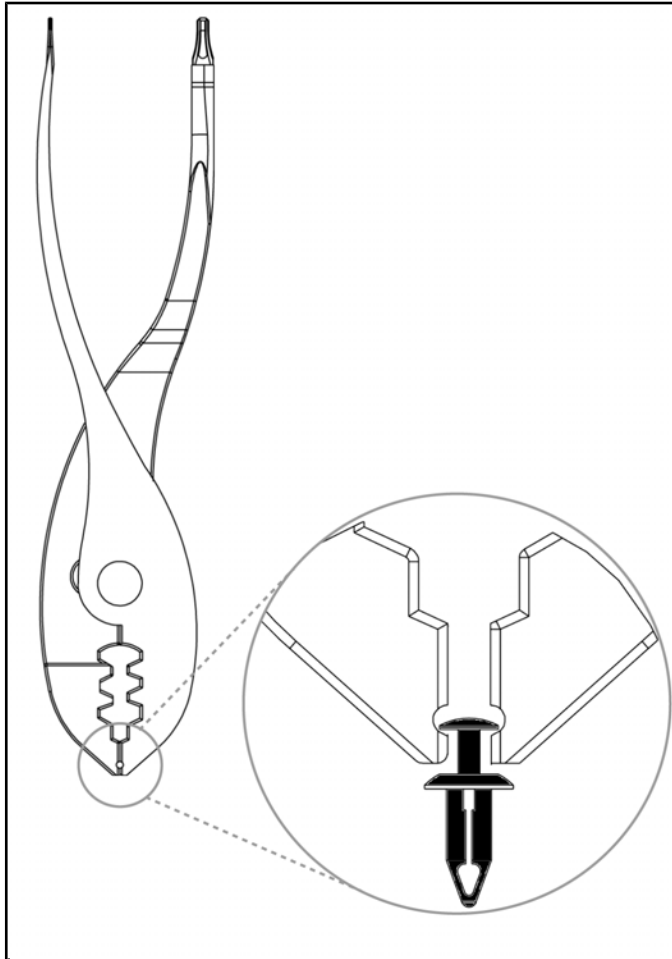
## GENERAL INFORMATION

### Special Tools

PART NUMBER	TOOL DESCRIPTION
2876389	Multi-Function Pliers

**Bosch Automotive Service Solutions:**  
1-800-345-2233 or <http://polaris.service-solutions.com/>

Included in the tool kit, the multi-function pliers assists in removing the plastic push rivets used to fasten body components.



### Torque Specifications

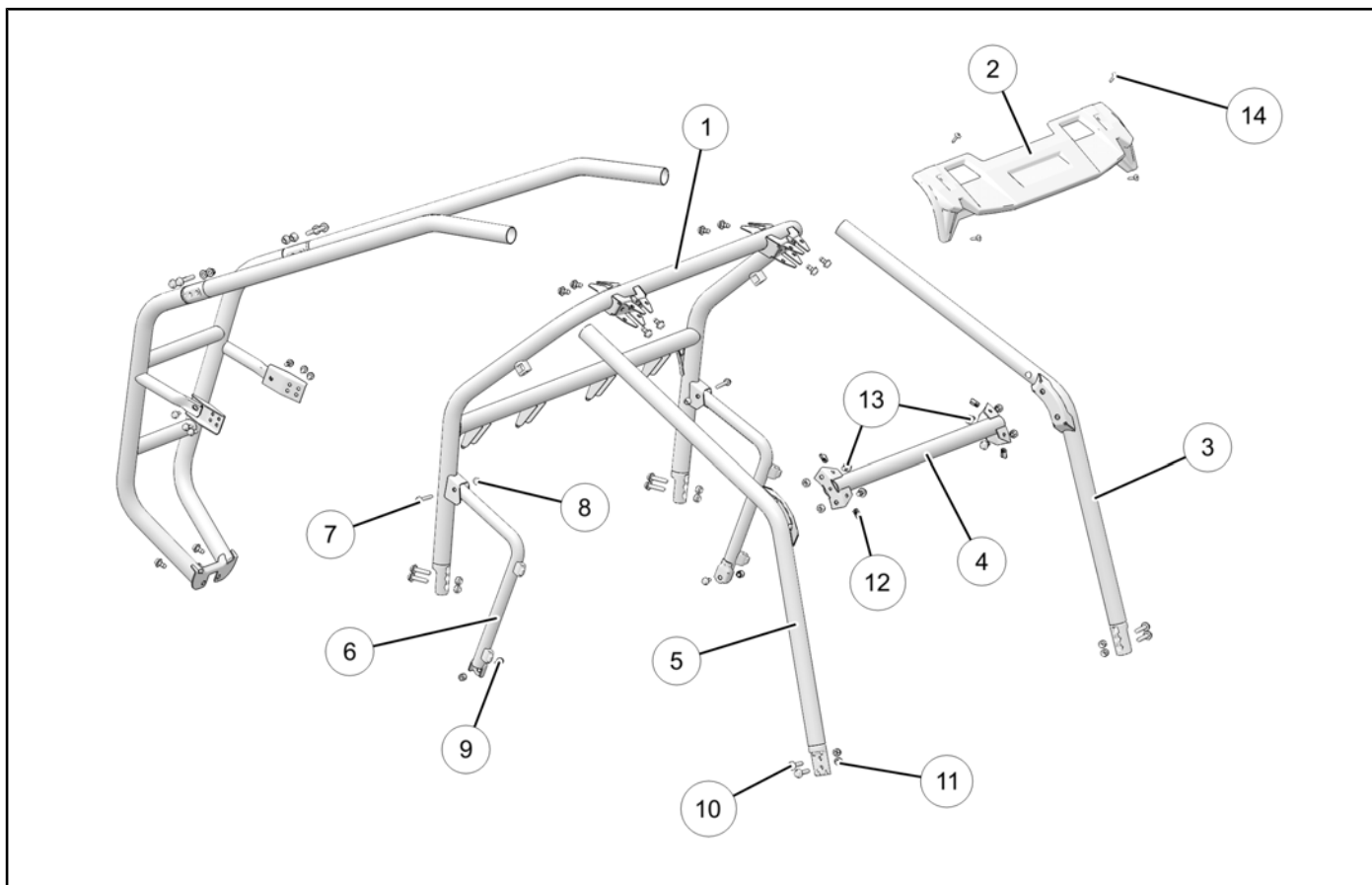
ITEM	TORQUE
Cab Frame Bolts	40 ft-lb (54 Nm)
Door Fasteners	8 ft-lb (11 Nm)
Frame Support Bar Fasteners (above engine)	22 ft-lb (30 Nm)
Front Fascia / Fender Fasteners	8 ft-lb (11 Nm)
Hip Bolster Fasteners	16 ft-lb (22 Nm)
Seat Frame Fasteners (front)	14 ft-lb (19 Nm)
Seat Frame Fasteners (rear)	30 ft-lb (41 Nm)
Seat Belt Mounting Fasteners	40 ft-lbs (54 Nm)
Skid Plate Fasteners	8 ft-lbs (11 Nm)
Visor Screws	8 ft-lb (11 Nm)

**BODY ASSEMBLY VIEWS**

**Cab Frame Assembly**

**NOTE: Finger tighten all components until cab frame is completely assembled on vehicle and then tighten to specification.**

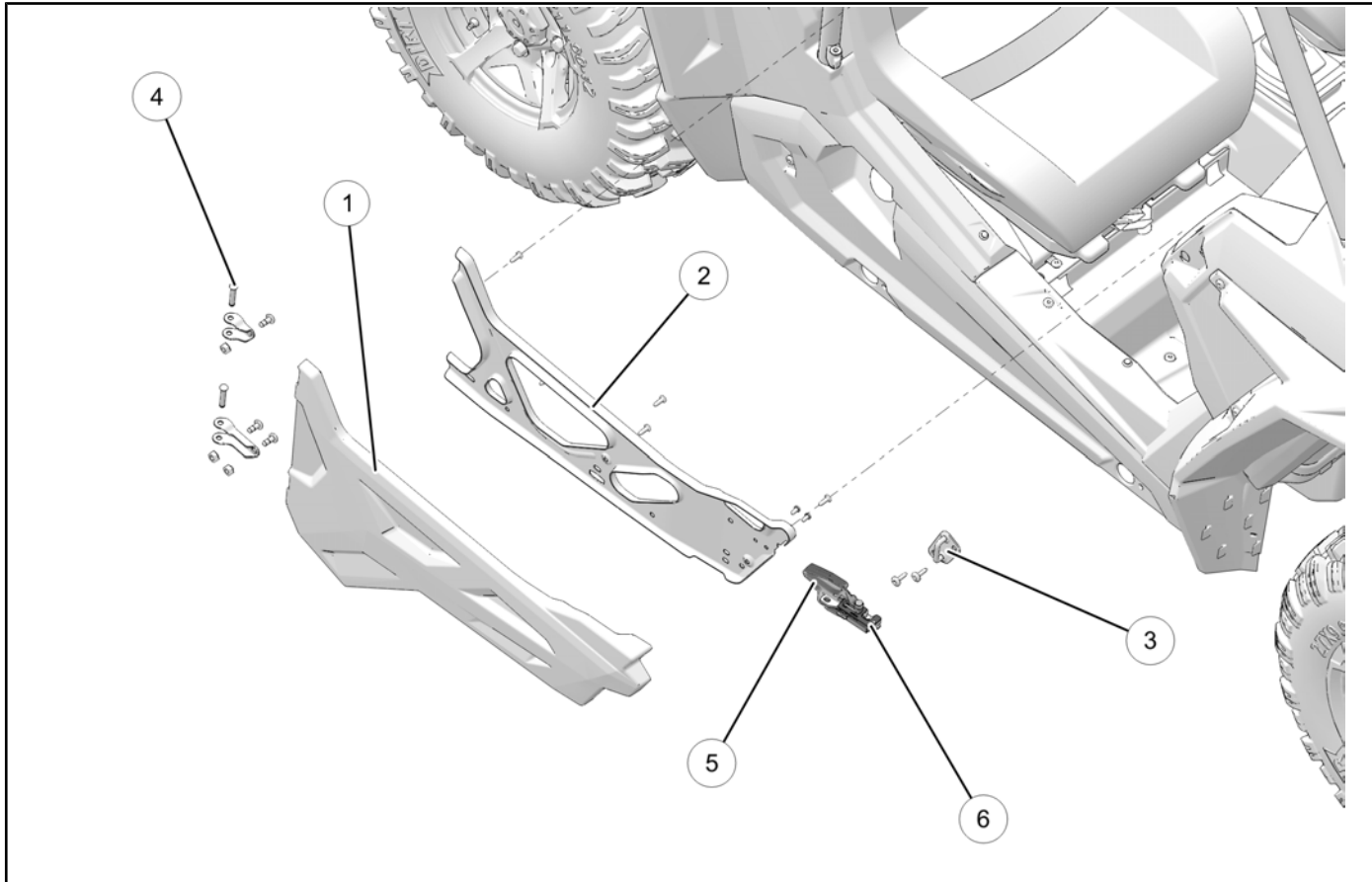
1. Install hip bolster and secure the bottom mount with M8x1.25x20 bolts. Torque fasteners to 14 ft-lb (19 Nm).
2. Install rear ROPS to the frame with M10x1.5x45 bolts and nuts. Torque fasteners to 40 ft-lb (54 Nm).
3. Install hip bolster to mount to the rear ROPS with M8x1.25x55 fasteners. Torque fasteners to 17 ft-lb (23 Nm)
4. Install front ROPS to the frame with M10x1.5x45 fasteners. Install front ROPS to rear ROPS and front ROPS cross brace to the left and right front ROPS with M10x1.5x20 screws. Torque fasteners to 40 ft-lb (54 Nm).
5. Install visor on front ROPS with M6x1.0x25 screws. Torque fasteners to 8 ft-lb (11 Nm).



① Rear ROPS	⑧ M8 x 1.25 Nut
② Visor	⑨ M8 x 1.25 x 20 Bolt <b>16 ft-lb (22 Nm)</b>
③ Front ROPS — Left	⑩ M10 x 1.5 x 45 Screw <b>40 ft-lb (54 Nm)</b>
④ Front ROPS Cross Brace	⑪ M10 x 1.5 Nut <b>40 ft-lb (54 Nm)</b>
⑤ Front ROPS — Right	⑫ Clip
⑥ Hip Bolster	⑬ M10 x 1.5 x 20 Screw <b>40 ft-lb (54 Nm)</b>
⑦ M8 x 1.25 x 55 Screw <b>16 ft-lb (22 Nm)</b>	⑭ M6 x 1.0 x 25 Screw <b>8 ft-lb (11 Nm)</b>

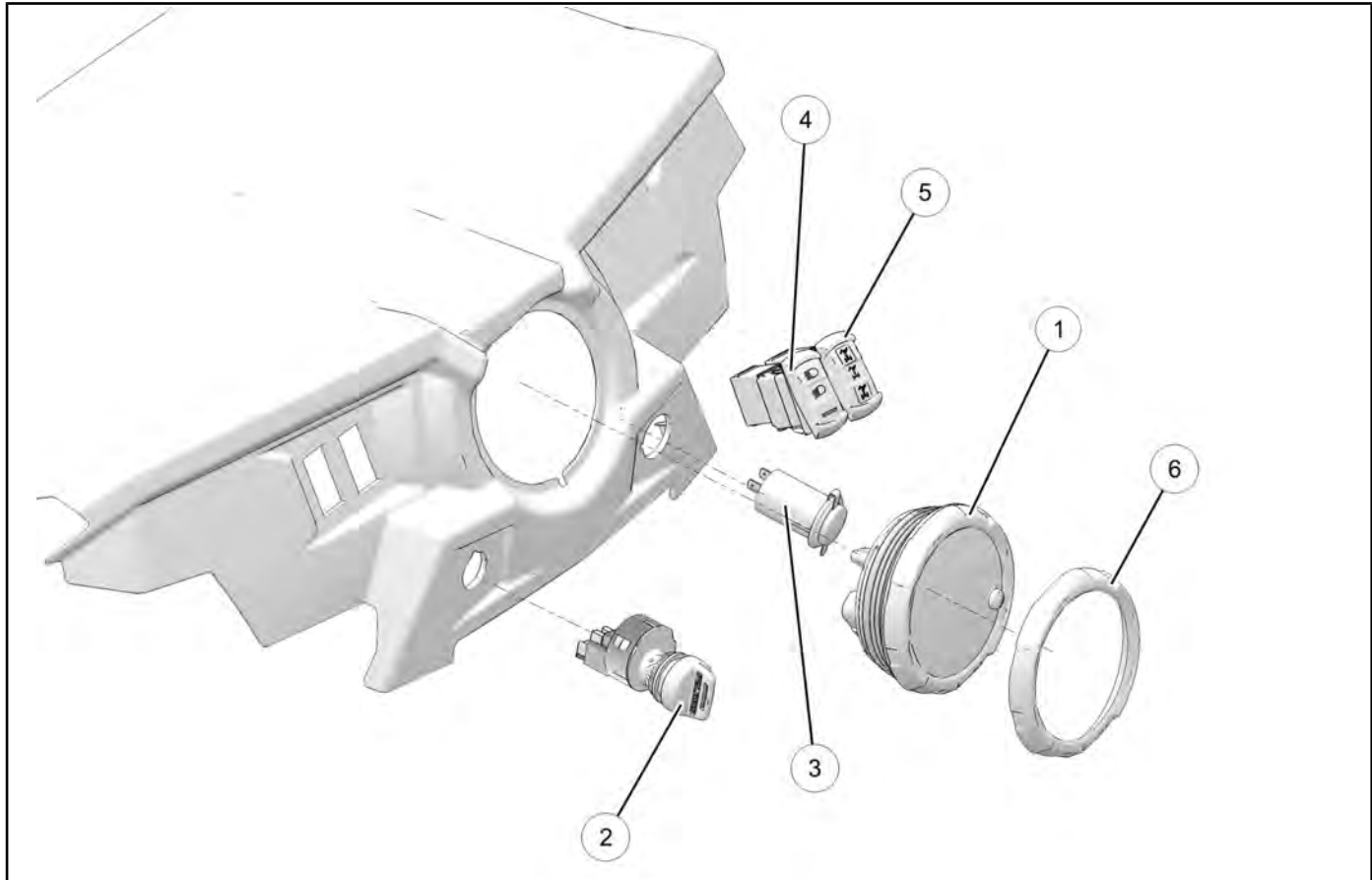
# BODY / FRAME

## Doors



① Door Panel	④ Hinge Pin <b>8 ft-lb (11 Nm)</b>
② Door Frame	⑤ Latch Release
③ Latch Striker <b>8 ft-lb (11 Nm)</b>	⑥ Latch

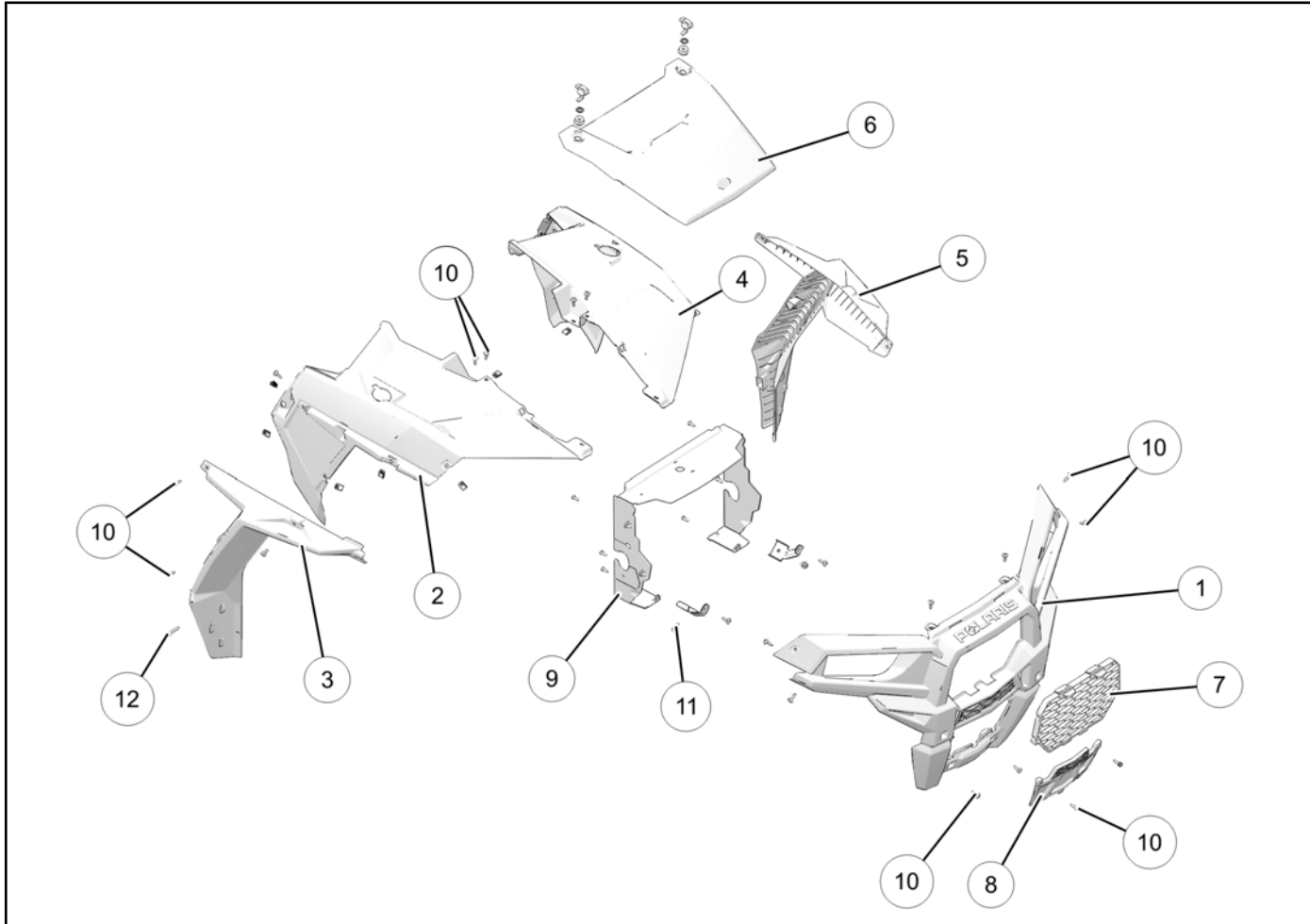
**Dash / Instruments**



① Instrument Cluster	④ Headlight Switch
② Key Switch	⑤ AWD Switch
③ 12V Accessory Port	⑥ Bezel

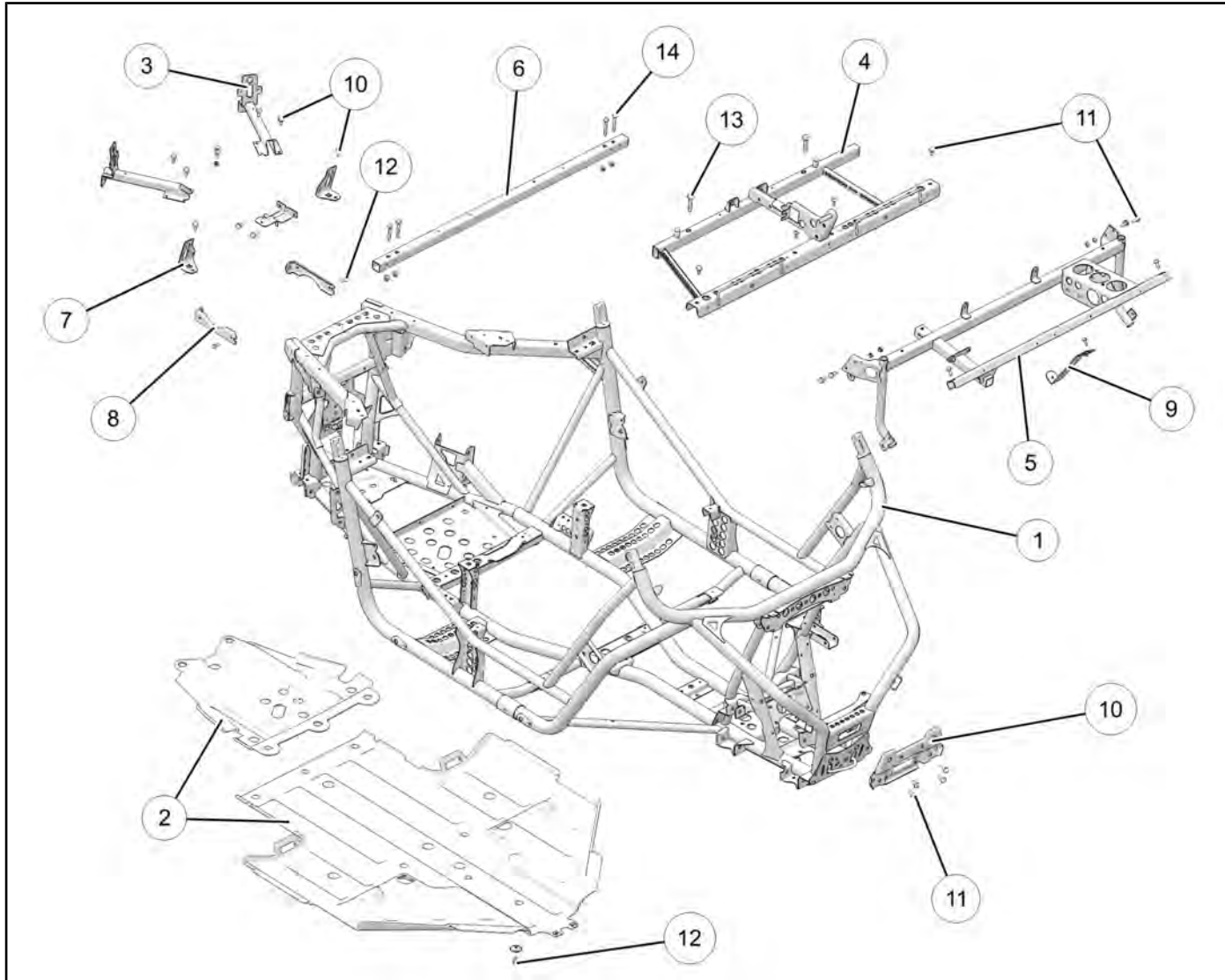
# BODY / FRAME

## Hood / Front Body



① Front Bumper	⑦ Grill
② Right Front Fender	⑧ Front Bumper Cover
③ Right Front Fender Flair (50" model has smaller flair)	⑨ Radiator Shroud
④ Left Front Fender	⑩ Screw <b>8 ft-lb (11 Nm)</b>
⑤ Left Front Fender Flair (50" model has smaller flair)	⑪ Bolt <b>7 ft-lb (10 Nm)</b>
⑥ Hood	⑫ Screw <b>8 ft-lb (11 Nm)</b>

**Chassis / Main Frame**



① Main Frame	⑧ Lower Rear Fascia Bracket
② Skid Plate	⑨ Dash Mounting Bracket
③ Rear Fascia Mount/Tiedown	⑩ Front Fascia Lower Mount Plate
④ Seat Base Frame	⑪ Frame Fasteners <b>14 ft-lb (19 Nm)</b>
⑤ Dash Frame	⑫ Skid Plate Screws <b>8 ft-lbs (11 Nm)</b>
⑥ Upper Frame Support	⑬ Seat Frame Bolt (rear) <b>30 ft-lb (41 Nm)</b>
⑦ Front Tiedown	⑭ Frame Support Bracket <b>22 ft-lb (30 Nm)</b>

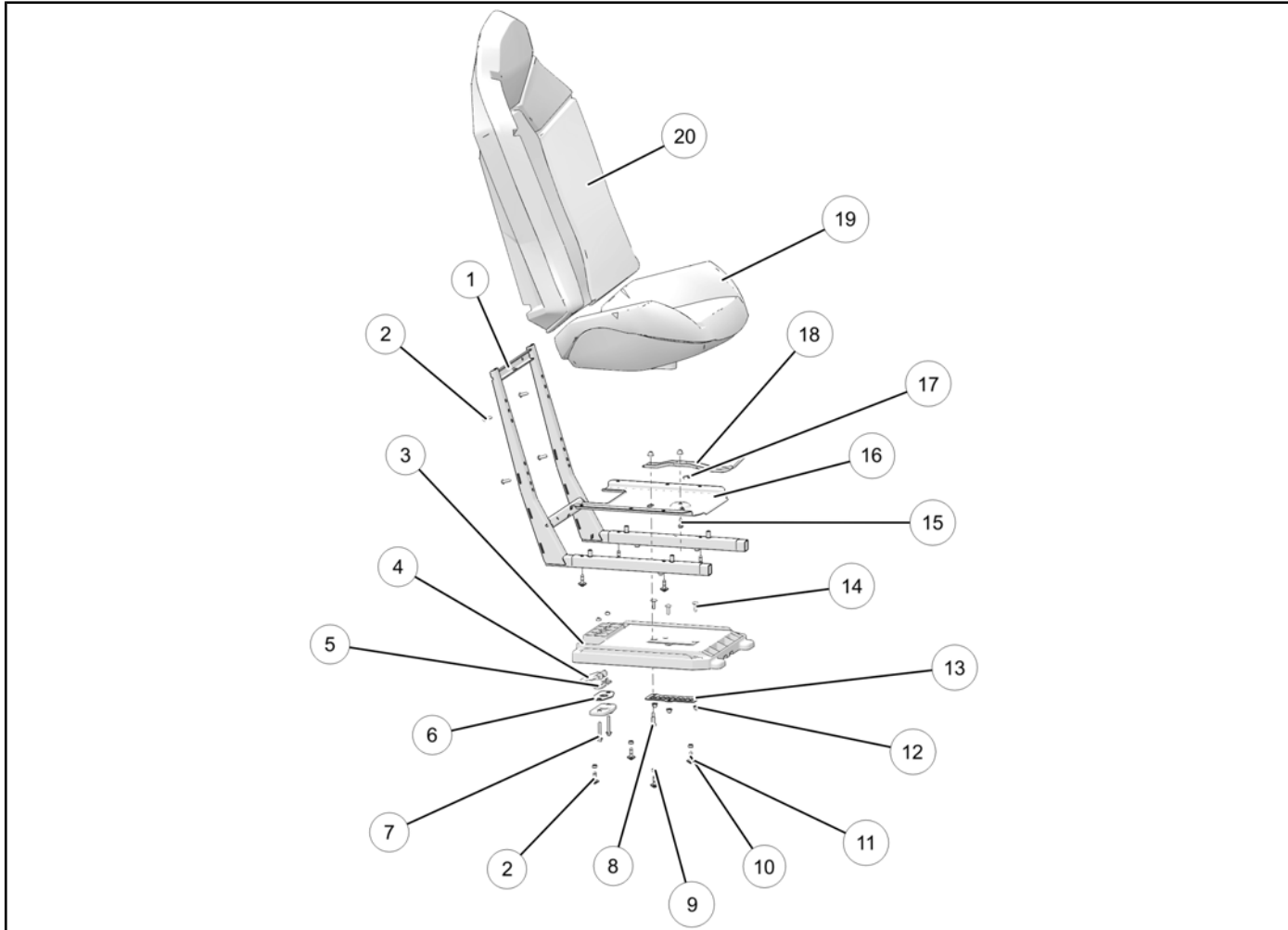
**10**



# BODY / FRAME

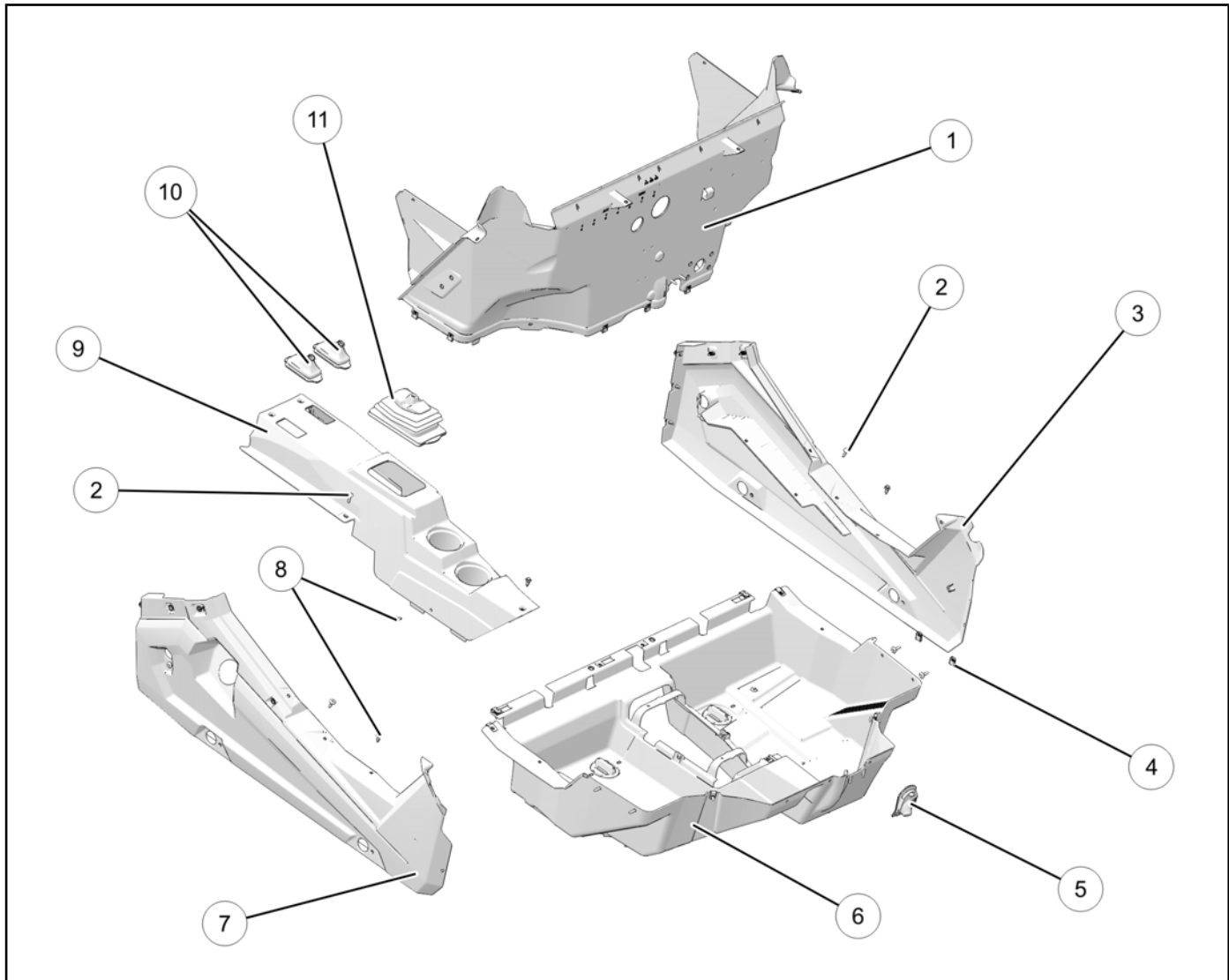
## Seats

NOTE: \*\*\*Driver's side shown. Passenger side will not have the seat slider.\*\*\*



① Seat Frame	⑪ Tube Spacer
② Seat Mounting Screw <b>4 ft-lb (5 Nm)</b>	⑫ Flange Nut Nylok
③ Seat Base Assembly Slider	⑬ Slider Adjustment Plate
④ Seat Latch Lever	⑭ Carriage Bolt
⑤ Spring Seat Latch	⑮ Shoulder Bolt
⑥ Plate Seat Latch	⑯ Seat Slider Mounting Plate
⑦ Seat Latch Screw <b>4 ft-lb (5 Nm)</b>	⑰ Spring
⑧ Shoulder Bolt	⑱ Seat Bottom
⑨ Spring Lock Washer	⑳ Seat Back
⑩ Flat Washer	

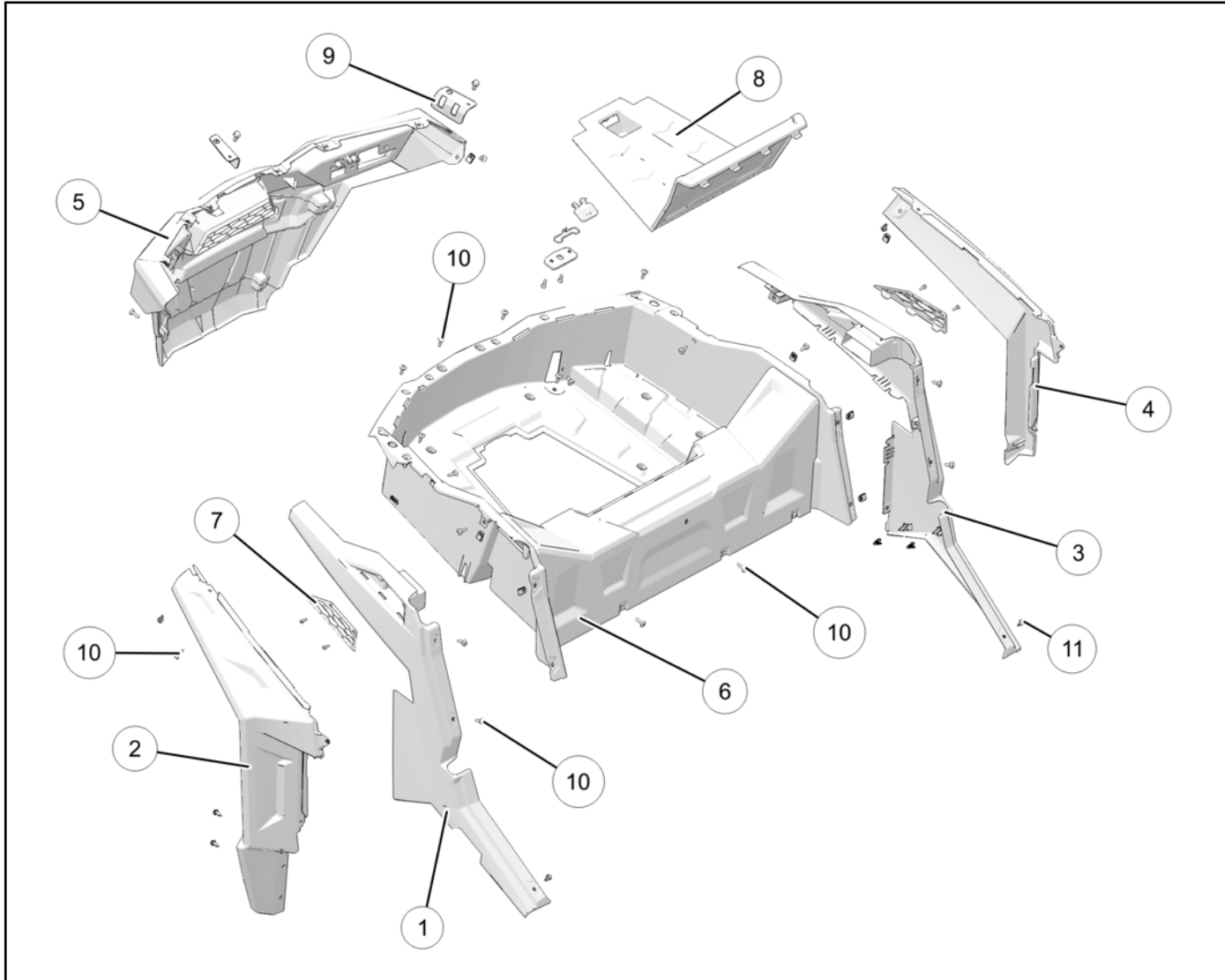
**Floor / Rocker Panels**



① Upper Floor	⑦ RH Rocker
② T27 Screw	⑧ Push Rivots
③ LH Rocker	⑨ Console Cover
④ U-Type Nuts	⑩ Seat Belt Boot
⑤ Block Off Flap	⑪ Shifter Boot
⑥ Lower Floor	

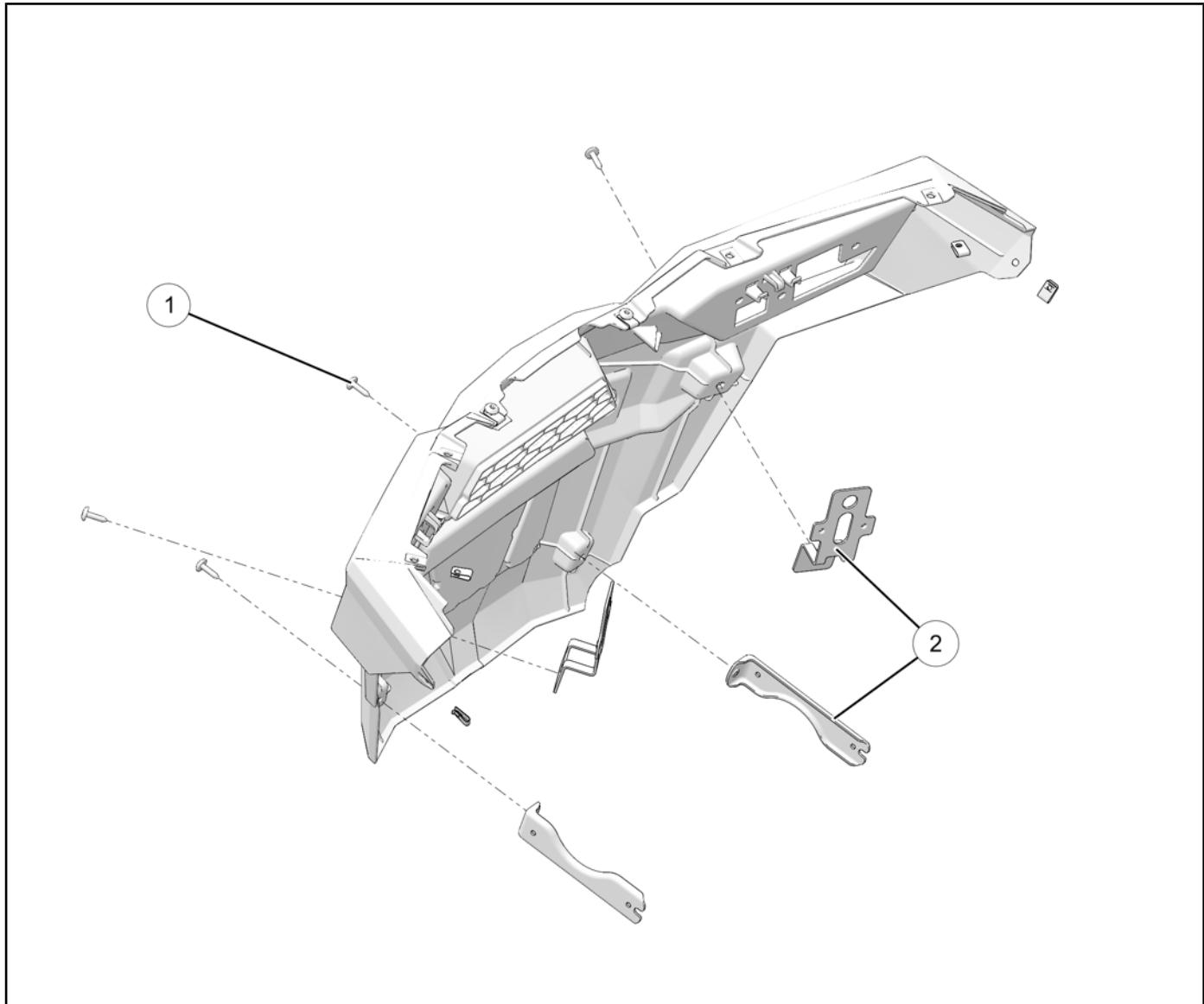
# BODY / FRAME

## Rear Cargo Box / Fenders



① RH Fender	⑦ Air Intake Cover
② RH Fender Flair (50" model has smaller flair)	⑧ Engine Access Panel
③ LH Fender	⑨ Bumper Bracket
④ LH Fender Flair (50" model has smaller flair)	⑩ T27 Torx Screws <b>8 ft-lb (11 Nm)</b>
⑤ Rear Bumper	⑪ Plastic Rivets
⑥ Cargo Box	

**Rear Bumper**



① Screw  
8 ft-lb (11 Nm)

② Mounting Brackets

## BODY / FRAME

### BODY COMPONENT REMOVAL

#### Seat Removal

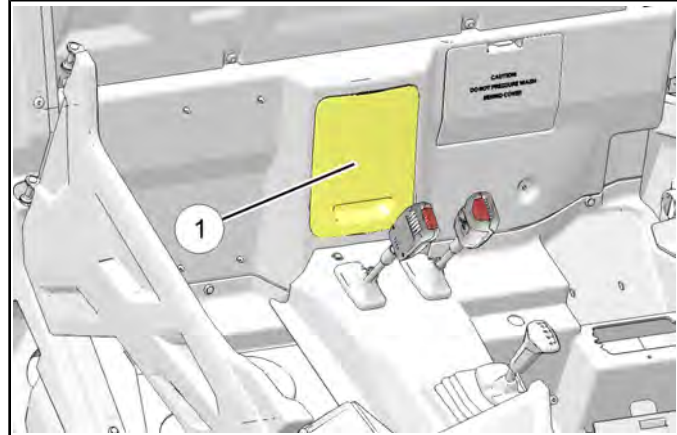
1. To remove any of the seats, lift upward on the latch lever ① located behind the seat bottom.



2. Lift upward and forward on the seat while lifting up on the latch lever and remove the seat from the vehicle.

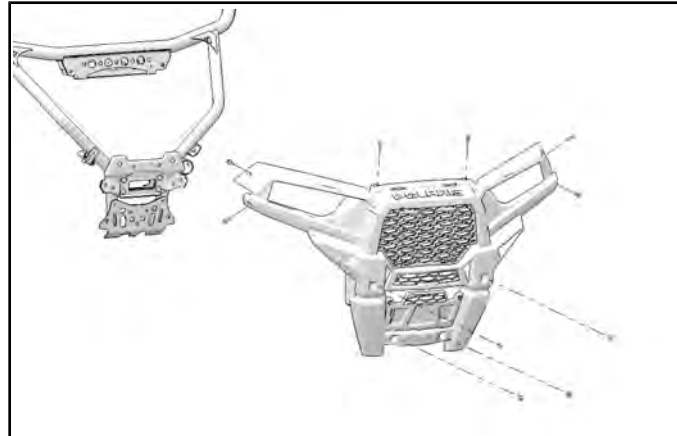
#### Engine Service Panel

Lift the panel upward and towards the front of the vehicle to remove the panel ①.



#### Front Bumper Removal

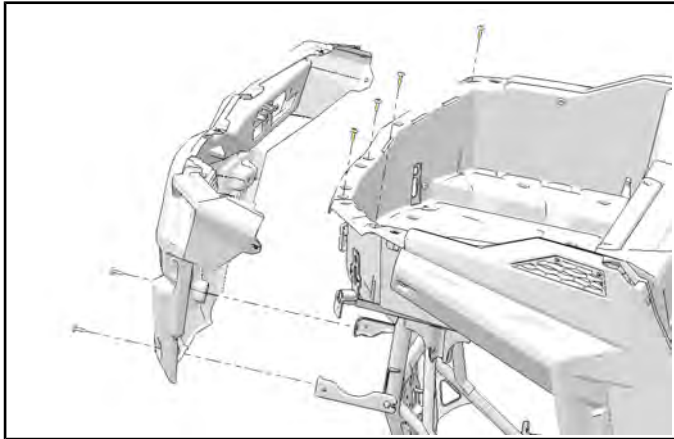
1. Remove the ten T-40 Torx screws retaining the front bumper.



2. Disconnect the front headlight connectors.
3. Remove the ten Torx screws retaining the upper, middle and lower portion of the bumper.
4. Pull out on the front bumper to remove the bumper, headlights and radiator deflector as an assembly.
5. If replacing the front bumper, remove both headlights and the radiator deflector.

## Rear Bumper Removal

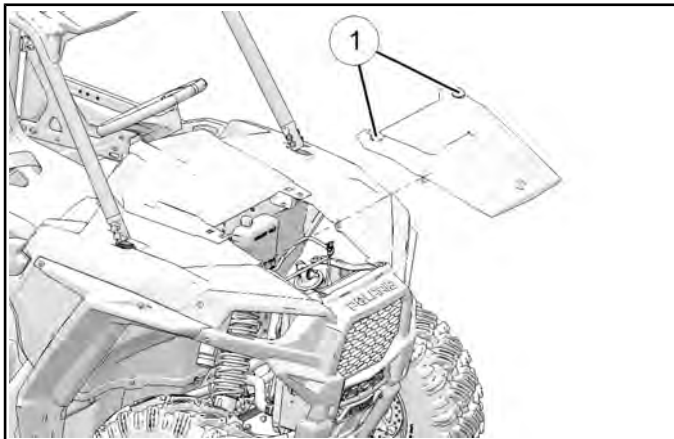
1. Disconnect the harness connectors at the tail lights.
2. Remove the zip ties retaining the harness to the rear bumper.
3. Remove the seven (two lower and five upper) T-27 Torx screws retaining rear bumper to the cargo box.



4. Remove rear bumper from vehicle.

## Hood Removal

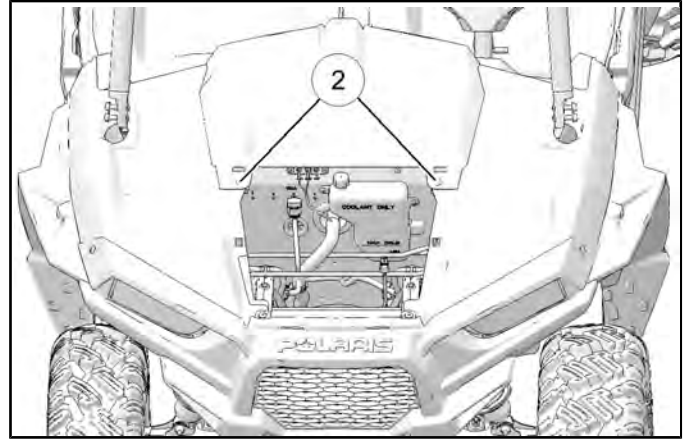
1. To remove the hood, turn both 1/4 turn latches ① to disengage the rear portion of the hood.



2. Lift rear of hood and slide forward to disengage the front tabs and remove the hood from the vehicle.

## Upper Dash Removal

1. Remove the hood as previously described.
2. Remove the two T-40 Torx screws retaining the Upper Dash cover between the front fenders ②.



3. Disconnect the instrument cluster, AWD switch, headlight switch, and ignition switch. Note their location and wire routing. Remove the upper dash.

## Lower Dash Removal

1. Remove the Upper Dash (see Chapter 10 – Upper Dash Removal, page 10.13)
2. Remove the two T-40 Torx screws retaining the dash and the one T-40 retaining the back of the dash to the bracket.
3. Remove the dash assembly from the vehicle.

**NOTE:** The lower dash is also held by clips. Pull the dash straight out to disengage the clips..

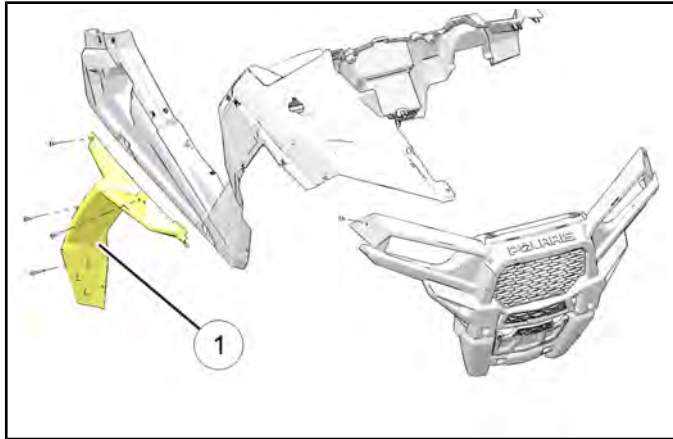


## BODY / FRAME

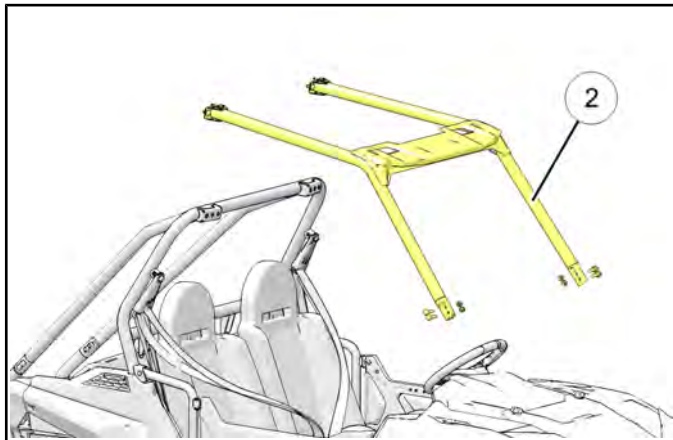
### Front Fender / Body Removal

1. Remove the six T40 Torx screws and remove fender flairs ① from the dash assembly, if equipped.

**NOTE:** Two of the screws on each fender flair will be longer than the others. Note this for reassembly.



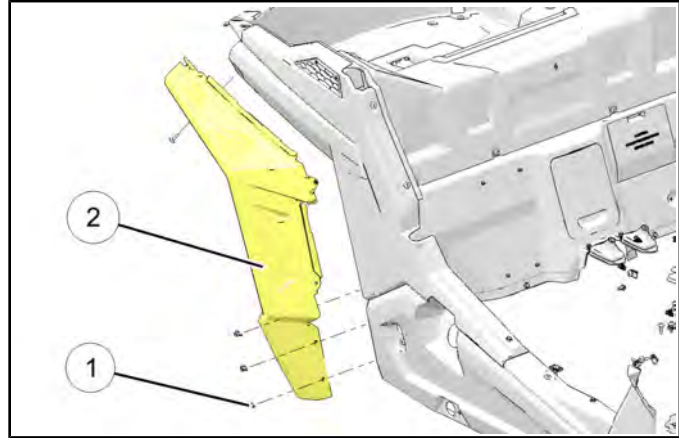
2. Remove the hood, upper dash and fender flairs as previously stated.
3. Remove the two T-40 Torx screw that were hidden beneath the fender flair (one on the outside of the fender and one on the inside).
4. Remove the front portion of the cab frame assembly ②. See Cab Frame Assembly, page 10.3 procedure for assembly torque specifications.



5. Remove the front fender.

### Rear Fender / Fender Flair Removal

1. Remove the four T27 Torx screws ①. Remove the three plastic rivets on the lower side of the rear fender flare.



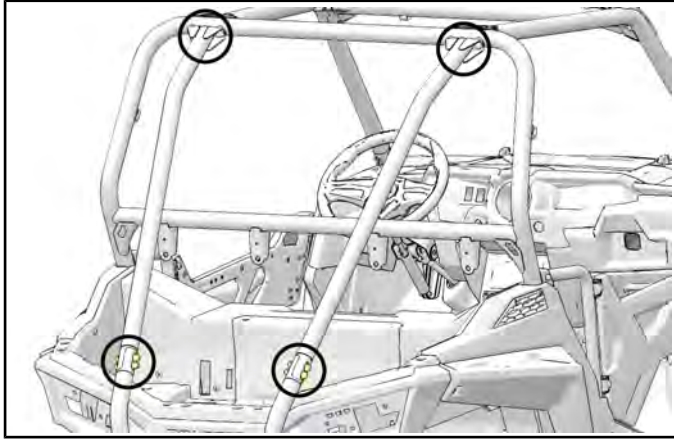
2. Remove the fender flare ② from the vehicle.
3. Remove the four plastic rivets (one of them hidden on the inside) retaining the rear fender.
4. Remove the one T-40 Torx screw on the top rear of the fender.
5. Remove it from the vehicle.

### Cargo Box Removal

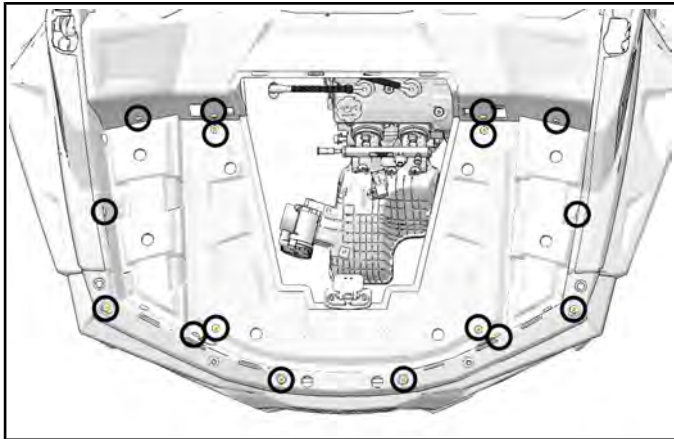
1. Remove both seats.
2. Remove the PVT pre-filter (driver side) and air intake pre-filter (passenger side) assembly.
3. Remove the T-25 Torx screw retaining each shock reservoir hose cover and remove the cover.
4. Loosen the shock reservoir clamps and maneuver the reservoir through the hole in the box.

**NOTE:** Do NOT let the reservoir hang by the hose. Use a wire or string to restrain the reservoir.

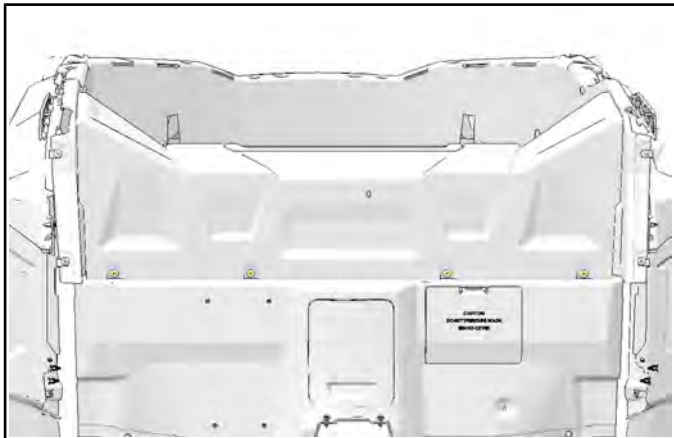
5. If equipped with rear cab frame extenders, remove the four bolts retaining each rear cab frame and remove it from the vehicle. Remove the bolts retaining the hip bolsters to the cab frame hoop.



6. Remove the eight fasteners retaining the rear cab frame to the frame and to the front cab frame. Remove the rear cab frame from the vehicle.
7. Remove the 17 Torx screws in the bed of the cargo box.



8. Remove the seven T-40 Torx screws on the cab side of cargo box.



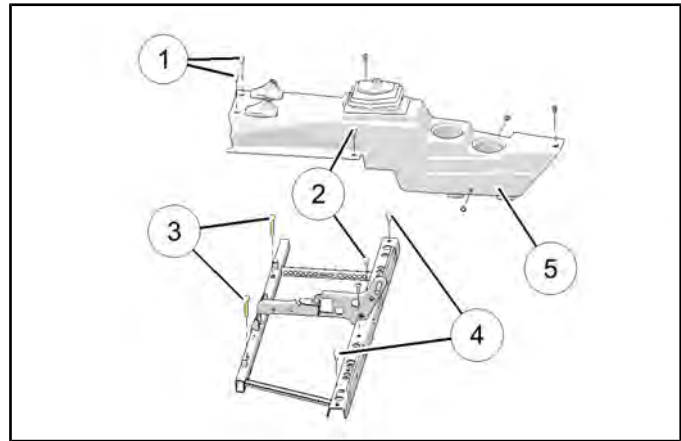
9. Remove the cargo box half from the vehicle.

## Rocker Panel / Console / Floor

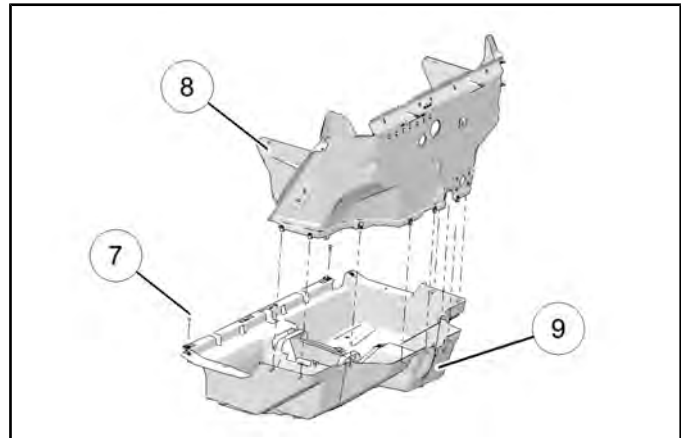
1. Remove the push rivets and Torx screws retaining the rocker panel and remove panel from the vehicle.

**NOTE:** If replacing the floor, remove rocker panels from both sides.

2. Remove the T27 screws ① retaining the console ⑤ to the floor.
3. Remove shift handle knob and remove the console.



4. Remove the Torx screws retaining the upper floor ⑧ to the lower floor ⑨.



5. Remove the Torx screws ⑦ retaining the rear portion of the floor and remove the lower floor from the vehicle.

## BODY / FRAME

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### DECALS

#### Decal Replacement

 **WARNING**

The following procedure involves the use of an open flame. Perform this procedure in a well ventilated area, away from gasoline or other flammable materials. Be sure the area to be flame treated is clean and free of gasoline or flammable residue.

 **WARNING**

Do not flame treat components that are installed on the vehicle. Remove the component from the vehicle before flame treating.

The body cab components are plastic polyethylene material. Therefore, they must be “flame treated” prior to installing a decal to ensure good adhesion. The flame treating procedure can also be used to reduce or eliminate the whitish stress marks that are sometimes left after a fender or cab is bent, flexed, or damaged.

To flame treat the decal area:

1. Pass the flame of a propane torch back and forth quickly over the area where the decal is to be applied until the surface appears slightly glossy. This should occur after just a few seconds of flame treating. Do not hold the torch too close to the surface (2-3 inches from the flame tip is recommended). Keep the torch moving to prevent damage.
2. Apply the decal on one edge first. Slowly lay down remainder of the decal while rubbing lightly over the decal surface to eliminate any air bubbles during the application.

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## GENERAL INFORMATION

### Special Tools

PART NUMBER	TOOL DESCRIPTION
PV-43568	Fluke™ 77 Digital Multimeter
PV-43526	Connector Test Kit
2870630	Timing Light
PU-50338	Battery Hydrometer
2460761	Hall Effect Sensor Probe Harness
2871745	Static Timing Light Harness
PU-50296	Battery Conductance Analyzer (MDX-610P)
PU-49466	Relay Bypass

### Bosch Automotive Service Solutions:

1-800-345-2233 or <http://polaris.service-solutions.com/>

### Service Notes

Keep the following notes in mind when diagnosing an electrical problem:

- Refer to wiring diagram for stator and electrical component resistance specifications.
- When measuring resistance of a component that has a resistance value under 10 Ohms, remember to subtract meter lead resistance from the reading. Connect the leads together and record the resistance. The resistance of the component is equal to tested value minus the lead resistance.
- Become familiar with the operation of your meter. Be sure leads are in the proper jack for the test being performed (i. e. 10A jack for current readings). Refer to the Owner's Manual included with your meter for more information.
- Voltage, amperage, and resistance values included in this manual are obtained with a Fluke™ 77 Digital Multimeter (PV-43568). This meter is used when diagnosing electrical problems. Readings obtained with other meters may differ.
- Pay attention to the prefix on the multimeter reading (K, M, etc.) and the position of the decimal point.
- For resistance readings, isolate the component to be tested. Disconnect it from the wiring harness or power supply.

- The headlights, taillights, switches and LED light will stay on for approximately 20 seconds after the key has been switched OFF. This is a normal occurrence.

### Under Dash Components

The following switches and components can be accessed underneath the instrument / dash panel:

- Speedometer
- AWD Switch
- Headlamp Switch
- 12 Vdc Accessory Power Point
- Ignition Switch
- LED Ambiance Light

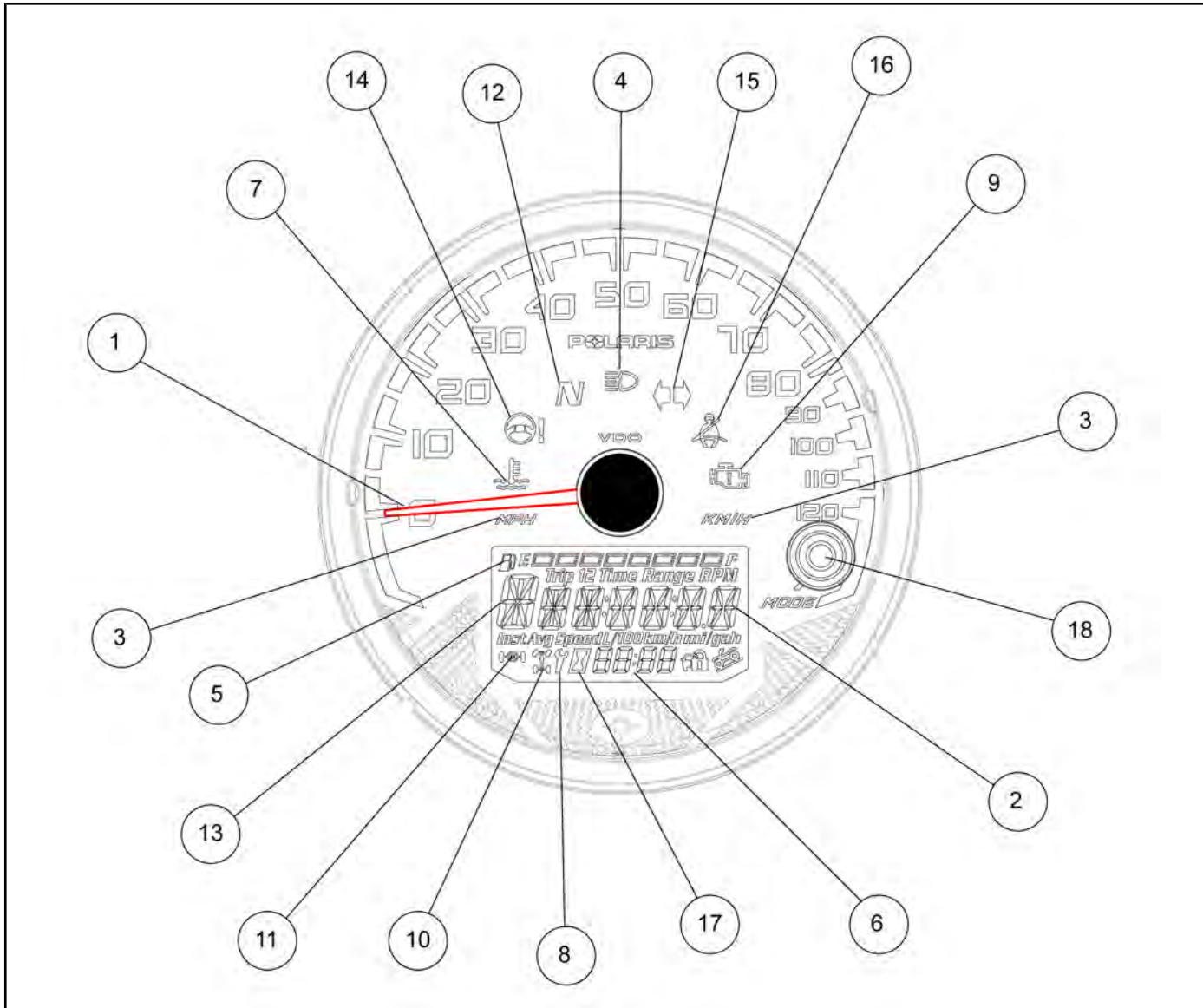


# ELECTRICAL

## INSTRUMENT CLUSTER

### Overview

The instrument cluster displays critical vehicle information to the user. Reference the following page for display functions and descriptions.



**NOTE:** Some features are not applicable to all models.

The use of a high pressure washer may damage the instrument cluster. Wash the vehicle by hand or with a garden hose using mild soap. Certain products, including insect repellents and chemicals, will damage the instrument cluster lens. Do not use alcohol to clean the instrument cluster. Do not allow insect sprays to contact the lens. Immediately clean off any gasoline that splashes on the instrument cluster.

The rider information display is located in the instrument cluster. All segments will light up for 1 second at start-up.

**NOTE:** If the instrument cluster fails to illuminate, a battery over-voltage may have occurred and the instrument cluster may have shut off to protect the electronic speedometer.

①	<b>Vehicle Speed Display</b> - Analog display of vehicle speed in MPH or km/h.
②	<b>Information Display Area - Odometer / Trip Meter / Tachometer / Engine Temperature / Engine Hours / Service Info / Clock</b> - LCD display of the service hour interval, total vehicle miles or km., total engine hours, a trip meter, engine RPM and engine temperature.
③	<b>MPH / KM/H Display</b> - MPH is displayed when the instrument cluster is in the <i>Standard</i> mode. KM/H is displayed when the instrument cluster is in the <i>Metric</i> mode.
④	<b>High Beam Indicator</b> - LED icon illuminates whenever the Headlamp switch is in the high beam position.
⑤	<b>Fuel Level Indicator</b> - LCD bar graph indicating current fuel level. All segments will flash when the fuel level is very low.
⑥	<b>Clock</b> - Displays current time in either 12-hour or 24-hour formats.
⑦	<b>Engine Temperature Indicator</b> - LED icon illuminates when the ECM determines the engine is overheating. The indicators will initially flash to indicate the engine is overheating. The indicators will stay lit and not flash if a severe overheating condition exists.
⑧	<b>Service Interval Indicator</b> - Preset at the factory and adjustable by the user, a flashing wrench symbol alerts the operator that the preset service interval has been reached and maintenance should be performed. The wrench icon will flash for 10 seconds upon start-up once it reaches 0.
⑨	<b>Check Engine MIL</b> - Illuminated when the ECM has detected a Diagnostic Trouble Code in the engine management system.
⑩	<b>AWD Indicator</b> - Illuminated when the AWD / 2WD switch is in the <i>AWD</i> position.
⑪	<b>Differential Unlocked Indicator</b> - If equipped with Turf Mode, will illuminate when the AWD switch is in Turf mode..
⑫	<b>Neutral Gear Indicator</b> - LED icon illuminates when gear selector is in the neutral (N) position.
⑬	<b>Gear Position Indicator</b> - Displays gear selector position. P = Park R = Reverse N = Neutral D = Drive 3 = 3rd Gear 2 = 2nd Gear 1 = 1st Gear – = Gear Signal Error (shifter stuck between gears)
⑭	<b>Power Steering System MIL</b> - LED icon illuminates when a fault has occurred in the EPS system. This indicator also turns on momentarily when the key is turned on.
⑮	<b>Turn Signal / Hazard Lamp Indicator</b> - If equipped with turn signals, the LED icon illuminates whenever the left, right or hazard blinker is activated.
⑯	<b>Helmet / Seat Belt Indicator</b> - LED icon illuminates for several seconds when the key is turned to the ON position as a reminder for the riders to properly use safety equipment. The lamp stays illuminated until the driver's seat belt is properly latched.
⑰	<b>Hours Indicator</b> - Illuminates when Hours are being displayed on the Information Display
⑱	<b>Mode Button</b> - Used to move through the menu features.

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## Information Display Area

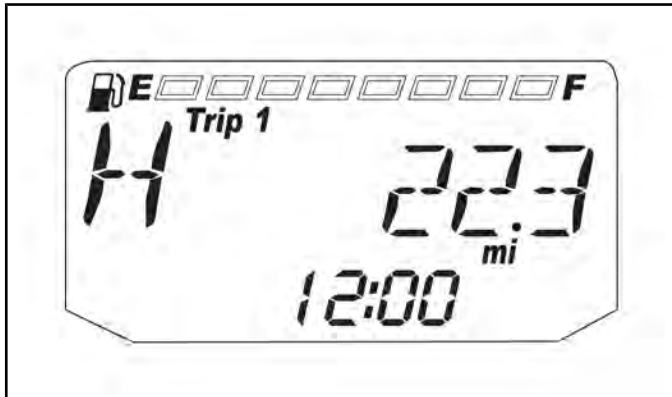
The LCD portion of the instrument cluster is the information display area. Information displayed in this area includes: odometer, trip meter, engine RPM, engine hours, service interval, clock, engine Diagnostic Trouble Codes (DTCs) and power steering DTCs.

### Odometer



The odometer records and displays the total distance traveled by the vehicle. The odometer can not be reset.

### Trip Meter

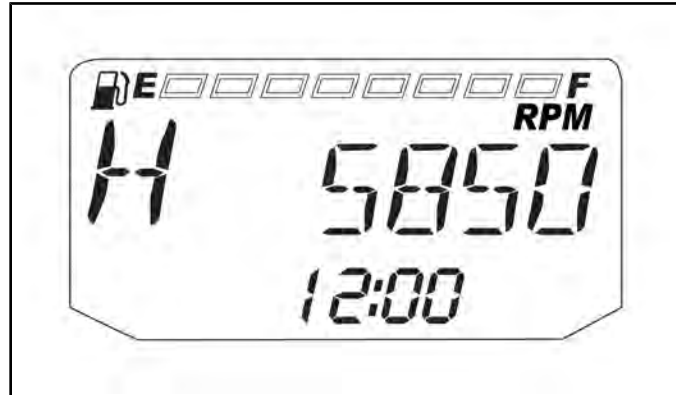


The trip meter records the miles traveled by the vehicle on each trip. To reset the trip meter:

1. Toggle the MODE button to TRIP 1.

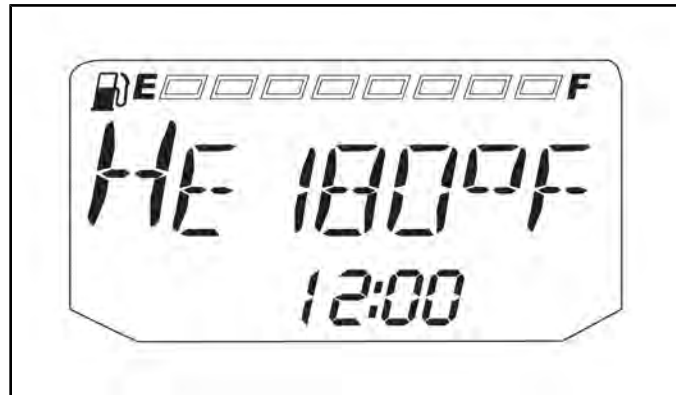
2. To reset to 0, push and hold the MODE button until the distance display changes to 0.

### Tachometer (RPM)



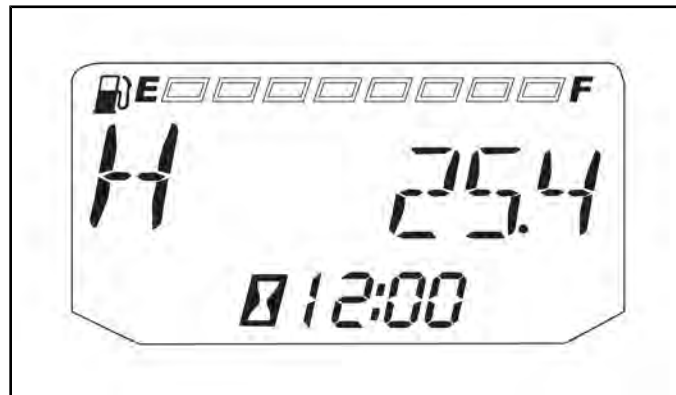
Engine RPM can be displayed digitally.

### Engine Temperature



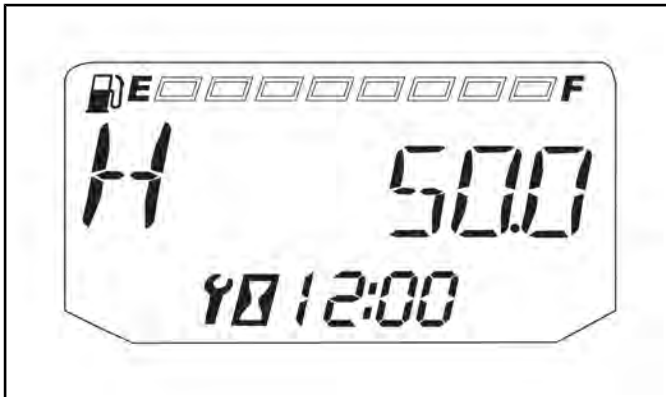
Engine temperature can be displayed in ° F or ° C. Refer to "Units of Measurement" to change the format.

### Engine Hours



Engine hours are logged anytime the engine is running. Total hours can not be reset.

## Programmed Service Interval



The initial factory service interval setting is 50 hours. Each time the engine is started, the engine hours are subtracted from the service interval hours. When the service interval reaches 0, the LCD wrench icon will flash for approximately 10 seconds each time the engine is started.

To change the hour setting or reset the function, follow these steps:

3. Toggle the MODE button until the wrench icon is displayed in the information area.
4. Press and hold the MODE button until the information display area begins to flash.
5. Toggle the MODE button to increase the service interval hours in 5 hour increments to a maximum of 100 hours.
6. To turn off the service interval function, toggle the MODE button until "OFF" is displayed.

## Clock



The clock displays the time in a 12-hour or 24-hour format. Refer to "Units of Measurement" to change the format (Standard 12-hour / Metric-24 hour). To set the clock, follow these steps:

7. Toggle the MODE button until the odometer is displayed.

8. Press and hold the MODE button until the hour segment flashes. Release the button.
9. With the segment flashing, tap the MODE button to advance to the desired setting.
10. Press and hold the MODE button until the next segment flashes. Release the button.
11. Repeat steps 3-4 twice to set the 10 minute and 1 minute segments. After completing the 1-minute segment, step 4 will save the new settings and exit the clock mode.

## Units of Measurement

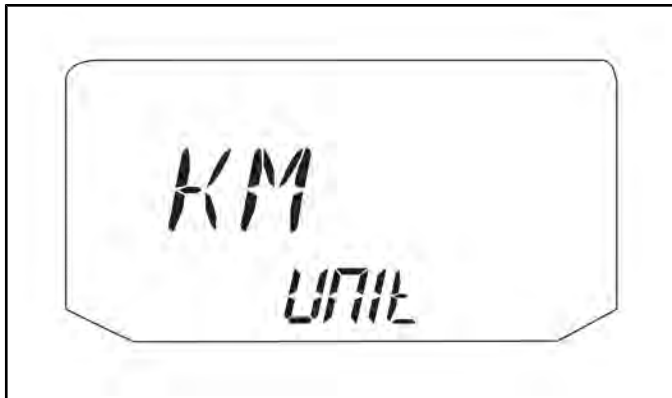
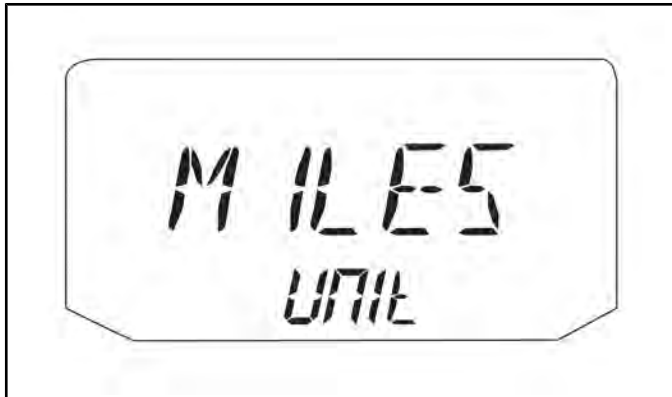
	STANDARD DISPLAY	METRIC DISPLAY
Distance	Miles (MPH)	Kilometers (KM/H)
Time	12-Hour Clock	24-Hour Clock
Temperature	Fahrenheit	Celsius

To change between Standard and Metric units of measurement, follow these steps:

12. Turn the key to the OFF position.
13. Press and hold the MODE button while turning the key to the ON position.

## ELECTRICAL

14. When the display flashes the distance setting, tap the MODE button to advance to the desired setting.



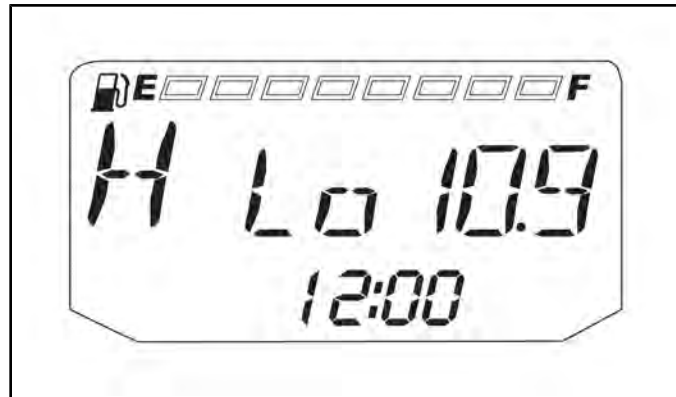
15. Press and hold the MODE button to save the setting and advance to the next display option.

16. Repeat the procedure to change remaining display settings.

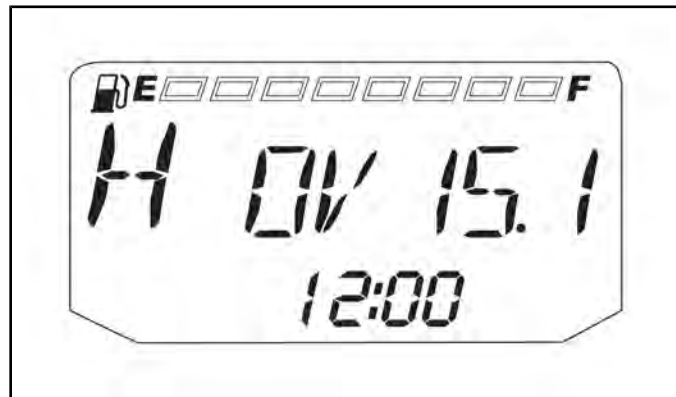
### Under / Over Voltage

This warning usually indicates that the vehicle is operating at an RPM too low to keep the battery charged. It may also occur when the engine is at idle and a high electrical load is applied (lights, cooling fan or other accessories).

If battery voltage drops below 11 volts, a warning screen will display "Lo" and provide the present battery voltage. If voltage drops below 8.5 volts, LCD backlighting and icons will turn off.



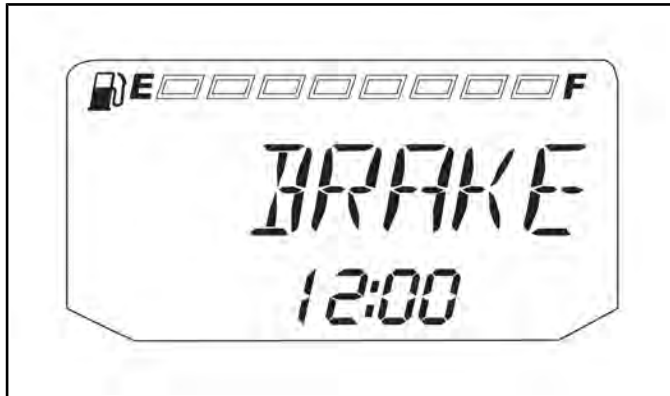
If battery voltage rises above 15 volts, a warning screen will display "OV" and provide the present battery voltage. If voltage rises above 16.5 volts, LCD backlighting and icons will turn off.



## Park Brake Indicator (INT'L Model Only)

This warning is used to notify the operator that the park brake lever is engaged.

When the park brake is fully engaged, "BRAKE" appears in the rider information display. Engine speed is limited to 1500 RPM in all gears, except neutral. If throttle is applied, this limiting feature prevents operation, which protects the park brake pads from excessive wear.



## Diagnostic Mode

The diagnostic mode is accessible only when the check engine MIL has been activated.

Use the following procedure to display diagnostic trouble codes that were activated during current ignition cycle causing the MIL to illuminate. Diagnostic trouble codes will remain stored in the gauge (even if MIL turns off) until the key is turned off.

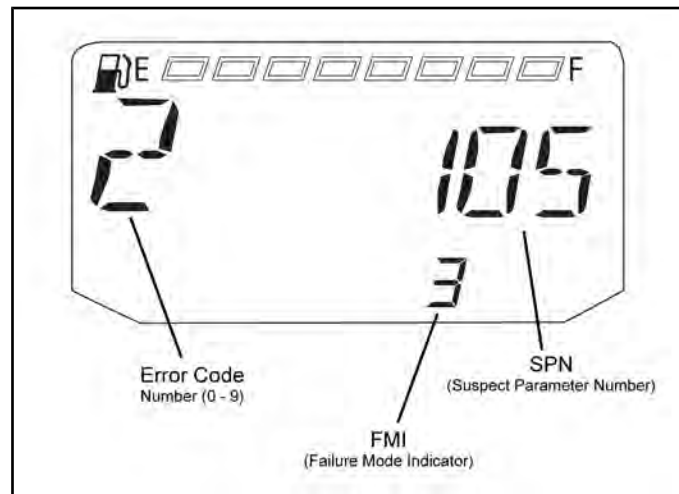
1. If the trouble code (s) are not displayed, use the MODE button to toggle until "CK ENG" displays on the information display area.



2. Press and hold the MODE button to enter the diagnostics code menu.

3. A set of three numbers will appear in the information area.

- The first number (located far left) can range from 0 to 9. This number represents the total number of trouble codes present (example: 2 means there are 3 codes present).
- The second number (located top right) can be 2 to 6 digits in length. This number equates to the suspected area of fault (SPN).
- The third number (located bottom right) can be 1 to 2 digits in length. This number equates to the fault mode (FMI).



4. Use the trouble code reference table in the EFI Chapter for a description of each code (see Chapter 4 – Trouble Code Display (ETC), page 4.34).
5. If more than one code exists, press the MODE button to advance to the next trouble code.
6. To exit the diagnostic mode, press and hold the MODE button or turn the ignition key OFF once the codes are recorded.

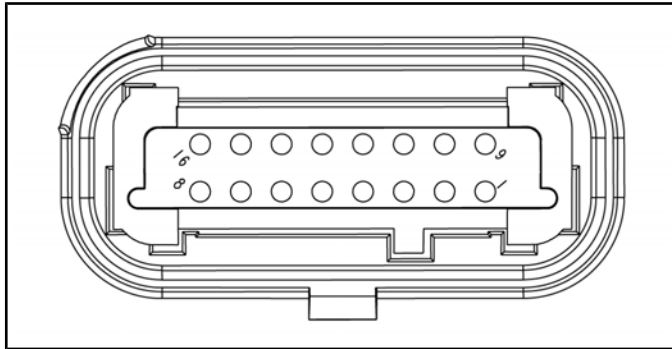
**NOTE:** If there is a diagnostic problem with the power steering system, the power steering MIL will illuminate and blink in place of the check engine MIL.



# ELECTRICAL

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## Instrument Cluster Pinouts

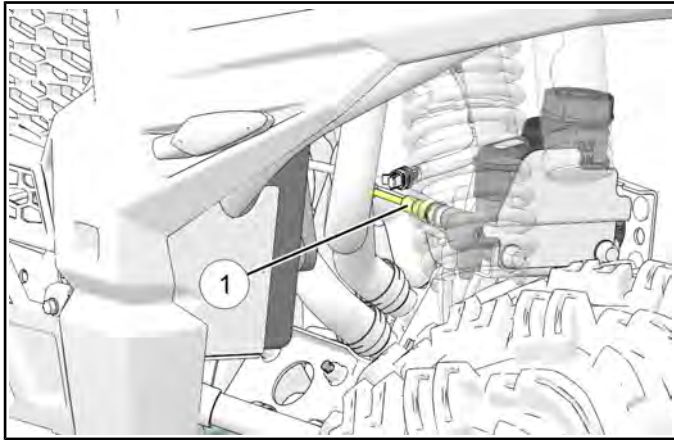


FUNCTION	PIN
CAN High	1
CAN Low	2
Switched Power (Vdc)	3
Constant Power (Vdc)	4
Ground	5
High Beam Input	8
Fuel Level Sensor	11
Ambient Air Temperature	15
<b>International Models Only</b>	
Turn Signal Input, LH	6
Turn Signal Input, RH	7

## SWITCHES

### Brake Light Switch

The brake light switch ① is located on the front brake line banjo bolt of the master cylinder. The brake switch may be accessed easily by removing the hood access panel.



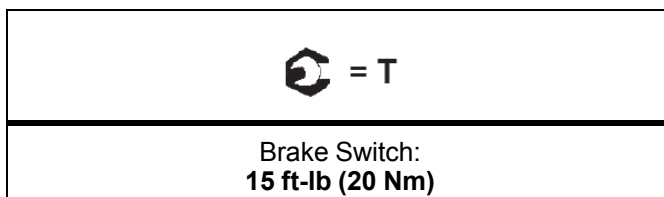
#### Testing:

1. Disconnect wire harness from switch and connect an ohmmeter across switch contacts. The reading should be infinite (OL).
2. Apply the brake and check for continuity. If there is no continuity, or if resistance is greater than 0.5 ohms, clean the switch terminals. Re-test and replace switch if necessary.

#### Replacement:

**NOTE: Brake fluid will leak out of the master cylinder when the brake switch is replaced. Place a suitable catch container/rags below the master cylinder prior to brake switch removal.**

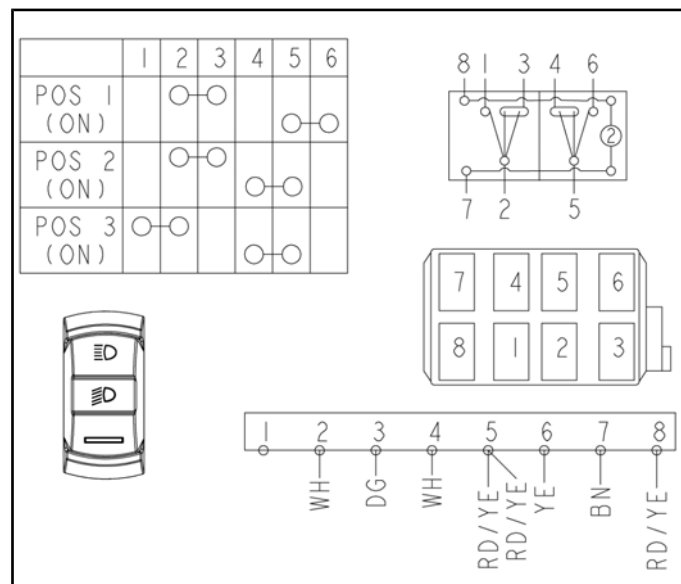
1. Disconnect the harness going to the brake switch.
2. Loosen and remove the brake switch.
3. Install new brake switch. Torque brake switch to specifications.



4. Bleed the brake system. See Chapter 9 – BRAKE BLEEDING / FLUID CHANGE, page 9.8

### Headlamp Switch

1. Disconnect the headlamp switch harness by depressing the connector locks and pulling on the connector. Do not pull on the wiring.
2. Test between the 3 sets of outputs (OFF / LOW / HIGH). If any of the tests fail, replace headlamp switch assembly.
  - Move the switch to HIGH. There should be continuity between switch pins 2 and 3; 5 and 6.
  - Move the switch to LOW. There should be continuity between switch pins 2 and 3; 4 and 5.
  - Move the switch to OFF. There should be continuity between switch pins 1 and 2; 4 and 5.

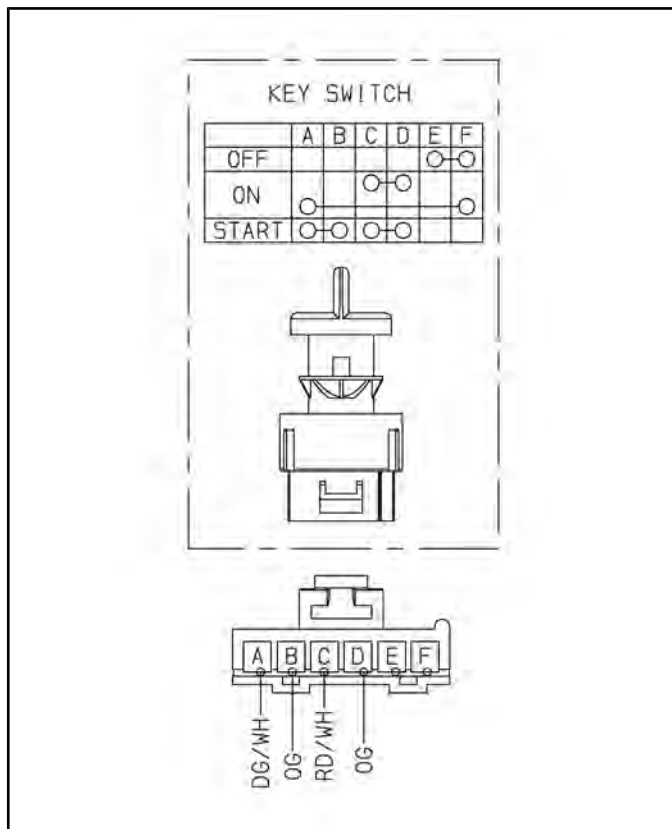


**NOTE: Pins 7 and 8 provide power and ground to light the switch lamp.**

# ELECTRICAL

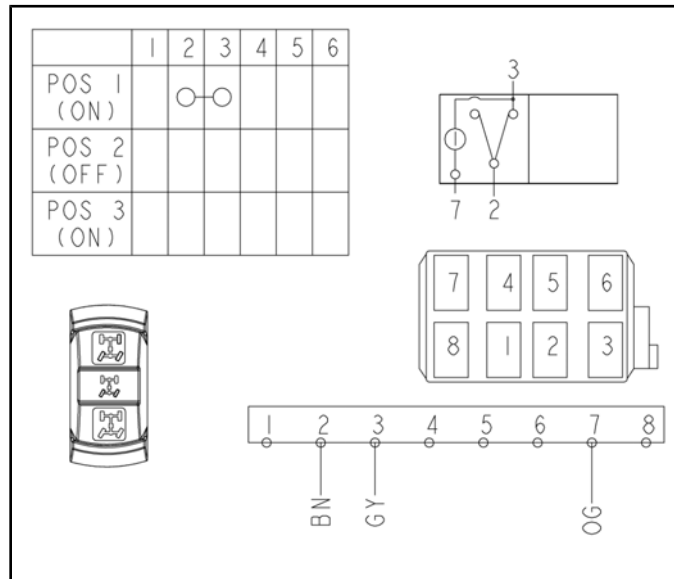
## Ignition (Key) Switch

1. Disconnect the key switch harness by depressing the connector lock and pulling on the connector. Do not pull on the wiring.
2. Test between the 3 sets of outputs (OFF / ON / START). If any of the tests fail, replace ignition switch assembly.
  - Turn the ignition key to ON. There should be continuity between switch pins C and D.
  - Turn the ignition key to START. There should be continuity between switch pins A and B; C and D.



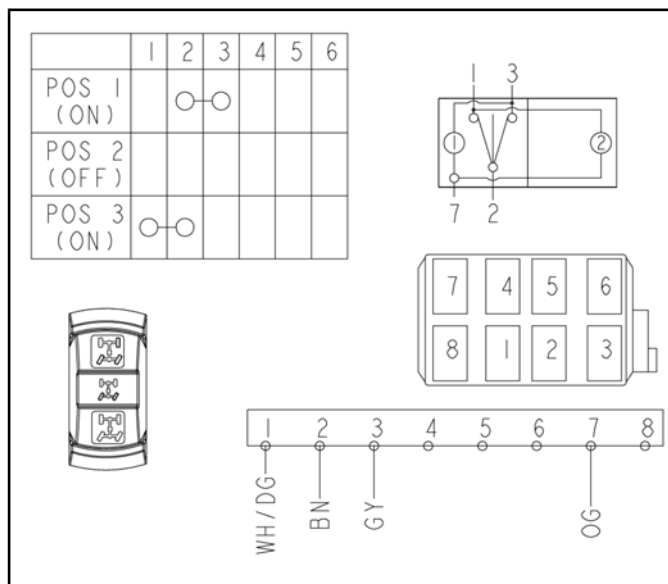
## AWD / 2WD Switch (models without Turf)

1. Disconnect the AWD / 2WD switch harness by depressing the connector locks and pulling on the connector. Do not pull on the wiring.
2. Test between the 2 sets of outputs (AWD / 2WD). If any of the tests fail, replace the switch assembly.
  - Move the switch to AWD (ON). There should be continuity between switch pins 2 and 3.
  - Move the switch to 2WD (NONE / OFF). There should be no continuity between any pins.



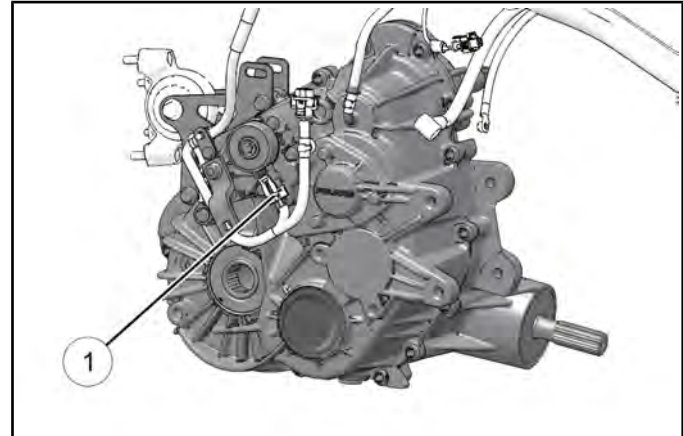
## AWD/2WD/Turf Switch (models with Turf)

1. Disconnect the AWD/2WD/Turf switch harness by depressing the connector locks and pulling on the connector. Do not pull on the harness.
2. Test between the three sets of outputs (AWD / 2WD / TURF). If any of the tests fail, replace the switch.
  - Move the switch to AWD. There should be continuity between switch pins 2 and 3; 5 and 6.
  - Move the switch to 2WD. There should be no continuity between any pins.
  - Move the switch to TURF. There should be continuity between switch pins 1 and 2; 4 and 5.



## Transmission (Gear Position) Switch

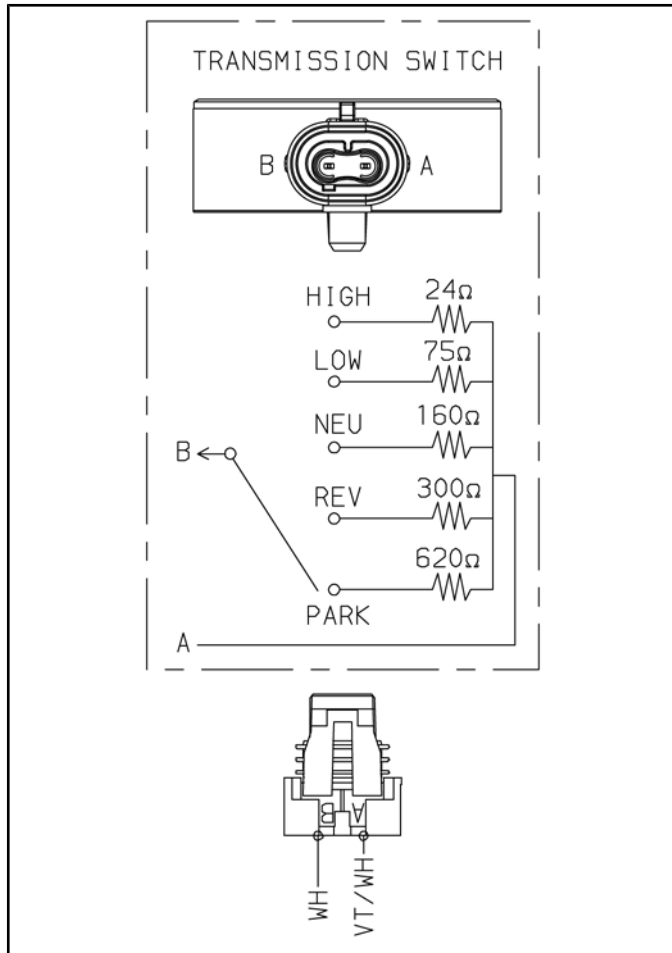
1. The transmission (gear position) switch ① is located on the RH side of the transmission and can be accessed through the RH wheel well area.



2. Disconnect the transmission switch harness by lifting the connector lock and pulling on the connector. Do not pull on the wiring.

# ELECTRICAL

- Test the transmission switch continuity readings for each gear position and compare to the specification table below.



GEAR POSITION	RESISTANCE VALUE WHEN MEASURED AT SWITCH TERMINALS A AND B
HIGH	24 Ω
LOW	75 Ω
NEU	160 Ω
REV	300 Ω
PARK	620 Ω

## Seat Belt Switch

### Location

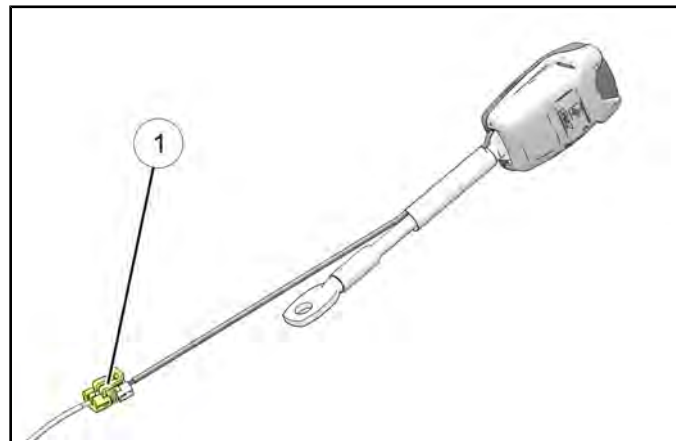
Found on the driver's seat belt latch

### Functionality

If the circuit is open (buckle undone) vehicle speed will be limited to 15mph. If the circuit is closed (buckle inserted), the vehicle will function normally.

### Testing:

- Disconnect the harness ① running to the seat belt.



- Using a multi-meter, measure between both pins on switch.

	SEAT BELT DISENGAGED	SEAT BELT ENGAGED
Measure between both pins on switch	∞ (OL)	< 1 Ω

## CHARGING SYSTEM

### Stator

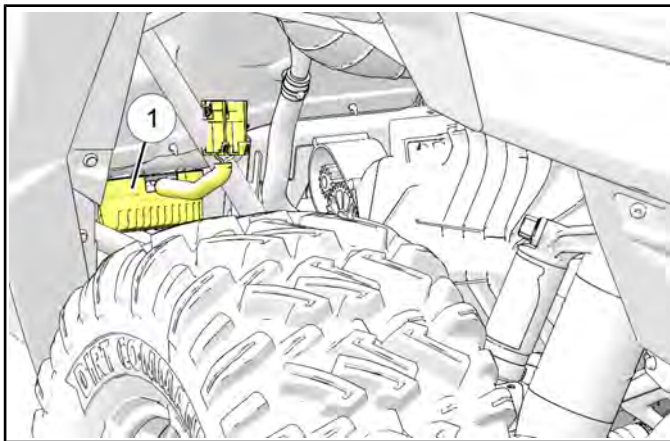
Refer to Engine Chapter – Stator Cover Removal / Inspection, page 3.44 to service the stator.

**NOTE:** The stator cover can be removed with the engine installed in the chassis.

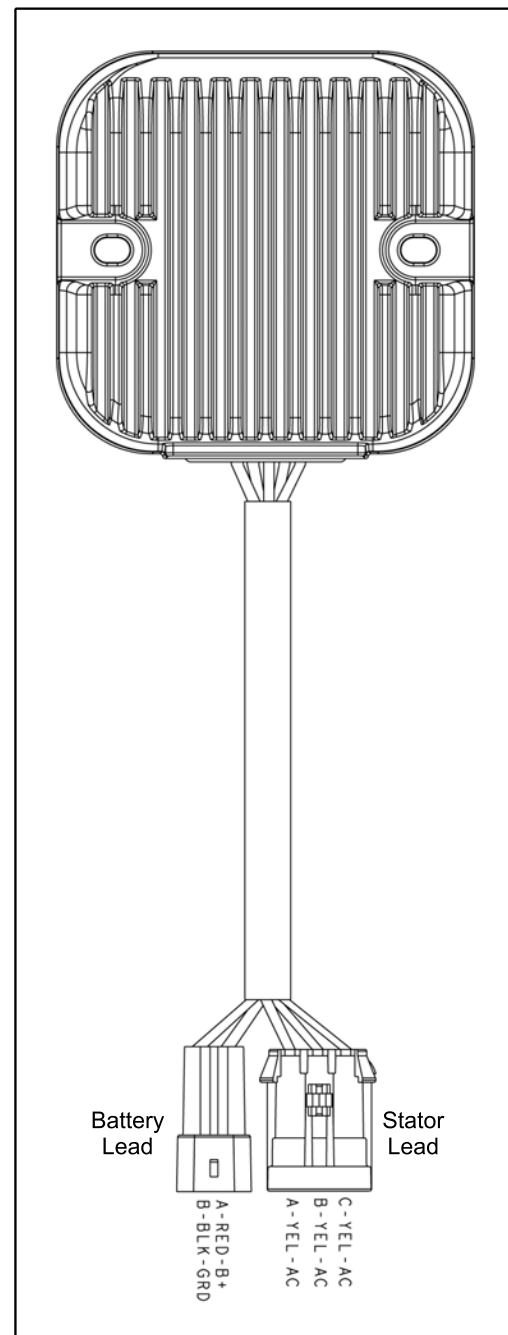
Be sure to thoroughly clean the area around the stator cover prior to removal.

### Voltage Regulator

The regulator / rectifier ① is located in front of the left rear wheel. It is mounted behind the left panel divider.



**NOTE:** If the regulator / rectifier case temperature exceeds 230° F or 110° C, the unit will turn itself off to cool down. The unit will turn on again after it has cooled down to at least 212° F or 100° C. If it turns off, verify the cooling fins are clean, free from debris and that adequate airflow is present.





# ELECTRICAL

## Charging System “Break Even” Test

### CAUTION

Do not allow the battery cables to become disconnected with the engine running. Follow the steps below as outlined to reduce the chance of damage to electrical components.

The “break even” point of the charging system is the point at which the alternator overcomes all system loads (lights, etc.) and begins to charge the battery. Depending on battery condition and system load, the break even point may vary slightly. The battery should be fully charged before performing this test.

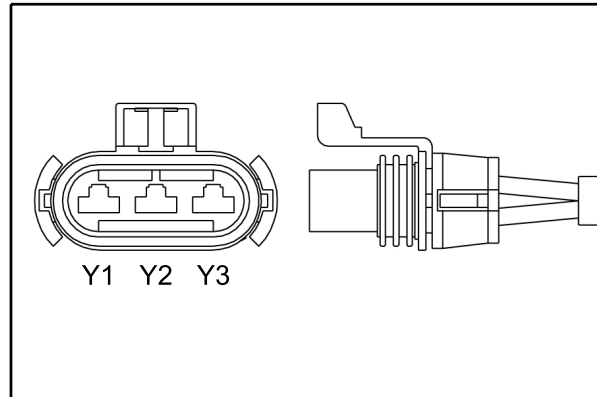
### WARNING

Never start the engine with an ammeter connected in series. Damage to the meter or meter fuse will result.  
Do not run test for extended period of time.  
Do not run test with high amperage accessories.

1. Using an inductive amperage metering device, (set to DC amps) connect to the negative battery cable.
2. With engine off, key switch and lights in the on position, the ammeter should read negative amps (battery discharge).
3. Shift transmission into park and start the engine. With the engine running at idle, observe meter readings.
4. Increase engine RPM while observing ammeter and tachometer. Note the RPM at which the battery starts to charge (ammeter indication is positive).
5. With lights and other electrical loads off, the “break even” point should occur at approximately 1500 RPM or lower.

## Charging System Stator (Alternator) Tests

Three tests can be performed using a multi-meter to determine the condition of the stator (alternator).



### TEST 1: Resistance Value of Each Stator Leg

1. Measure the resistance value of each of the three stator legs: Y1 to Y2, Y1 to Y3, and Y2 to Y3. Each test should measure: **0.07 - 0.13 Ω**

TEST	CONNECT METER LEADS TO:	OHMS READING
Battery Charge Coil	Y1 to Y2	0.07 - 0.13 Ω
Battery Charge Coil	Y1 to Y3	0.07 - 0.13 Ω
Battery Charge Coil	Y2 to Y3	0.07 - 0.13 Ω

**NOTE: If there are any significant variations in ohm readings between the three legs it is an indication that one of the stator legs may be weak or failed.**

### TEST 2: Resistance Value of Each Stator Leg to Ground

2. Measure the resistance value of each of the stator legs to ground: Y1 to Ground, Y2 to Ground, Y3 to Ground.

3. Each test should measure: **Open Line (OL)**

TEST	CONNECT METER LEADS TO:	OHMS READING
Battery Charge Coil	Y1, Y2, or Y3 to Ground	Open Line (Infinity)

**NOTE:** Any measurement other than Infinity (open) will indicate a failed or shorted stator leg.

**TEST 3: Measure AC Voltage Output of Each Stator Leg at Charging RPM**

4. Set the selector dial to measure AC Voltage.
5. Start the engine and let it idle.
6. While holding the engine at a specified RPM, separately measure the voltage across each 'leg' of the stator by connecting the meter leads to the wires leading from the alternator (Y1 to Y2, Y1 to Y3, Y2 to Y3).

7. Refer to the following table for approximate AC Voltage readings according to RPM. Test each leg at the specified RPM in the table.

8. Example: The alternator current output reading should be approximately **21 VAC at 1300 RPM between each 'leg'**.

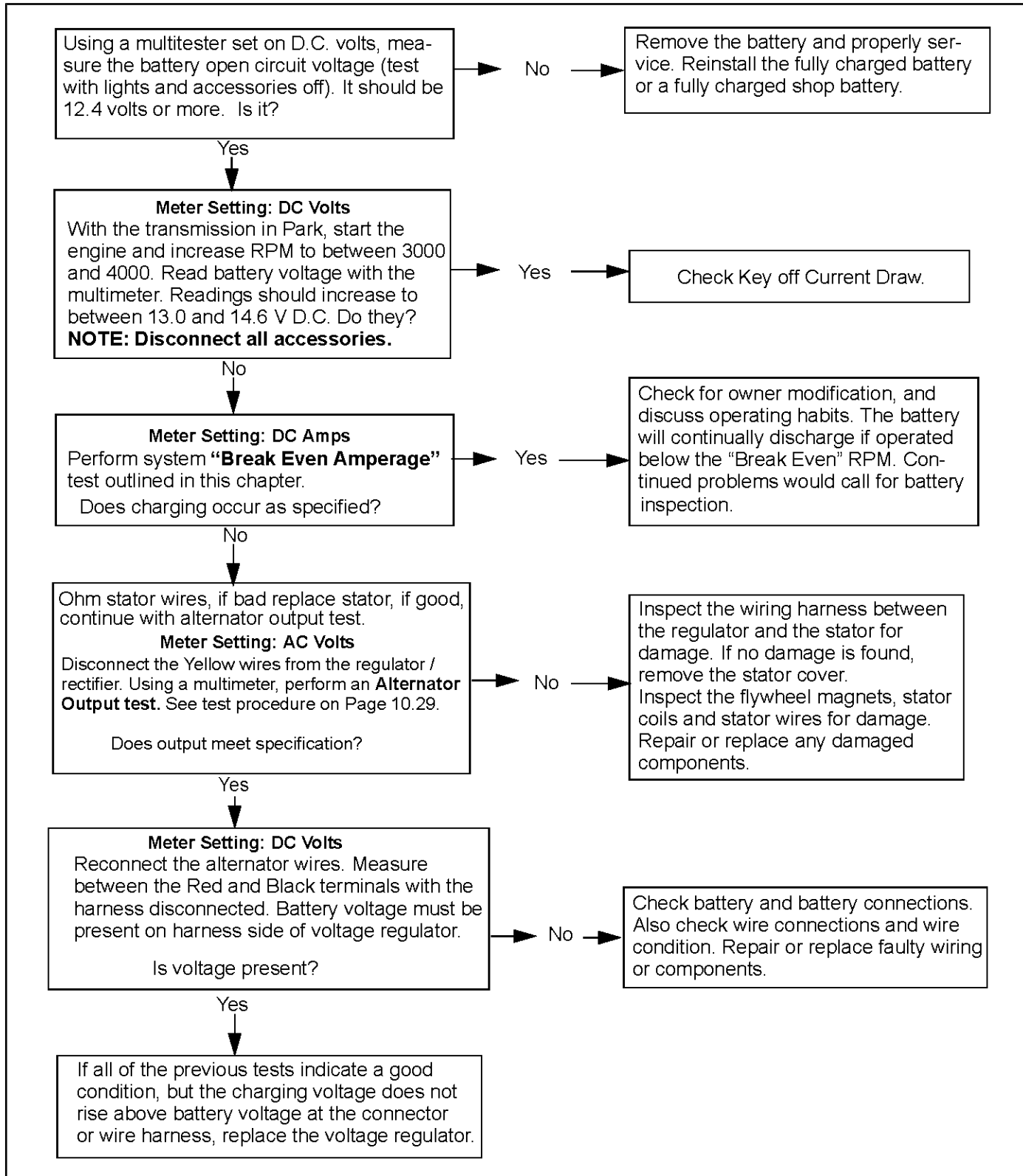
**NOTE:** If one or more of the stator leg output AC voltage varies significantly from the specified value, the stator may need to be replaced.

RPM READING	AC VOLTAGE (VAC) READING
1300	21 VAC $\pm$ 25%
3000	47 VAC $\pm$ 25%
5000	79 VAC $\pm$ 25%

# ELECTRICAL

## Charging System Testing Flow Chart

Whenever charging system problems are suspected, proceed with the following system check after verifying that all wires are in good condition, connected and not exposed or pinched.

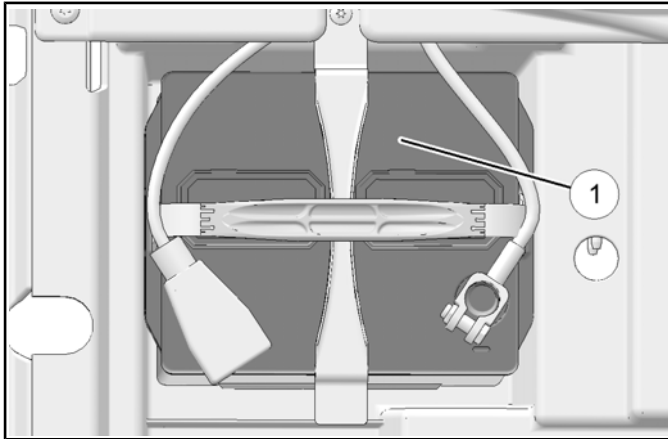


## BATTERY

### Battery Specifications

### Battery Removal

1. Remove the driver's seat to access the battery ①.

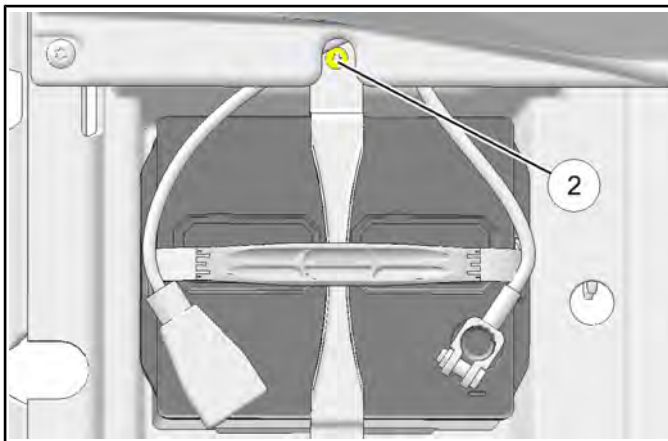


2. Disconnect the black (negative) battery cable.

### CAUTION

To reduce the chance of sparks: Whenever removing the battery, disconnect the black (negative) cable first. When reinstalling the battery, install the black (negative) cable last.

3. Disconnect the red (positive) battery cable.
4. Remove the battery hold-down bracket ②.



5. Lift the battery out of the vehicle.

### Battery Installation

**NOTE:** Using a new battery that has not been fully charged can damage the battery and result in a shorter life. It can also hinder vehicle performance. Refer to **Battery Charging**, page 2.29 before installing the battery.

1. Ensure the battery is fully charged.
2. Place the battery in the battery holder and secure with hold-down bracket. Torque bracket fastener to specification.



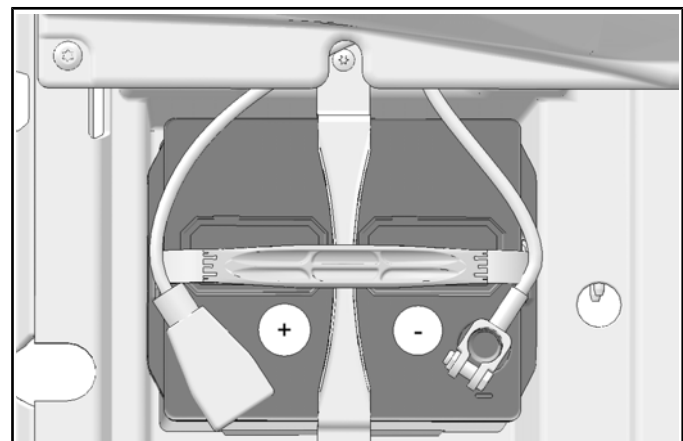
Battery Hold-Down Bracket:  
**8 ft-lb (11 Nm)**

3. Coat the terminals with dielectric grease or petroleum jelly.
4. Connect and tighten the red (positive) cable(s) first. Torque fasteners to specification.



Battery Terminal Fasteners:  
**60 in-lb (7 Nm)**

5. Connect and tighten the black (negative) cable(s) last.



6. Verify that cables are properly routed and reinstall the driver's seat.

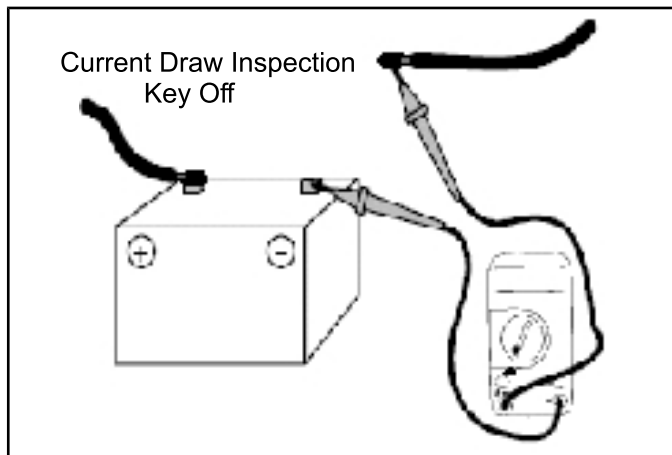
# ELECTRICAL

## Current Draw - Key Off

### CAUTION

Do not connect or disconnect the battery cable or ammeter with the engine running. Damage will occur to electrical components.

Connect an ammeter in series with the negative battery cable. Check for current draw with the key off. If the draw is excessive, loads should be disconnected from the system one by one until the draw is eliminated. Check component wiring as well as the component for partial shorts to ground to eliminate the draw.



**Current Draw - Key Off:  
Maximum of .01 DCA (10 mA)**

## OCV - Open Circuit Voltage Test

Battery voltage should be checked with a digital multimeter. Readings of 12.6 volts or less require further battery testing and charging. See the following chart and "Load Test".

**NOTE: Maintenance Free batteries should be kept at a high state of charge during storage. If the battery is stored or used at a low state of charge, hard crystal sulfation will form on the plates, reducing the efficiency and service life of the battery.**

Use a volt/ohm meter to test battery voltage.

### OPEN CIRCUIT VOLTAGE

STATE OF CHARGE	VOLTAGE
100%	12.8 V and up
75% Charged	12.6 V
50% Charged	12.3 V
25% Charged	12.0 V
0% Charged	11.8 V or less

## Load Test

### CAUTION

To prevent shock or component damage, remove spark plug high tension leads and connect securely to engine ground before proceeding.

A battery may indicate a full charge condition in the OCV test, but still may not have the storage capacity necessary to properly function in the electrical system. For this reason, a battery capacity or load test should be conducted whenever poor battery performance is encountered.

To perform this test, use a load testing device that has an adjustable load. Apply a load of three times the ampere-hour rating. At 14 seconds into the test, check battery voltage. A good 12V battery will have at least 10.5 volts. If the reading is low, charge the battery and retest.

## Battery Conductance Analyzer

Conductance describes the ability of a battery to conduct current. A conductance tester functions by sending a low frequency AC signal through the battery and a portion of the current response is captured, from this output a conductance measurement is calculated. Conductance testing is more accurate than voltage, specific gravity, or load testing.

Authorized Polaris dealers/distributors are required to use the conductance analyzer when testing 12V Polaris batteries.



**Polaris MDX-610P**  
**Bosch PN: PU-50296**



# ELECTRICAL

## LIGHTING SYSTEM

### Headlights

When you turn the key off, there is approximately a 20 second delay before the switch indicators, Blue LED light, headlights and taillights turn off. This is a normal occurrence.

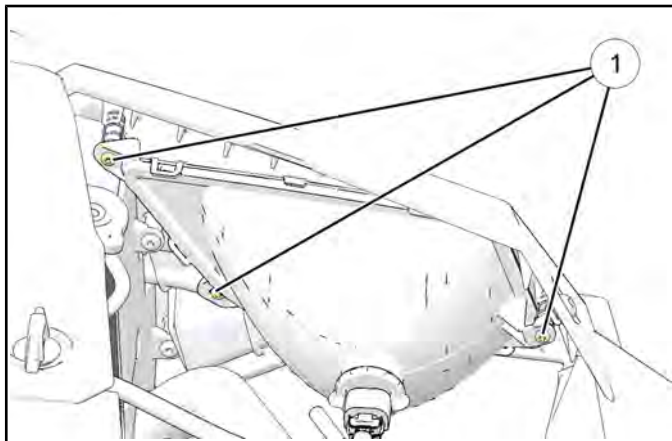
### Headlight Adjustment

The headlight beams are adjustable

1. Place the vehicle on a level surface with the headlight approximately 25 ft. (7.6 m) from a wall.
2. Measure the distance from the floor to the center of the headlight and make a mark on the wall at the same height.
3. With the machine in Park, start the engine and turn the headlight switch to the LOW position.
4. The most intense part of the LOW beam headlight beam should be aimed 2 in. (5 cm) below the mark placed on the wall in Step 2.

**NOTE: Rider weight must be included in the seat while performing this procedure.**

5. Adjust the beam to the desired position by loosening or tightening the three T-25 adjustment screws ① and moving the lamp to the appropriate height.



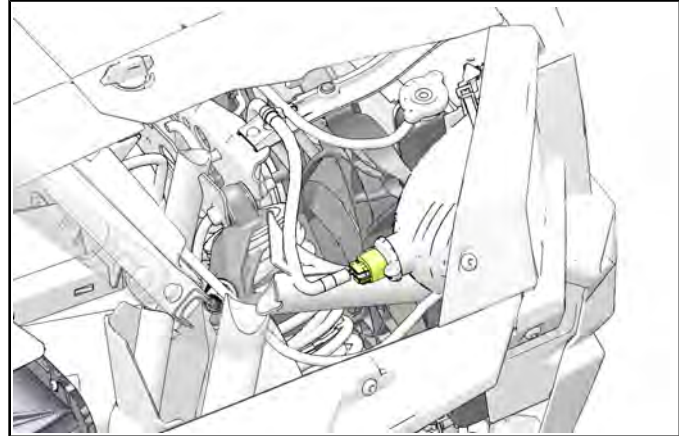
6. Adjust the beam to the desired position. Repeat the procedure to adjust the other headlight.

### WARNING

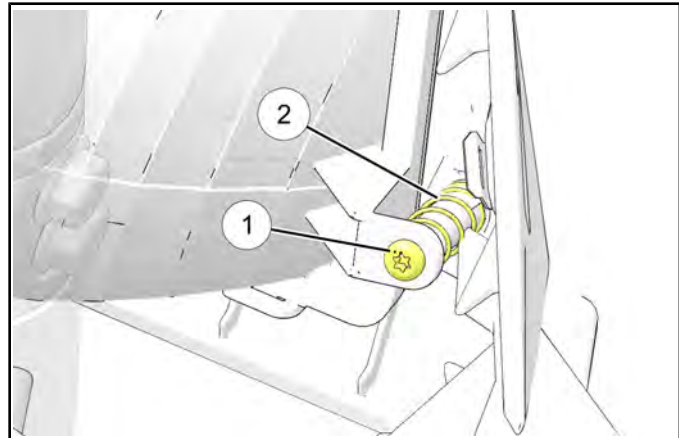
Due to the nature of light utility vehicles and where they are operated, headlight lenses become dirty. Frequent washing is necessary to maintain lighting quality. Riding with poor lighting can result in severe injury or death.

### Headlamp Replacement

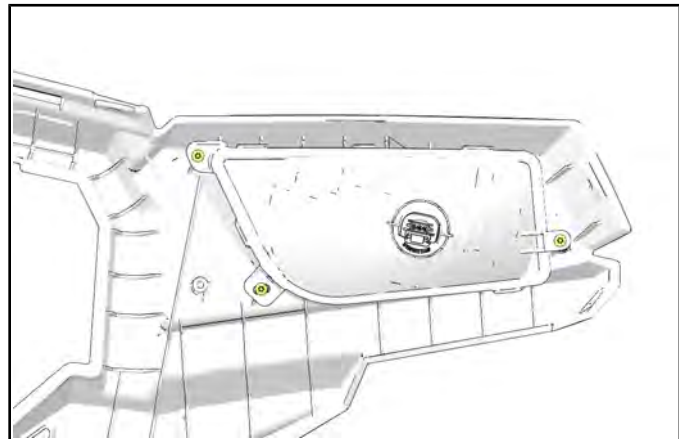
1. Disconnect wire harness from headlamp assembly. Be sure to pull on the connector, not on the wiring.



2. Remove the three T-25 headlamp mounting screws ① and three adjustment preload springs ②.



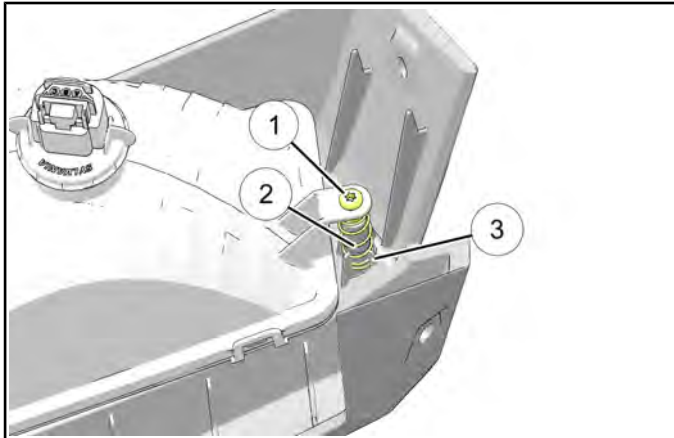
**NOTE: The front bumper can be removed and placed face down on a suitable workbench to ease headlamp replacement (see Chapter 10 – Front Bumper Removal, page 10.12).**



3. Carefully lift and remove headlamp assembly from the bumper.

## Headlamp Installation

1. Install the headlamp adjustment springs onto the front bumper mounting bosses.
2. Insert the three T-25 headlamp mounting screws into the headlamp assembly mounting holes.
3. Maneuver the headlamp assembly into position. Be sure all three headlamp springs ② and mounting screws ① are properly aligned with mounting bosses ③ on the front bumper.



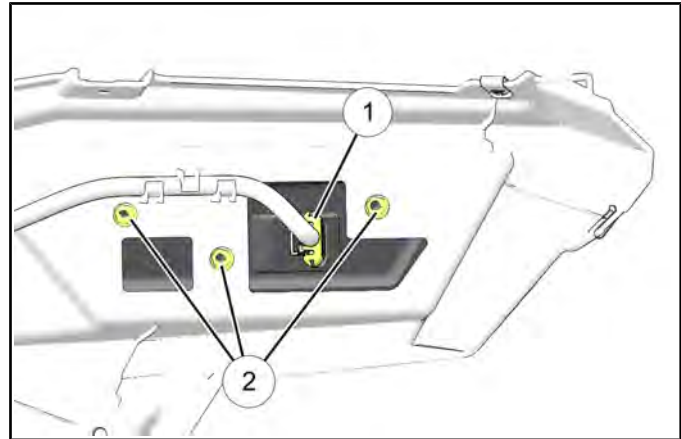
4. Fully tighten all three headlamp screws until the headlamp assembly is fully seated. Back headlamp mounting screws off 1/8" to 1/4" (2-3 turns).
5. Install the front bumper as shown in Chapter 5 if previously removed.
6. Connect headlamp electrical connector to the headlamp assembly.
7. Perform the "Headlamp Adjustment" procedure as shown in this chapter.

## Taillights

### Taillight Replacement

Before replacing the taillight(s), use a digital multi-meter to test the harness to ensure the lamp is receiving 12 volts and that a ground path is present.

1. Disconnect the wire harness ①.



2. While holding the taillight assembly, remove the three nuts ② retaining the taillight assembly and remove it from the rear fascia.

## Dash LED Light

The vehicle is equipped with an LED light below the dash that illuminates when the key is turned on. This LED will stay on for approximately 20 seconds after the key has been turned off.

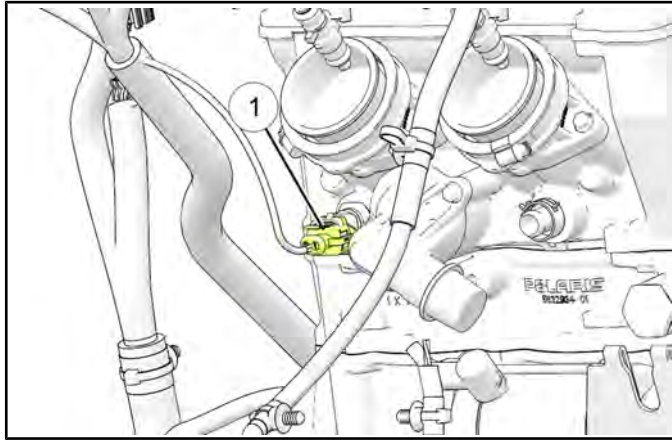
# ELECTRICAL

## COOLING SYSTEM

### Coolant Temperature Sensor

#### Engine Coolant Temperature Sensor (ECT) Overview

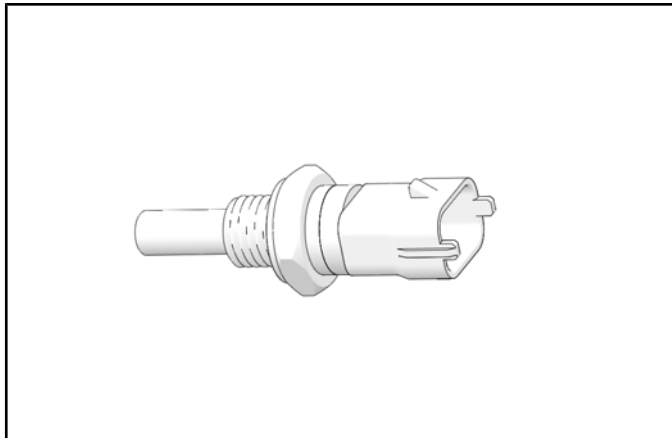
Mounted in the thermostat housing, the engine temperature sensor ① measures the coolant temperature. The engine temperature sensor is a Negative Temperature Coefficient (NTC) type sensor, as the temperature increases the resistance decreases.



Coolant passes through the thermostat housing and by the sensor probe, varying a resistance reading which is relayed to the ECU. This signal is processed by the ECU and compared to its programming for determining the fuel and ignition requirements during operation. The ECU also uses this signal to determine when to activate the cooling fan during operation.

#### ECT Sensor Test

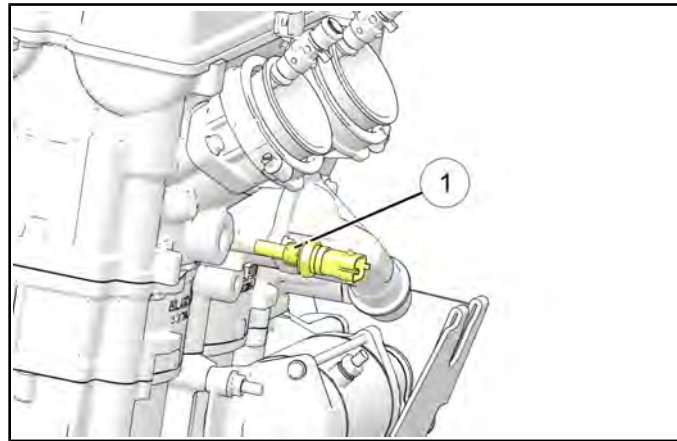
To quickly rule out other components and wiring related to the ECT, disconnect the harness from the ECT sensor and start the engine. After a few seconds, the fan should turn on and the “Check Engine” indicator should display on the instrument cluster. This indicates all other components are working properly.



Refer to Chapter 3 and 10 for additional ECT sensor information. Polaris dealers can test the sensor by using Digital Wrench® Diagnostic Software (dealer only).

#### ECT Sensor Replacement

1. Remove the throttle body / ETC. (see Chapter 4 – ETC Replacement, page 4.28).
2. Be sure the engine has cooled enough to work on.
3. Disconnect the vehicle harness from the ECT sensor.
4. Drain the coolant so the level is below the sensor (see Chapter 2 – Coolant Drain / Fill, page 2.24).
5. Using a wrench, remove and replace the sensor ①, applying a light coating of thread sealant to aid installation.



6. Torque the new ECT sensor to specification and connect the vehicle harness to the sensor.

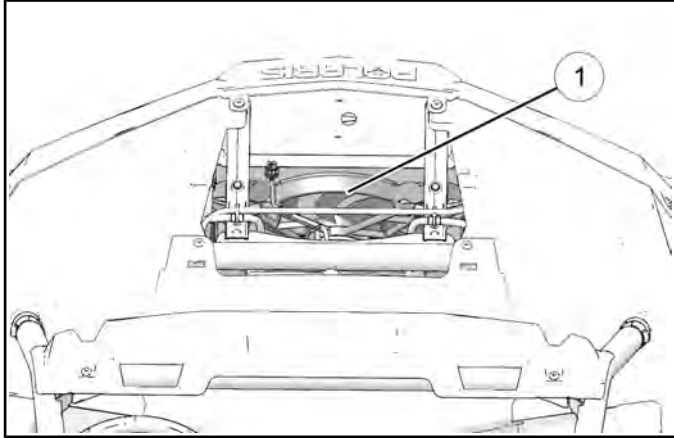


ECT Sensor:  
**17 ft-lb (23 Nm)**

7. Reinstall the throttle body
8. Add the required amount of coolant and bleed the system (see Chapter 3 – Cooling System Bleeding, page 3.15).

## Radiator Fan

The radiator fan ① is located on the radiator, accessible through the hood access panel.



# ELECTRICAL

## STARTING SYSTEM

### Starter Troubleshooting

#### *Starter Motor Does Not Run*

- Battery discharged
- Loose or faulty battery cables or corroded connections (see Chapter 11 – Voltage Drop Test, page )
- Related wiring loose, disconnected, or corroded
- Poor ground connections at battery cable, starter motor, or starter solenoid (see Chapter 11 – Voltage Drop Test, page )
- Faulty key switch
- Faulty starter solenoid or starter motor
- Engine problem - seized or binding (can engine be rotated easily)

#### *Starter Motor Turns Over Slowly*

- Battery discharged
- Excessive circuit resistance - poor connections (see Chapter 11 – Voltage Drop Test, page )
- Engine problem - seized or binding (can engine be rotated easily)
- Faulty or worn brushes in starter motor

#### *Starter Motor Turns - Engine Does Not Rotate*

- Faulty starter drive
- Faulty starter drive gears or starter motor gear
- Faulty flywheel gear or loose flywheel

### Voltage Drop Test

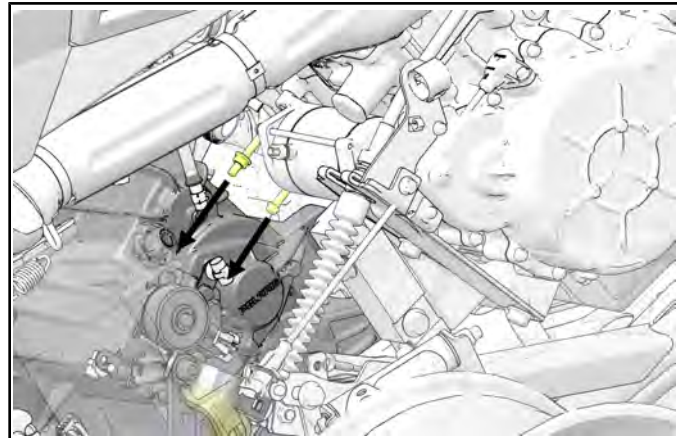
The Voltage Drop Test is used to test for bad connections. When performing the test, you are testing the amount of voltage drop through the connection. A poor or corroded connection will appear as a high voltage reading. Voltage shown on the meter when testing connections should not exceed 0.1 VDC per connection or component.

To perform the test, place the meter on DC volts and place the meter leads across the connection to be tested. Refer to the voltage drop tests on the starter system in this chapter.

**Voltage should not exceed 0.1 volts per connection**

### Starter Removal

1. Remove driver side seat and disconnect the battery.
2. Raise and support rear of vehicle.
3. Remove RH rear wheel.
4. Remove (+) positive wire from starter motor terminal.
5. From the RH side wheel well using an 8mm flex socket, remove the negative battery cable nut and the two fasteners securing the starter motor to the engine.



**NOTE:** The (-) negative battery cable is mounted to the engine using the upper starter mounting bolt / stud.

6. Remove the starter from the engine.

### Starter Installation

1. Inspect and replace starter motor O-ring if needed.
2. Lubricate starter motor O-ring with fresh engine oil.
3. Install the starter motor onto the engine case.
4. Hand tighten the upper starter mounting bolt / stud.
5. Install and torque the lower mounting bolt to specification.

**NOTE:** Tighten the lower starter bolt first, as the bottom hole acts as a pilot hole to properly align the starter drive (bendix) with the flywheel. This helps prevent binding and starter damage.

6. Torque upper starter mount screw to specification.



7. Install (-) negative battery cable to the upper starter mounting bolt / stud. Torque nut to specification.



Starter Mounting Bolts and Nut:  
**7 ft-lb (10 Nm)**

## Starter Solenoid

### Starter Solenoid Bench Test

Test the start solenoid by powering the solenoid using battery voltage for a *maximum of 5 seconds*. With the solenoid energized, resistance should read about 0 - 0.5 ohms between terminals (A) and (B). If resistance measurement is out of specification, replace the starter solenoid

### Starter Solenoid Operation

To energize the Starter Solenoid the following must occur:

- The brake must be applied to provide a ground path via the orange wire.
- The key switch must be turned to the “start” position to provide 12V power via the Green / White wire.
- Once the pull-in coil is energized, the solenoid provides a current path for 12V power to reach the starter motor.

**NOTE:** See “ELECTRICAL SYSTEM BREAKOUTS: Starter-Interlock” provided in this chapter for starter solenoid operation.

# ELECTRICAL

## ELECTRONIC POWER STEERING

### EPS Operation

The EPS module is an intelligent electronic power steering system that operates off of the vehicle's 12V electrical system. It calculates steering assist by sensing the difference between the input torque of the steering post and the output torque required to turn the wheels, and then provides assist by energizing an electric motor. The process provides a smooth, seamless assist.

The system is continuously running diagnostic checks and monitoring factors such as battery voltage, ground speed and engine speed. In the event an internal or external issue that affects the EPS system is detected, the system will illuminate a fault indicator and transition to a normal mechanically coupled steering system. The system is Polaris Digital Wrench® compatible for simplified diagnostics and system troubleshooting through the vehicle's diagnostic port.

With the engine off and the key on, the power steering unit will operate for up to five minutes. After the five minutes, you will need to cycle the key switch and restart the engine to regain power steering operation.

**NOTE:** To conserve battery power, the EPS unit will shut down 5 minutes after the engine has stopped if the key remains in the ON position. At this point, the EPS Malfunction Indicator Light will illuminate to indicate the EPS has shut down and will set a fault code in Digital Wrench®.

### The Power Steering 20A Fuse.

- If the fuse fails, the Power Steering Malfunction Indicator Light (MIL) on the instrument cluster will illuminate. During this time, the vehicle will have no power steering operation. You will be able to connect and communicate with the vehicle's Engine Controller, but not the Power Steering Controller, while using Digital Wrench®.

### CAUTION

DO NOT SPLICE OR CUT INTO THE CAN CIRCUITS.

**IMPORTANT:** Electronic Power Steering (EPS) units are not interchangeable between ATV, RZR and RANGER product lines.

**NOTE:** See Chapter 5 – Power Steering Unit Removal, page 8.10 for power steering unit removal and installation procedures.

### 2–Pin Connector

WIRE COLOR	FUNCTION
ORANGE	Main Power (20A Protected)
BROWN	Ground

### 8–Pin Connector

WIRE COLOR	FUNCTION
ORANGE	Key-On Battery Voltage
YELLOW	CAN High Signal
GREEN	CAN Low Signal

### EPS System Diagnosis

READ BEFORE YOU REPLACE THE EPS UNIT!

**NOTE:** Verify the EPS unit has the latest software version and calibration loaded before replacing the EPS unit. If an older version is found using Digital Wrench, update the software to the latest version and follow guided diagnostic procedures available for any Digital Wrench codes found.



## FUSES / RELAYS

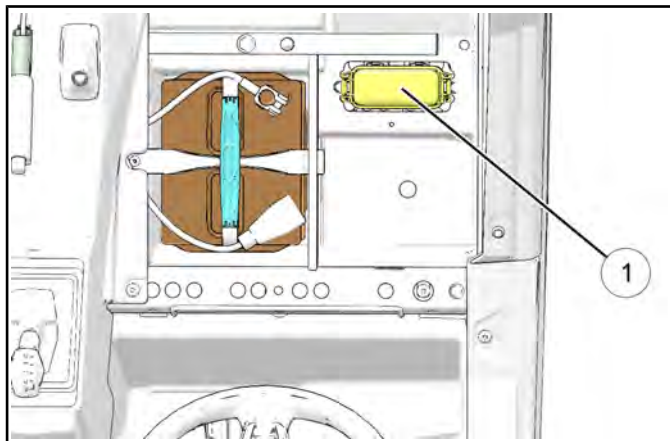
### Fuse Box

#### Overview / Operation

Located in the fuse box ① under the driver's seat, the fuses provide overload protection for wiring and components such as the instrument cluster, ECU, EFI system, main harness, lights, accessories and power steering. The relays assist with component operation like the cooling fan, fuel pump, EFI system, drive system and electronic power steering. A separate 20-amp circuit breaker protects the fan motor circuit. Two separate relays located under the dash operate the headlights and the "flash to pass" function on INT'L models.

#### Relay Operation

Located in the fuse box ① under the driver's seat, the relays assist with component operation like the cooling fan, fuel pump and EFI system, drive system and EPS.



### Relay Circuits

#### Chassis Relay

Provides power to the following systems:

- Lights (Headlights / Taillights)
- Drive (AWD)
- Accessory (12V Receptacles / Accessory Options)

WIRE COLOR	FUSE BOX PIN	FUNCTION
Red / Dark Blue	33	Coil power from EFI B+ #2 Splice
Red	34	High side power from Start Solenoid B+
Red / Dark Green	37	High side output to Chassis Splice
Grey	38	ECU controlled ground

#### Fuel Pump Relay

provides power to the following system:

- Fuel Pump

WIRE COLOR	FUSE BOX PIN	FUNCTION
Red / Dark Blue	25	Coil power from EFI B+ #2 Splice
Orange	26	High side power from R/S B+ #1 Splice
Red / Blue	29	High side output to fuel pump
Dark Green / Yellow	30	ECU controlled ground

#### EFI Relay

provides power to the following systems:

- Fuel Injectors
- Ignition Coil
- Fan Relay
- Fuel Pump Relay

WIRE COLOR	FUSE BOX PIN	FUNCTION
Red / White	17	Coil power from B+ Unswitched Fused #1 Splice
Red	18	High side power from EFI fuse
Red / Dark Blue	21	High side output to EFI B+ Splice
Dark Green / Yellow	22	ECU controlled ground

#### Fan Relay

provides power to the following system:

- Fan Motor

WIRE COLOR	FUSE BOX PIN	FUNCTION
Red / Dark Blue	9	Coil power from R/S B+ #2 Splice
Orange / Black	10	High side power from Fan circuit breaker
Orange / Black	13	High side output to Fan
Orange / Black	14	ECU controlled ground

# ELECTRICAL

## EPS Relay (if equipped)

provides power to the following system:

- Electronic Power Steering Unit

WIRE COLOR	FUSE BOX PIN	FUNCTION
Orange	3	Coil power from R/S B+ #2 Splice
Red	4	High side power from EPS fuse
Orange	7	High side output to EPS unit
Brown	8	Chassis ground

## Fuse / Circuit Breaker Circuits

### Fan – 20A Circuit Breaker

WIRE COLOR	FUNCTION
Red	Power in from solenoid B +
Orange / Black	Power to Fan Relay

### EFI – 10A Fuse

WIRE COLOR	FUNCTION
Red	Power from EFI Splice
Red	Power to EFI Relay high side

### Key – 10A Fuse

WIRE COLOR	FUNCTION
Red	Power from EFI Splice
Red / White	Power to B+ Unswitched Splice #1

### Term (Terminal Block) – 10A Fuse

WIRE COLOR	FUNCTION
Red / Dark Green	Power from Chassis Splice
Orange / White	Power to Key Acc Splice

### Accessory – 10A Fuse

WIRE COLOR	FUNCTION
Red	Power from Solenoid B+
Orange / White	Power to 12V Receptacle

## Drive – 10A Fuse

WIRE COLOR	FUNCTION
Red / Dark Green	Power from Chassis Splice
Red / Dark Green	Power to AWD Coil

## Lights – 15A Fuse

WIRE COLOR	FUNCTION
Red / Dark Green	Power from Chassis Splice
Red / Yellow	Power to Lights B+ Splice

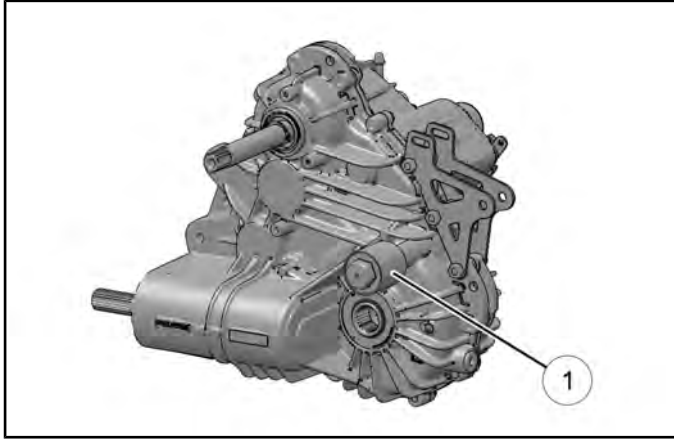
## EPS (if equipped) – 20A Fuse

WIRE COLOR	FUNCTION
Red	Power from Solenoid B+
Red	Power to EPS Relay high side

## DIFFERENTIAL CIRCUIT (TURF MODELS ONLY)

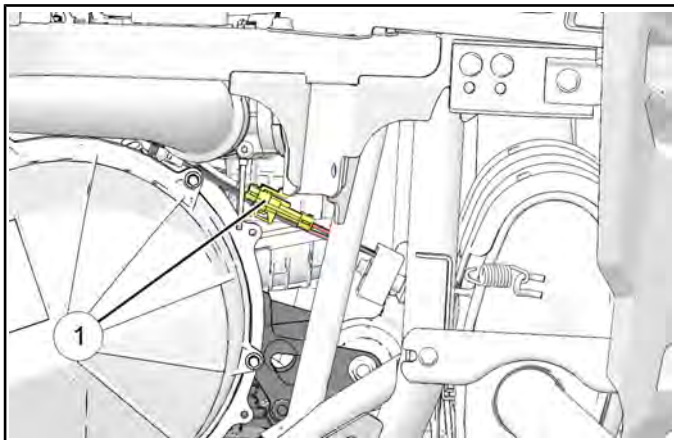
### **Turf Solenoid (Turf Mode models only)**

The Turf Solenoid ① is located on the driver's side of the transmission, above the half shaft.



### **Turf Solenoid Driver (Turf Mode models only)**

The Turf Solenoid Driver ① is located between the clutch cover and the exhaust muffler.

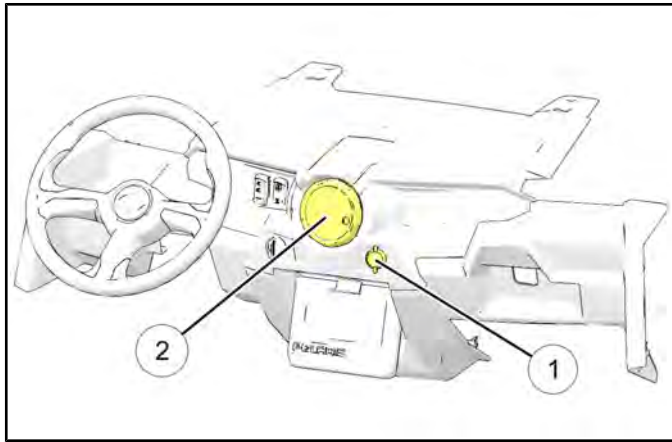


# ELECTRICAL

## MISC. ELECTRICAL

### 12v Receptacle

This vehicle is equipped with a 12v receptacle ①, located near the instrument cluster ②.



### AWD Coil

#### Operation Overview

- When the key switch is “ON”, 12 VDC power is present at the hub coil.
- When the AWD switch is “ON”, and if the criteria is met, the Engine Controller provides a ground path (brown/white wire). When this occurs the AWD icon should display in the instrument cluster.
- The AWD system must be grounded to operate.

#### Diagnosing System Failures

- Verify the AWD switch is functional and that a minimum of 11 volts is present at the hub coil.
- Verify the AWD hub coil is functional. Test the AWD hub coil using an ohmmeter. See specifications below:

**AWD Hub Coil Resistance:**  
**24Ω ± 5%**

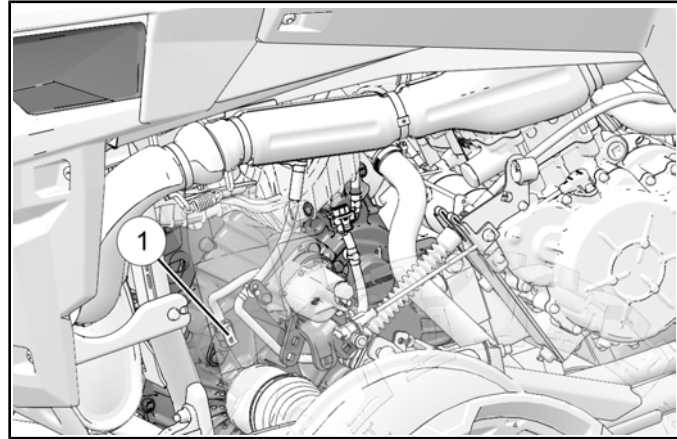
- Verify the wiring harness, wiring, connectors, connector pins and grounds are undamaged, clean and connect properly.
- Verify continuity of wire connections with a known good volt/ohm meter.

**NOTE: Verify all wires and wiring connections have been tested properly with a known good volt/ohm meter before suspecting a component failure. 80% of all electrical issues are caused by bad/failed connections and grounds.**

### Speed Sensor

#### Speed Sensor Location

The speed sensor ① is located on the RH side of the transmission, accessed through the rear RH wheel well.

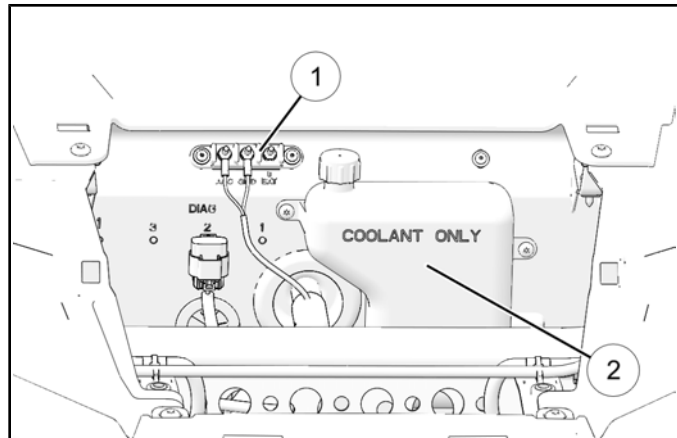


#### Speed Sensor Testing

1. Disconnect the three wire harness from the speed sensor and remove the sensor from the transmission.
2. Connect the wires from the Static Timing Light Harness (2871745) to the sensor 3 pin connector using the Hall Sensor Probe Harness (2460761).
3. Pass a screwdriver back and forth in front of the sensor tip.
4. Be sure connections are good and 9V battery is in good condition. If the light flashes, the sensor is good.

#### Terminal Block

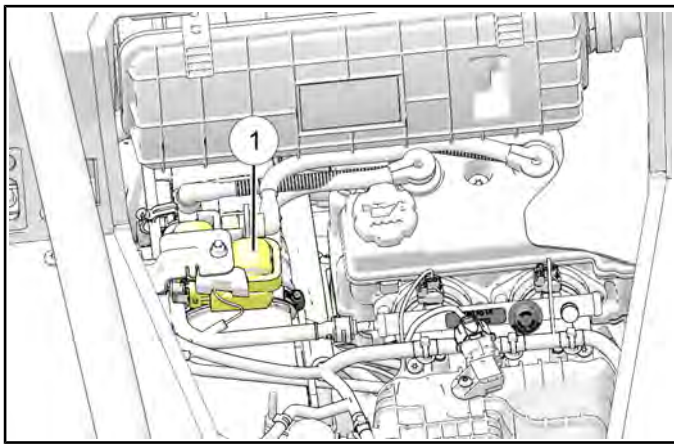
The terminal block ① is located under the hood access panel near the coolant reservoir ②.



## Ignition Coil

### Operation Overview

The ignition coil ① is used to provide high voltage to fire the spark plugs. When the ignition key is on, DC voltage is present in the primary side of the ignition coil windings. During engine rotation, an AC pulse is created within the crankshaft position sensor for each passing tooth on the flywheel's encoder ring. The encoder ring missing tooth creates an "interrupt" input signal, corresponding to specific crankshaft position. This signal serves as a reference for the control of ignition timing. The ECU then calculates the time interval between the consecutive pulses, and determines when to trigger the voltage spike that induces the voltage from the primary to the secondary coil windings to fire the spark plugs.



### Ignition Coil / HT Lead Replacement

**NOTE:** The engine will misfire if the spark plug wires are installed incorrectly. The spark plug wires are marked with PTO and MAG from the factory and should be installed to the corresponding cylinder and ignition coil post.

1. Remove the seats and engine service panel to access the ignition coil.
2. Disconnect the ignition coil harness and remove the high tension leads from the coil.
3. Remove the fastener retaining the ignition coil and remove it from the vehicle. If replacing the high tension lead(s), remove the other end of the lead(s) from the spark plug.
4. Install the new ignition coil and/or high tension lead(s).



Ignition Coil Retaining Bolt:  
75 in-lb (9 Nm)

### Ignition Coil Tests

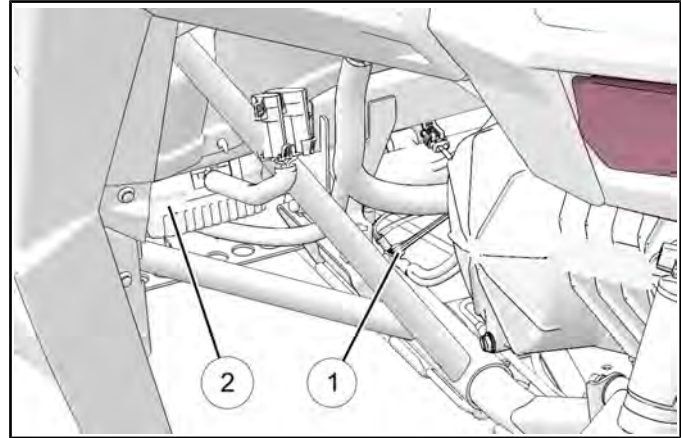
The ignition coil can be tested by using an ohmmeter. Use the following illustration and specification table to test the ignition coil resistance.

#### Primary Test

#### Secondary Test

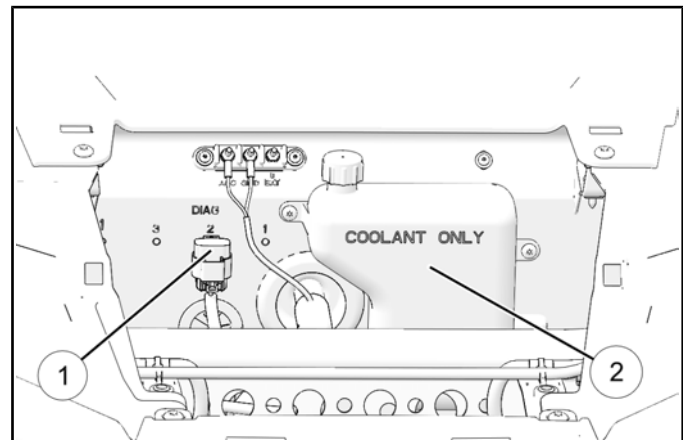
### Chassis Ground Point

The chassis ground point ① is located in front of the driver's side rear tire, near the voltage regulator ②.



### Diagnostic Plug

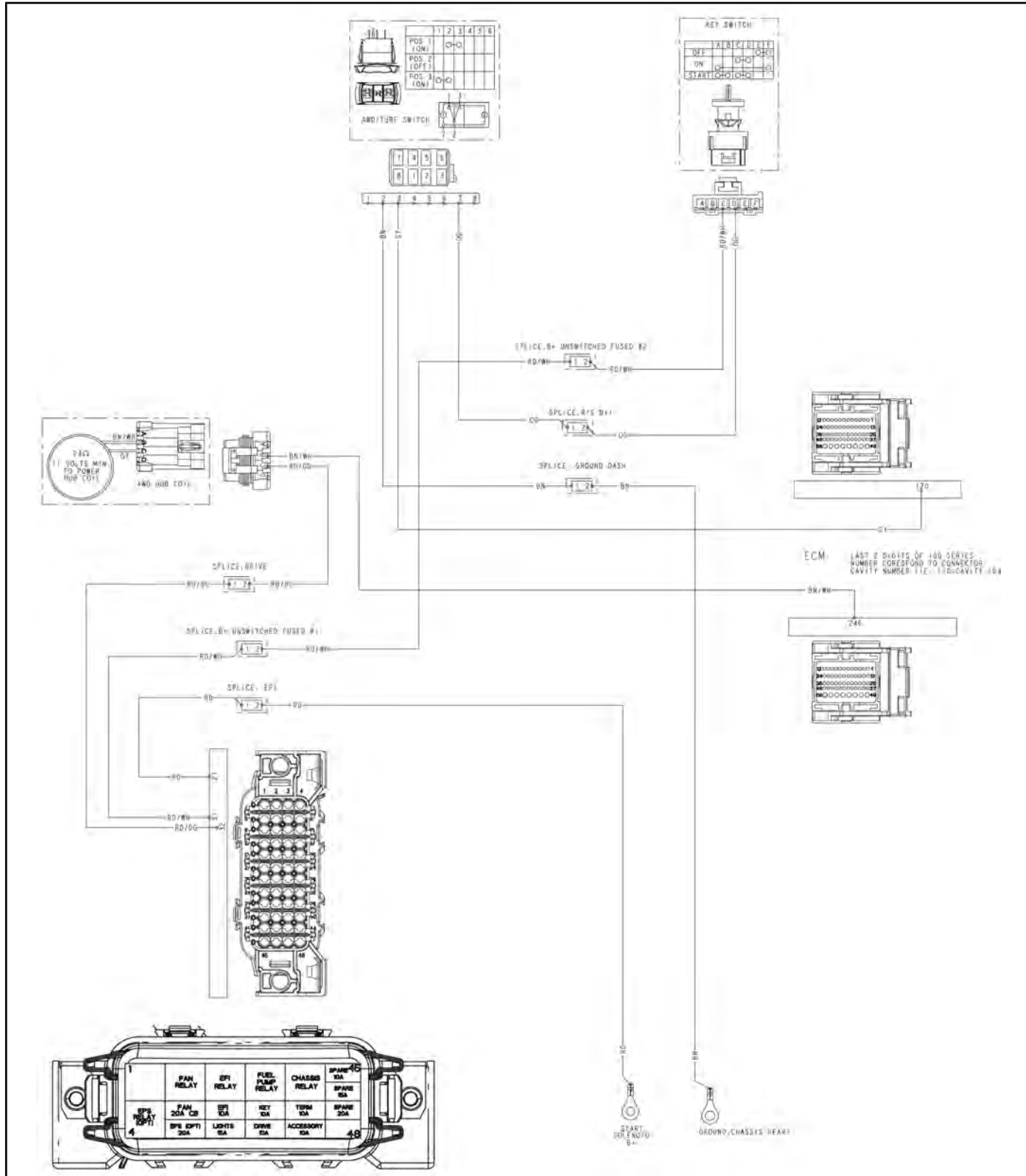
The diagnostic plug ① is located under the hood near the coolant reservoir ②.



# ELECTRICAL

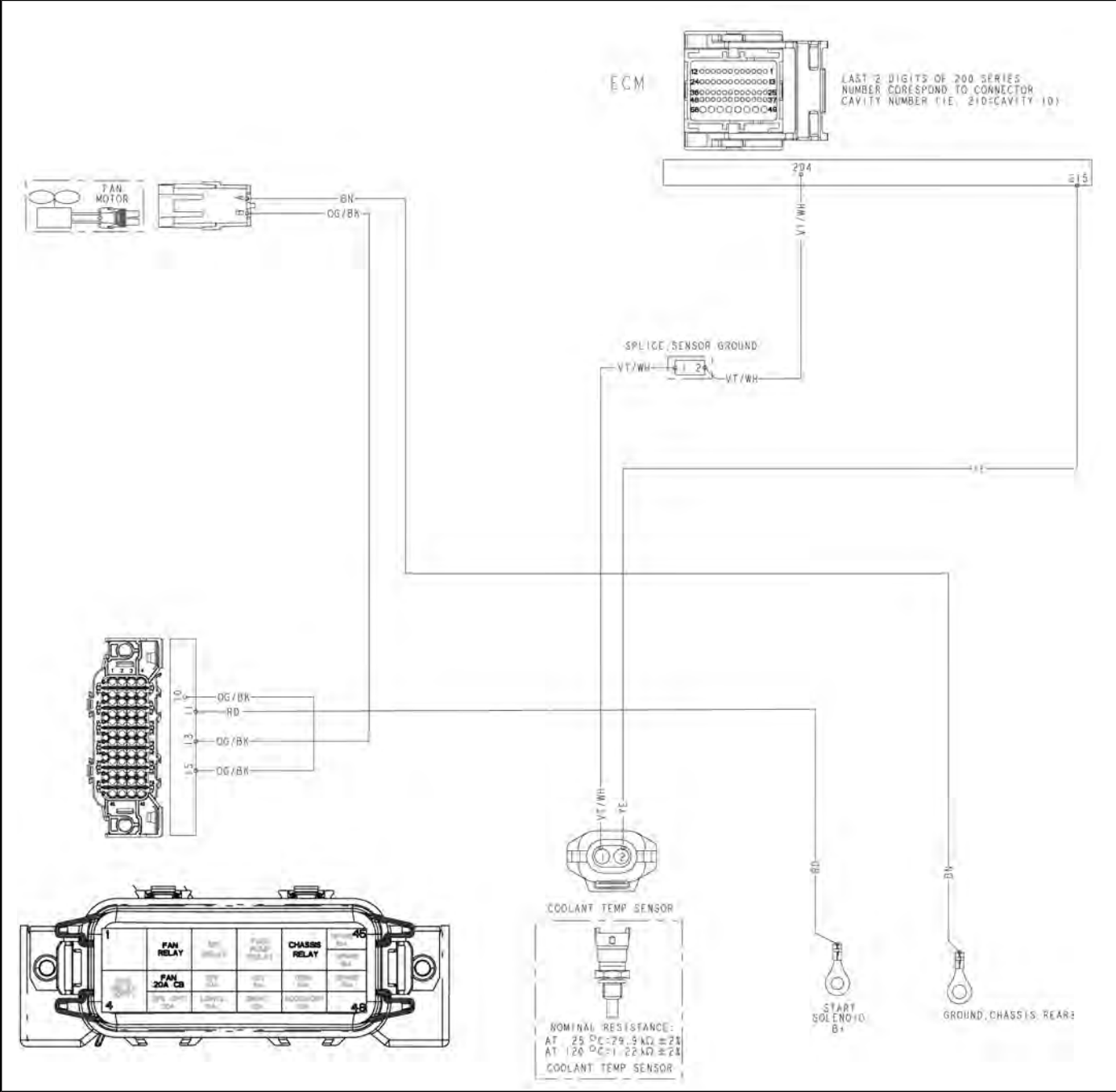
## BREAK-OUT DIAGRAMS

### AWD Break-Out Diagram



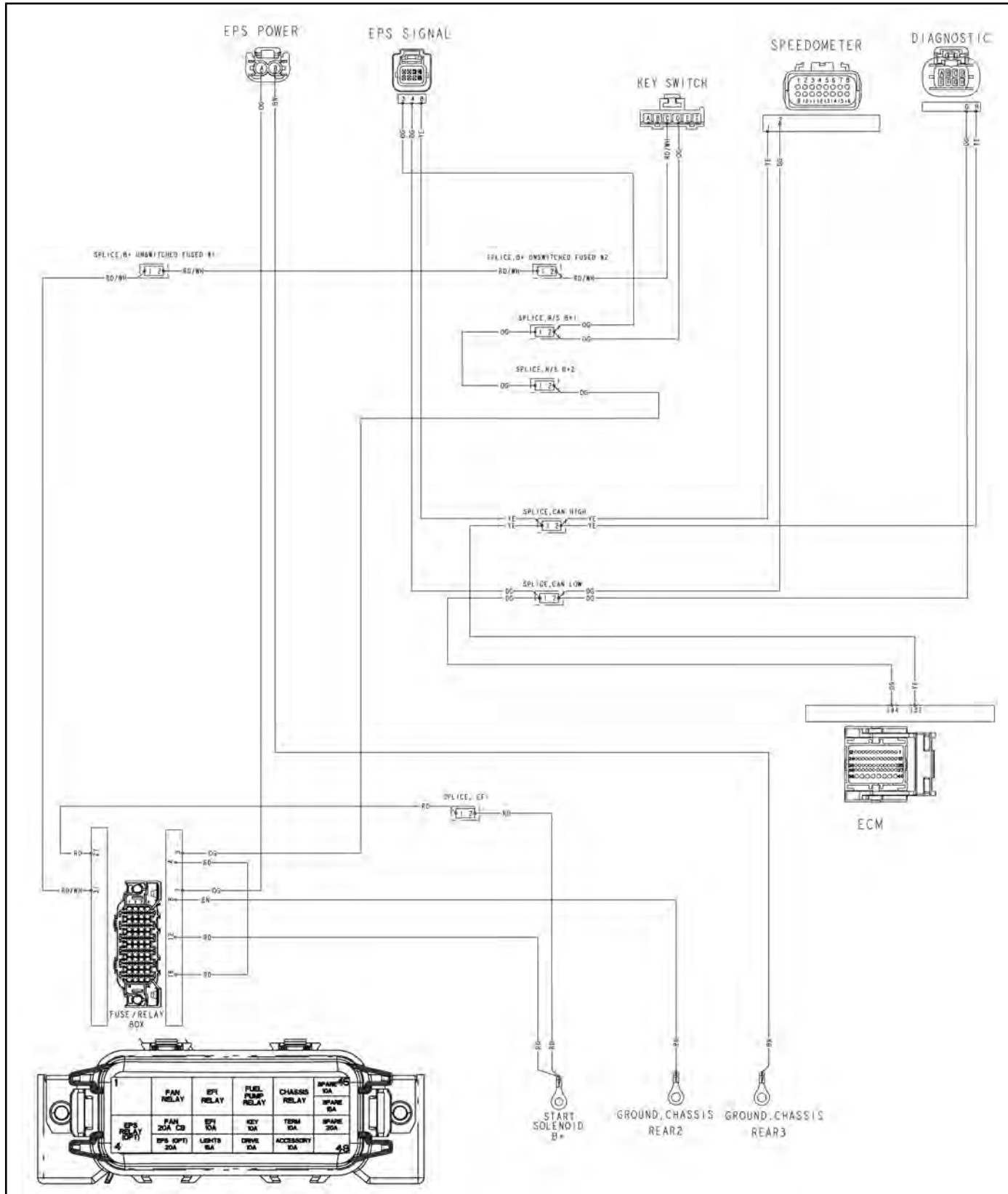


Cooling System Break-Out Diagram

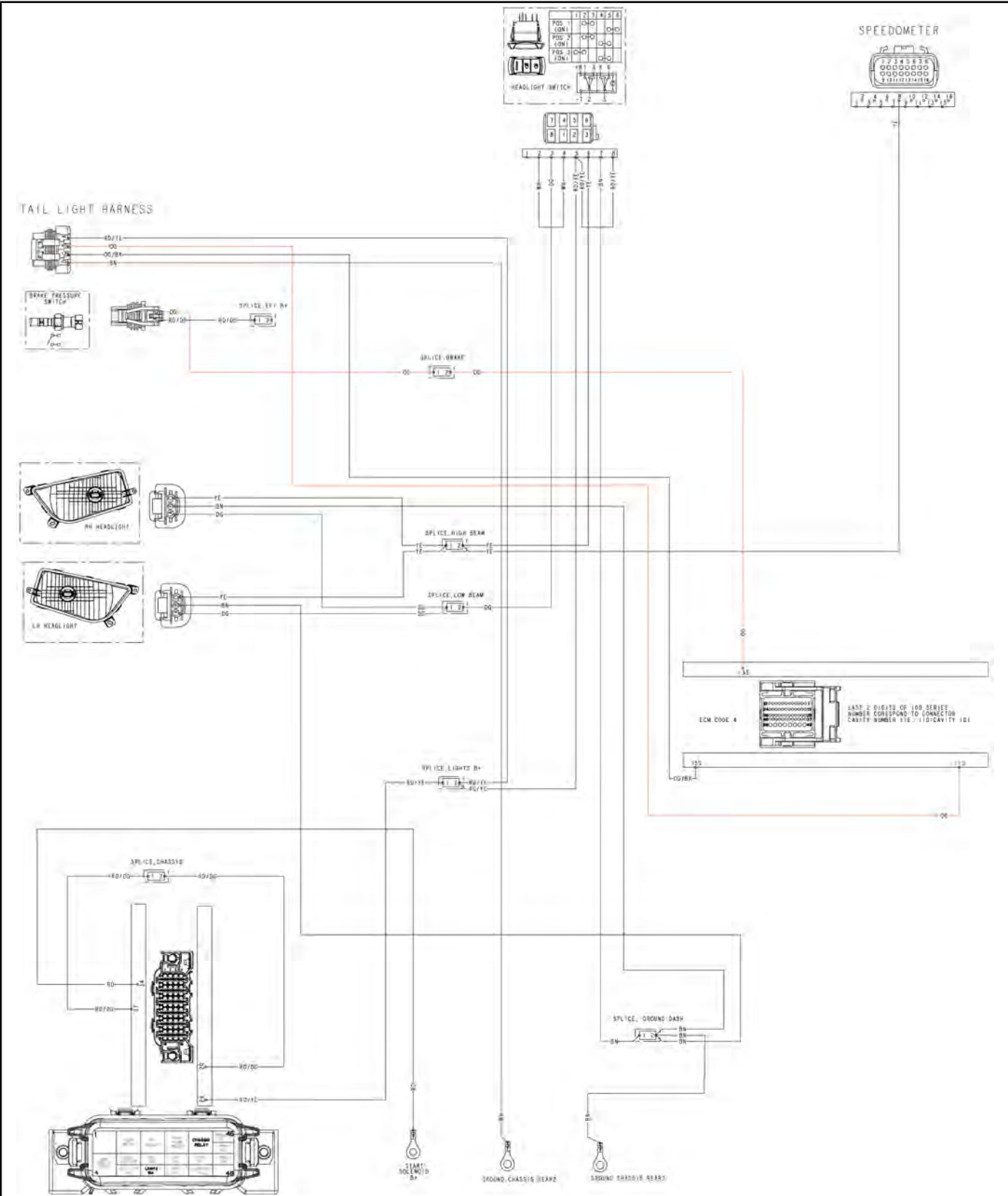


# ELECTRICAL

## EPS Break-Out Diagram

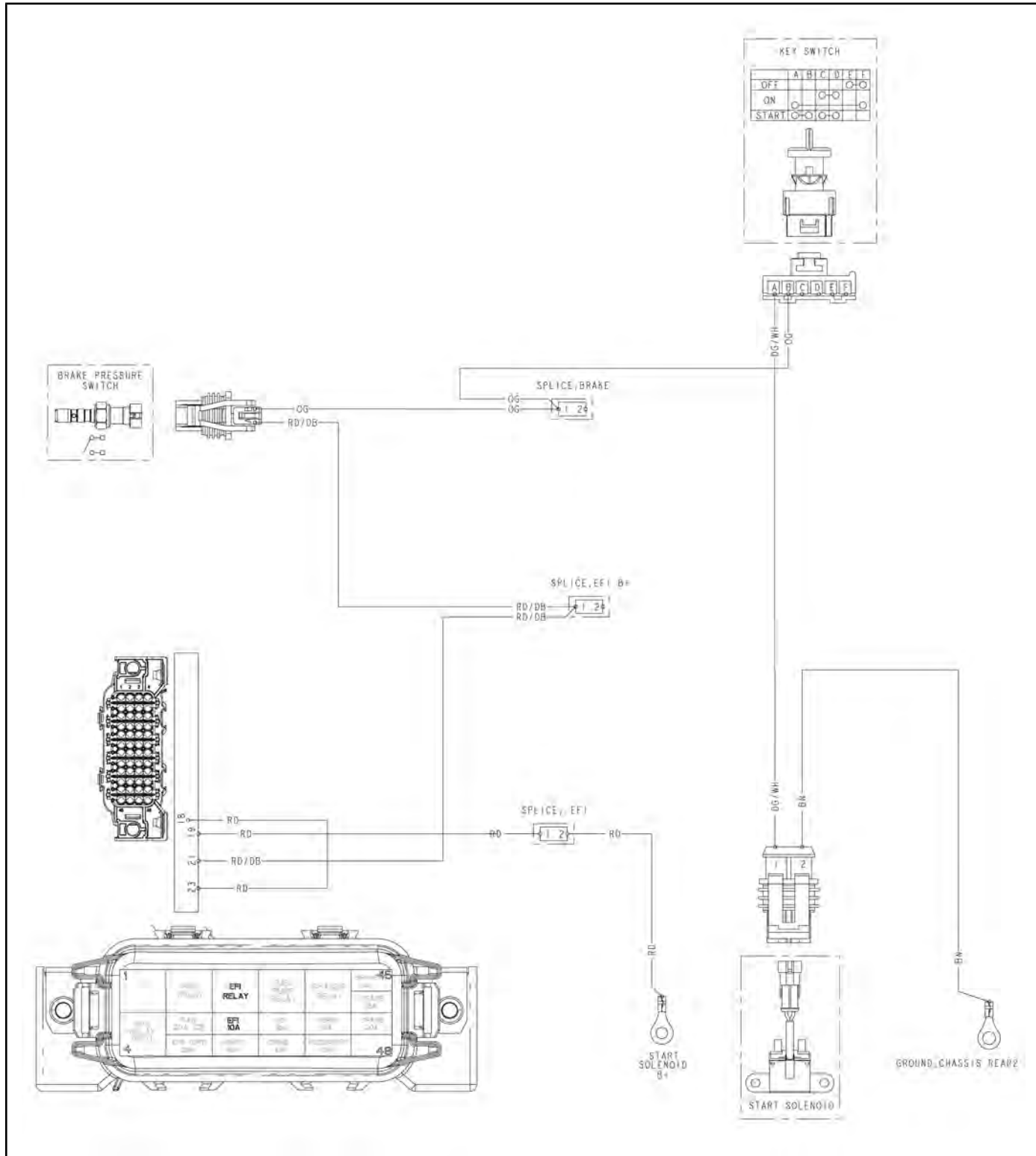


Lighting Break-Out Diagram

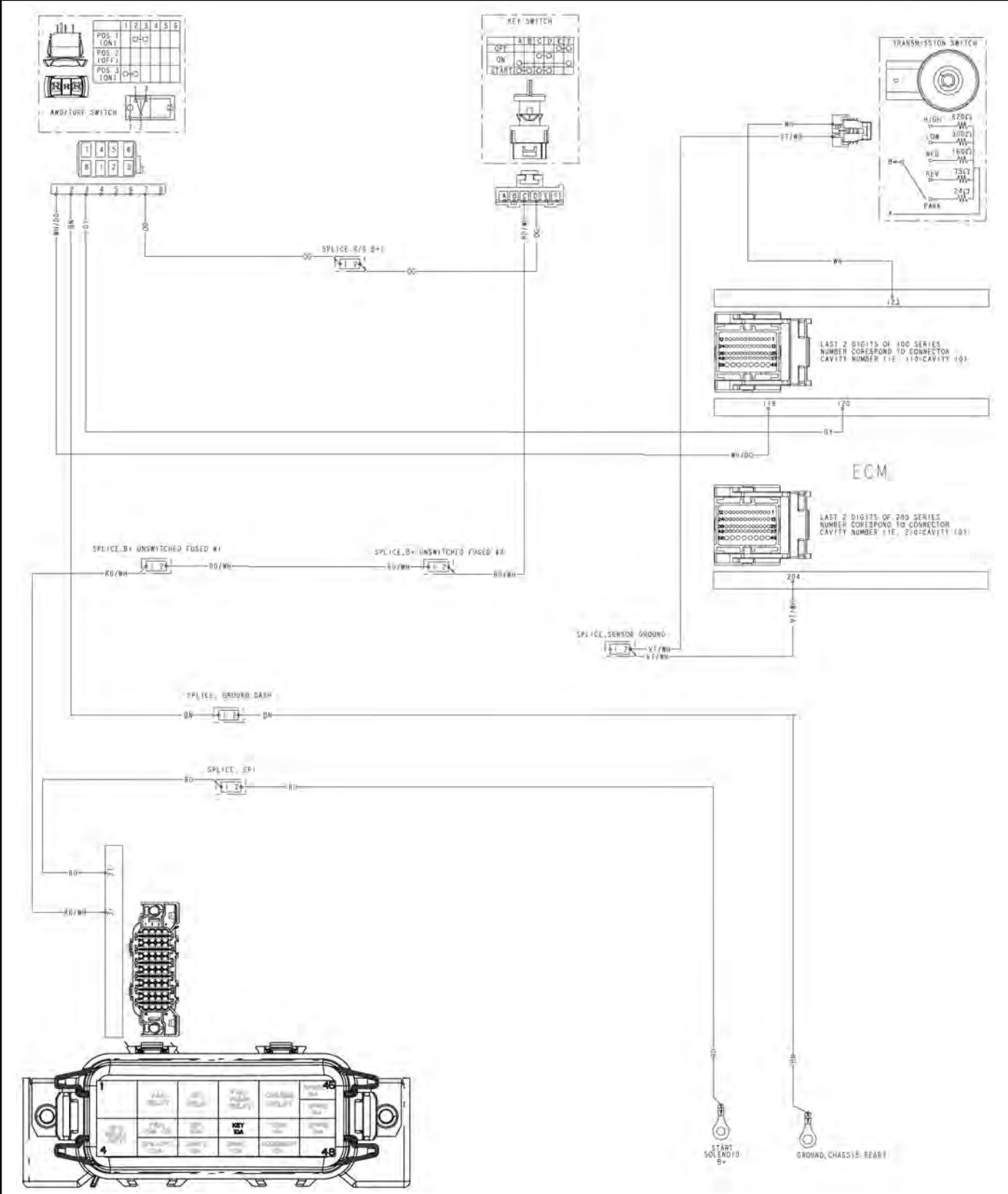


# ELECTRICAL

## Starting System Break-Out Diagram

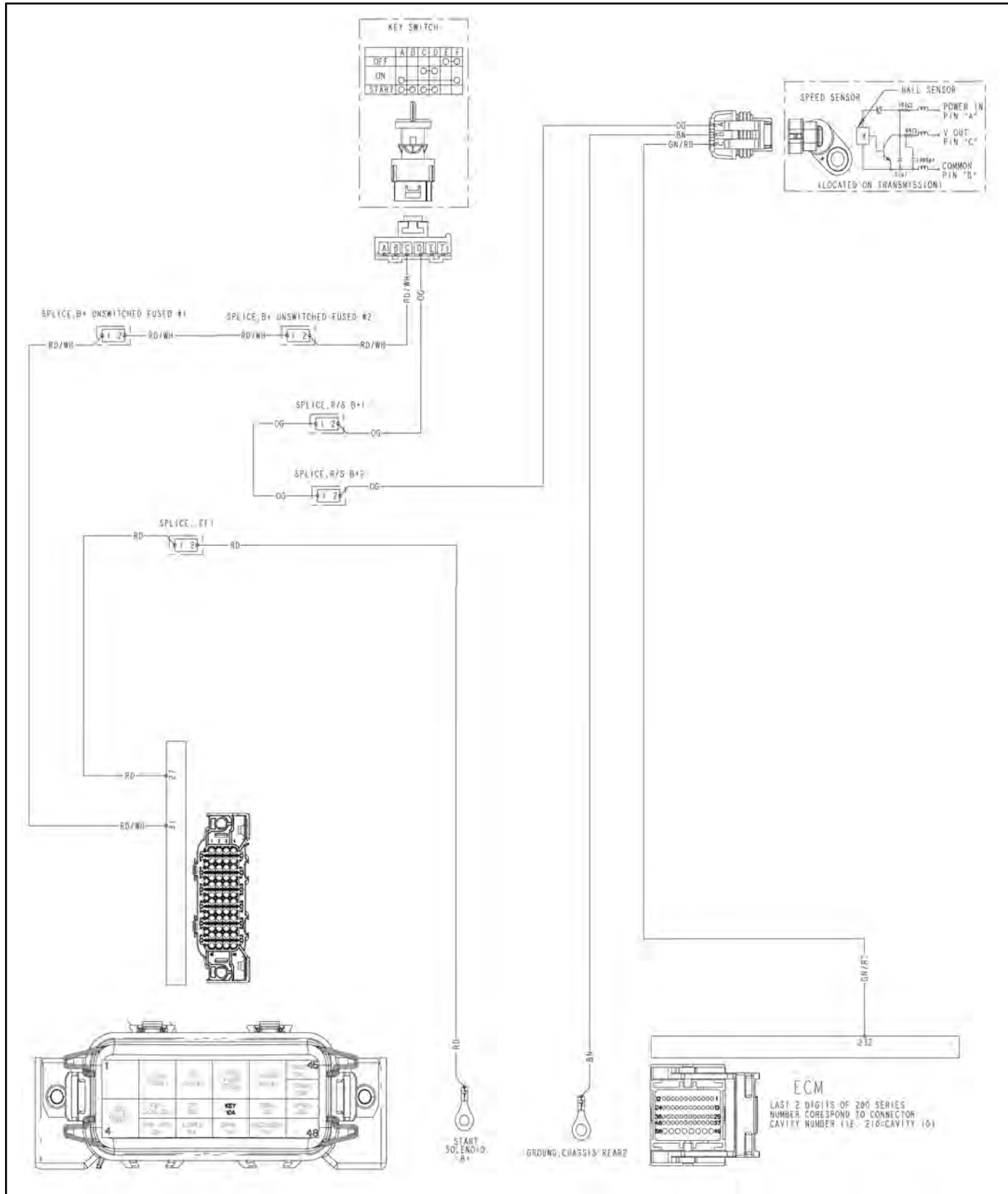


Differential Circuit Break-Out Diagram



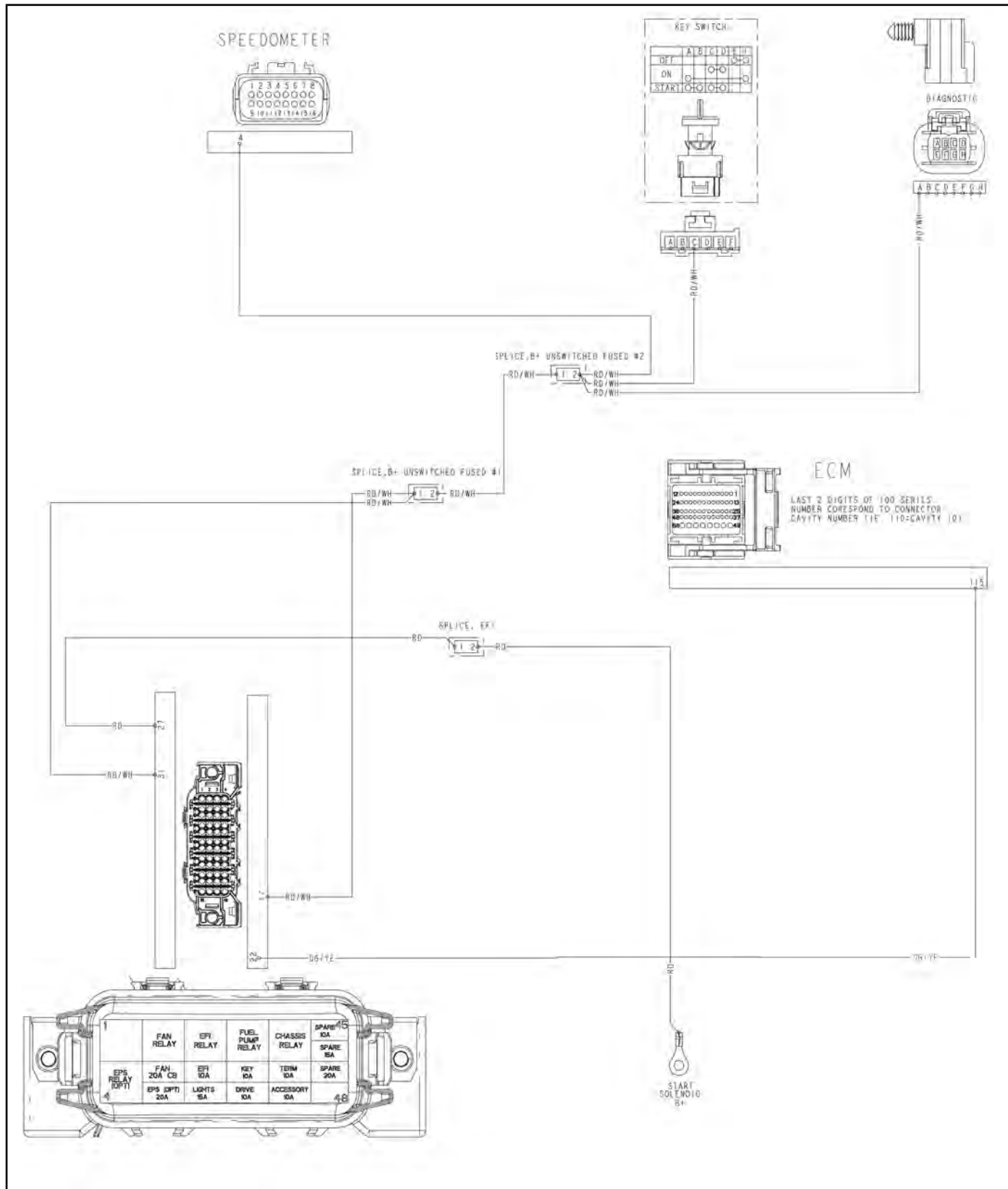
# ELECTRICAL

## Vehicle Speed Sensor Break-Out Diagram



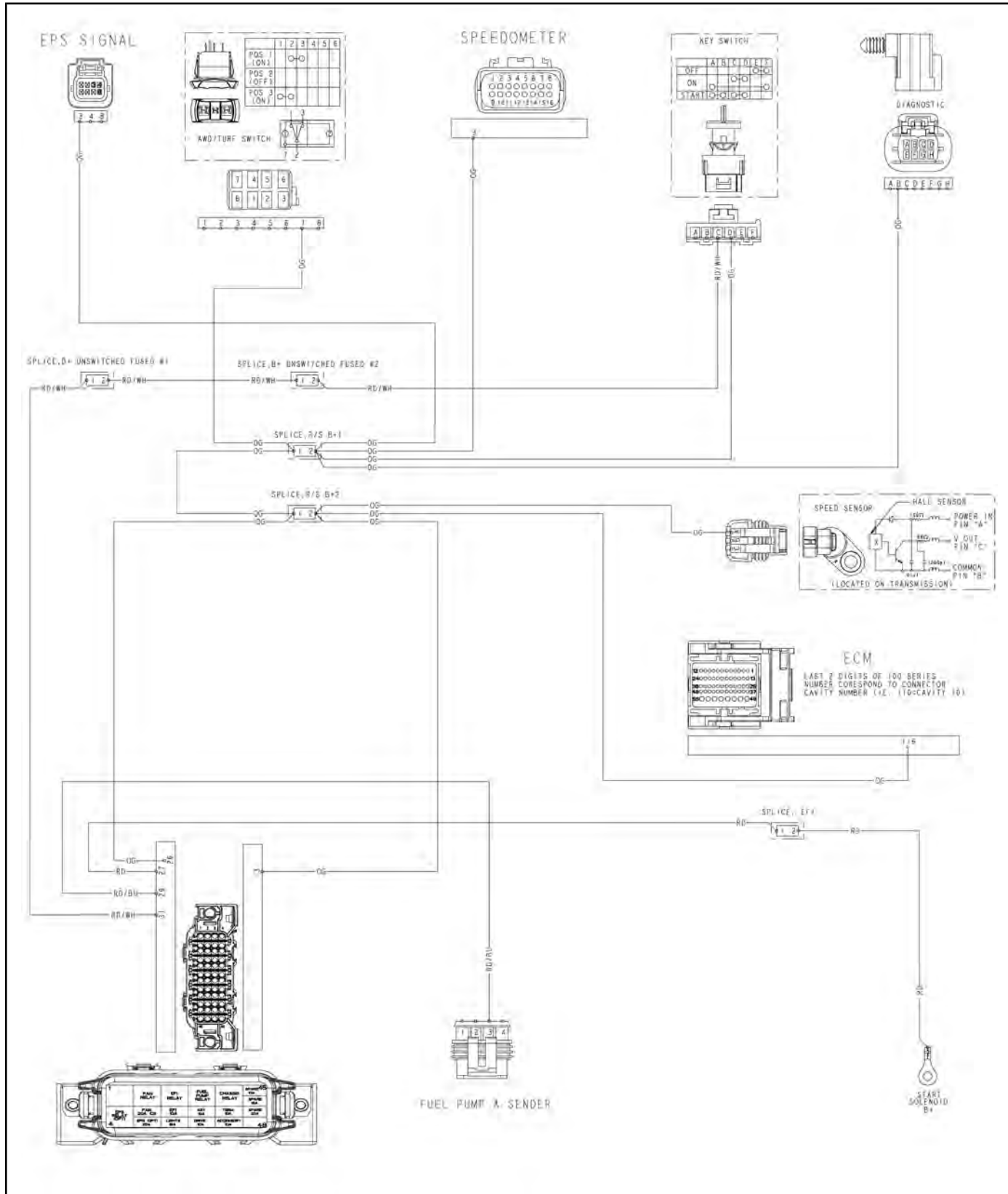


## Unswitched Chassis Power Break-Out Diagram



# ELECTRICAL

## Key On Battery Power Break-Out Diagram



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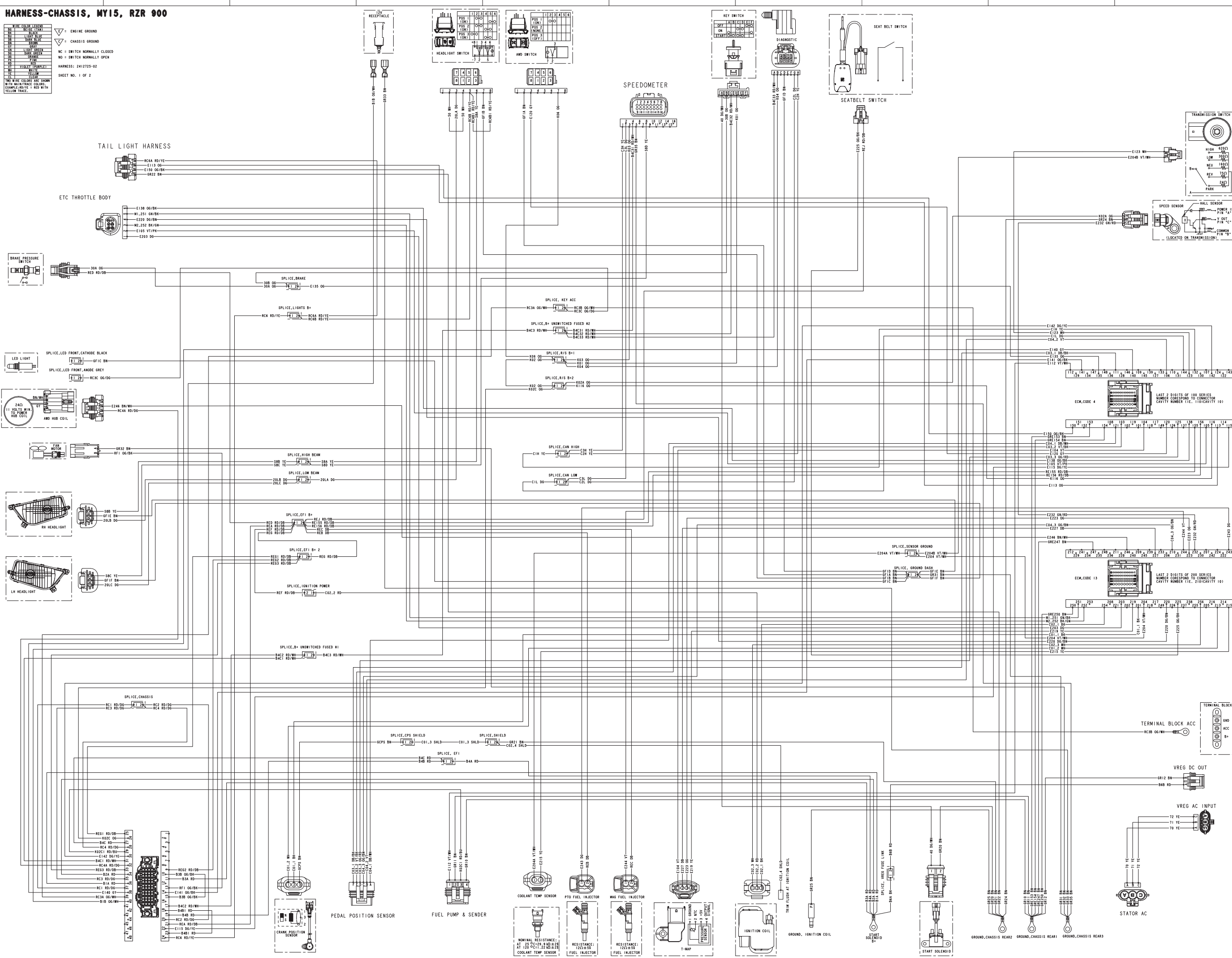
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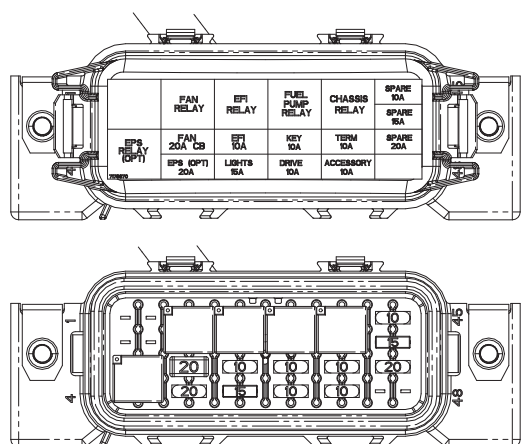
# HARNESS-CHASSIS, MY15, RZR 900

W/WM	WIRE COLOR/TRACE
BL	BLACK
BR	BROWN
BU	BLUE
GR	GREEN
OR	ORANGE
PK	PINK
RD	RED
TR	TRACED (YELLOW)
YL	YELLOW
YR	YELLOW/RED

▽ = ENGINE GROUND  
 ▽ = CHASSIS GROUND  
 NC = SWITCH NORMALLY CLOSED  
 NO = SWITCH NORMALLY OPEN  
 HARNESS: 2412725-02  
 SHEET NO. 1 OF 2



## FUSE/RELAY CENTER

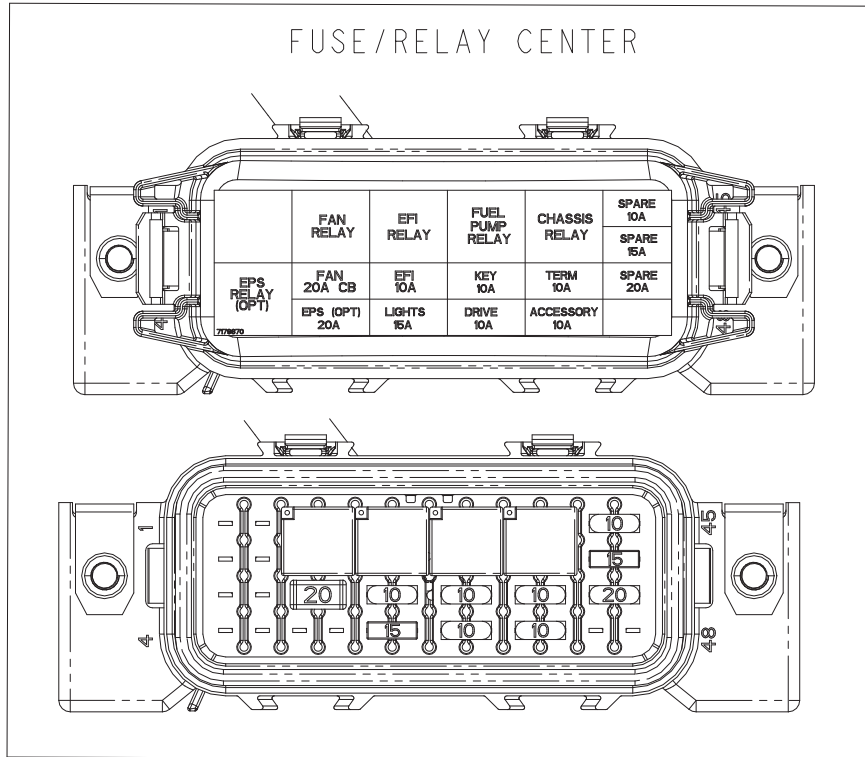


# HARNESS-CHASSIS, MY15, RZR 900

WIRE COLOR LEGEND	
BG	(BLIGE/TAN)
BK	BLACK
BU	LIGHT BLUE
DB	DARK BLUE
BN	BROWN
GY	GRAY
GN	LIGHT GREEN
DG	DARK GREEN
OR	ORANGE
PK	PINK
RD	RED
VT	VIOLET (PURPLE)
WH	WHITE
YE	YELLOW
CL	CLEAR

TWO WIRE COLORS ARE SHOWN WITH MAIN/TRACE COLORS. EXAMPLE: RD/YE = RED WITH YELLOW TRACE.

= ENGINE GROUND  
 = CHASSIS GROUND  
 NC = SWITCH NORMALLY CLOSED  
 NO = SWITCH NORMALLY OPEN  
 HARNESS: 2412725-02  
 SHEET NO. 2 OF 2



INDEX	CCT #	TYPE	GAUGE	COLOR	FROM COMPONENT	TO PORT	FUNCTION
1	20LA	TXL	1.0	DG	HEADLIGHT SWITCH	A	SPRICE, LOW BEAM
2	20LB	TXL	0.8	DG	RH HEADLIGHT	A	SPRICE, LOW BEAM
3	20LC	TXL	0.8	DG	LH HEADLIGHT	A	SPRICE, LOW BEAM
4	30A	TXL	0.8	OS	SPLICE, BRAKE	B	SPRICE, BRAKE SWITCH
5	30B	TXL	0.8	OG	KEY SWITCH	B	SPRICE, BRAKE
6	40	TXL	0.8	DG/WH	KEY SWITCH	A	START SOLENOID
7	50	TXL	1.0	WH	HEADLIGHT SWITCH	2	HEADLIGHT SWITCH
8	70D	TXL	2.0	YE	STATOR AC	A	VREG AC INPUT
9	71	TXL	2.0	YE	STATOR AC	B	VREG AC INPUT
10	72	TXL	2.0	YE	STATOR AC	C	VREG AC INPUT
11	B1A	TXL	1.0	RD	RELAY/FUSE BLOCK	36	START SOLENOID B+
12	B1B	TXL	1.0	OG/WH	RELAY/FUSE BLOCK	40	12V RECEPTACLE FRONT HI
13	B2A	TXL	2.0	RD	START SOLENOID B+	1	RELAY/FUSE BLOCK
14	B3A	TXL	1.0	RD	RELAY/FUSE BLOCK	11	START SOLENOID B+
15	B3B	TXL	1.0	OG/WH	RELAY/FUSE BLOCK	15	RELAY/FUSE BLOCK
16	B4A	TXL	2.0	RD	SPLICE, EFI	2	START SOLENOID B+
17	B4B	TXL	1.0	RD	SPLICE, EFI	1	RELAY/FUSE BLOCK
18	B4B1	TXL	1.0	RD	RELAY/FUSE BLOCK	18	RELAY/FUSE BLOCK
19	B4C	TXL	1.0	RD	SPLICE, EFI	1	RELAY/FUSE BLOCK
20	B4C1	TXL	1.0	RD/WH	RELAY/FUSE BLOCK	31	SPLICE, B+ UNSWITCHED FUSED #1
21	B4C2	TXL	0.5	RD/WH	RELAY/FUSE BLOCK	17	SPLICE, B+ UNSWITCHED FUSED #1
22	B4C3	TXL	1.0	RD/WH	SPLICE, B+ UNSWITCHED FUSED #1	2	SPLICE, B+ UNSWITCHED FUSED #2
23	B4C31	TXL	0.8	RD/WH	SPEEDOMETER	4	SPLICE, B+ UNSWITCHED FUSED #2
24	B4C32	TXL	1.0	RD/WH	KEY SWITCH	C	SPLICE, B+ UNSWITCHED FUSED #2
25	B4C33	TXL	0.5	RD/WH	DIAGNOSTIC	A	SPLICE, B+ UNSWITCHED FUSED #2
26	B6A	FUSIBLE LINK	1.0	BK	SPLICE, VREG FUSE LINK	1	START SOLENOID B+
27	B6B	TXL	3.0	RD	VREG DC OUT	A	SPLICE, VREG FUSE LINK
28	CO1-1	TXL	0.5	BK	ECM CODE 13	201	CRANK POSITION SENSOR
29	CO1-2	TXL	0.5	WH	ECM CODE 13	213	CRANK POSITION SENSOR
30	CO1-3	SHLD	0.35	SHLD	SPLICE, CPS SHIELD	2	SPLICE, SHIELD
31	CO2-1	TXL	0.5	BK	ECM CODE 13	254	IGNITION COIL
32	CO2-2	TXL	0.5	RD	SPLICE, IGNITION POWER	1	IGNITION COIL
33	CO2-3	TXL	0.5	WH	ECM CODE 13	256	IGNITION COIL
34	CO2-4	SHLD	0.35	SHLD	TRIM FLUSH AT IGNITION COIL	1	SPLICE, SHIELD
35	CO3-1	TXL	0.5	DB/WH	ECM CODE 4	111	PEDAL POSITION SENSOR
36	CO3-2	TXL	0.5	VT/WH	ECM CODE 4	103	PEDAL POSITION SENSOR
37	CO3-3	TXL	0.5	OG/RD	ECM CODE 4	125	PEDAL POSITION SENSOR
38	CO4-1	TXL	0.5	DB/WH	ECM CODE 4	121	PEDAL POSITION SENSOR
39	CO4-2	TXL	0.5	VT	ECM CODE 4	106	PEDAL POSITION SENSOR
40	CO4-3	TXL	0.5	OG/BN	ECM CODE 13	210	PEDAL POSITION SENSOR
41	C1H	TXL	0.5	STP	YE ECM CODE 4	132	SPLICE, CAN HIGH
42	C1L	TXL	0.5	STP	DG ECM CODE 4	144	SPLICE, CAN LOW
43	C2H	TXL	0.5	STP	DG DIAGNOSTIC	H	SPLICE, CAN HIGH
44	C2L	TXL	0.5	STP	DG DIAGNOSTIC	G	SPLICE, CAN LOW
45	C3H	TXL	0.5	STP	YE SPEEDOMETER	1	SPLICE, CAN HIGH
46	C3L	TXL	0.5	STP	YE SPEEDOMETER	2	SPLICE, CAN LOW
47	E104	TXL	0.5	VT	ECM CODE 4	104	T-MAP
48	E105	TXL	0.5	VT/WH	ECM CODE 4	105	ETC THROTTLE BODY
49	E112	TXL	0.5	VT/WH	ECM CODE 4	112	FUEL PUMP & SENDER
50	E113	TXL	0.5	OG	ECM CODE 4	113	TAIL LIGHT HARNESS
51	E115	TXL	0.5	DG/YE	ECM CODE 4	115	RELAY/FUSE BLOCK
52	E120	TXL	0.5	GY	ECM CODE 4	120	AWD SWITCH
53	E123	TXL	0.5	WH	ECM CODE 4	123	TRANSMISSION SWITCH
54	E135	TXL	0.5	BN	ECM CODE 4	135	ETC THROTTLE BODY
55	E138	TXL	0.5	OG/BN	ECM CODE 4	138	ETC THROTTLE BODY
56	E140	TXL	0.5	GY	ECM CODE 4	140	RELAY/FUSE BLOCK
57	E141	TXL	0.5	OG/BN	ECM CODE 4	141	RELAY/FUSE BLOCK
58	E142	TXL	0.5	DG/YE	ECM CODE 4	142	RELAY/FUSE BLOCK
59	E150	TXL	0.5	OG/BN	TAIL LIGHT HARNESS	C	ECM CODE 4
60	E203	TXL	0.5	DG	ECM CODE 13	203	ETC THROTTLE BODY
61	E204	TXL	0.5	VT/WH	ECM CODE 13	204	SPLICE, SENSOR GROUND
62	E204A	TXL	0.5	VT/WH	COOLANT TEMP SENSOR	1	SPLICE, SENSOR GROUND
63	E204B	TXL	0.5	VT/WH	TRANSMISSION SWITCH	A	SPLICE, SENSOR GROUND
64	E215	TXL	0.5	YE	ECM CODE 13	215	COOLANT TEMP SENSOR
65	E219	TXL	0.5	YE	ECM CODE 13	219	T-MAP
66	E220	TXL	0.5	DG/BN	ECM CODE 13	220	ETC THROTTLE BODY
67	E223	TXL	0.5	OG	ECM CODE 13	223	T-MAP
68	E225	TXL	0.5	OG/BN	ECM CODE 13	225	SEATBELT SWITCH
69	E227	TXL	0.5	DB	ECM CODE 13	227	MANIFOLD AIR TEMPERATURE SENSOR
70	E232	TXL	0.5	GN/RD	ECM CODE 13	232	VEHICLE SPEED SENSOR
71	E243	TFE	0.5	DG	PTO FUEL INJECTOR	1	ECM CODE 13
72	E244	TFE	0.5	VT	MAG FUEL INJECTOR	1	ECM CODE 13
73	E246	TXL	0.8	BN/WH	ECM CODE 13	246	AWD COIL
74	SCPS	TXL	0.5	BN	CRANK POSITION SENSOR	3	SPLICE, CPS SHIELD
75	GF1A	TXL	0.5	BN	AWD SWITCH	2	SPLICE, GROUND DASH
76	GF1B	TXL	0.5	BN	HEADLIGHT SWITCH	7	SPLICE, GROUND DASH
77	GF1C	TXL	0.5	BN	SPLICE, LED FRONT, CATHODE BLACK	1	GROUND, INTERIOR LED
78	GF1D	TXL	0.5	BN	DIAGNOSTIC	D	SPLICE, GROUND DASH
79	GF1E	TXL	0.8	BN	RH HEADLIGHT	B	SPLICE, GROUND DASH
80	GF1F	TXL	0.8	BN	LH HEADLIGHT	B	SPLICE, GROUND DASH
81	GR10	TXL	0.8	BN	FUEL PUMP & SENDER	4	GROUND, FUEL PUMP
82	GR11	TXL	0.5	BN	FUEL PUMP & SENDER	2	GROUND, CHASSIS REAR1
83	GR12	TXL	3.0	BN	VREG DC OUT	B	GROUND, CHASSIS REAR1
84	GR20	TXL	0.8	BN	START SOLENOID	2	GROUND, CHASSIS REAR2
85	GR21	TXL	0.5	BN	GROUND, CHASSIS REAR2	1	GROUND, CHASSIS REAR2
86	GR22	TXL	0.8	BN	TAIL LIGHT HARNESS	D	GROUND, CHASSIS REAR2
87	GR24	TXL	0.5	BN	VEHICLE SPEED SENSOR	B	GROUND, CHASSIS REAR2
88	GR25	TXL	0.5	BN	GROUND, IGNITION COIL	P1	GROUND, CHASSIS REAR2
89	GR31	TXL	1.0	BN	SPLICE, GROUND DASH	2	GROUND, FRONT
90	GR32	TXL	1.0	BN	FAN	A	GROUND, CHASSIS REAR3
91	GR33	TXL	1.0	BN	12V RECEPTACLE FRONT LO	1	GROUND, CHASSIS REAR3
92	GR35	TXL	0.8	BN	SPEEDOMETER	5	GROUND, CHASSIS REAR3
93	GRE133	TXL	0.8	BN	ECM CODE 4	153	GROUND, ECM
94	GRE154	TXL	0.8	BN	ECM CODE 4	154	GROUND, CHASSIS REAR1
95	GRE247	TXL	0.5	BN	ECM CODE 13	247	GROUND, CHASSIS REAR1
96	GRE250	TXL	0.8	BN	ECM CODE 13	250	GROUND, CHASSIS REAR1
97	K01	TXL	1.0	OG	KEY SWITCH	D	SPLICE, R/S B+1
98	K02	TXL	0.5	OG	SPLICE, R/S B+1	1	SPLICE, R/S B+2
99	K02A	TXL	0.5	OG	VEHICLE SPEED SENSOR	A	SPLICE, R/S B+2
100	K02C	TXL	0.8	OG	SPLICE, R/S B+2	1	RELAY/FUSE BLOCK
101	K02L	TXL	0.8	RD/BU	RELAY/FUSE BLOCK	29	FUEL PUMP & SENDER
102	K03	TXL	0.5	OG	SPEEDOMETER	3	SPLICE, R/S B+1
103	K04	TXL	0.5	OG	DIAGNOSTIC	B	SPLICE, R/S B+1
104	K06	TXL	0.5	OG	AWD SWITCH	1	SPLICE, R/S B+1
105	K116	TXL	0.5	OG	SPLICE, R/S B+2	2	ECM CODE 4
106	M1-251	TXL	0.8	GN/WH	ECM CODE 13	251	ETC THROTTLE BODY
107	M2-252	TXL	0.8	BK/WH	ECM CODE 13	252	ETC THROTTLE BODY
108	RC1	TXL	2.0	RD/DB	RELAY/FUSE BLOCK	37	SPLICE, CHASSIS
109	RC2	TXL	1.0	RD/DB	SPLICE, CHASSIS	2	RELAY/FUSE BLOCK
110	RC3	TXL	1.0	RD/DB	RELAY/FUSE BLOCK	35	SPLICE, CHASSIS
111	RC3A	TXL	1.0	OG/WH	SPLICE, KEY ACC	1	RELAY/FUSE BLOCK
112	RC3B	TXL	1.0	OG/WH	SPLICE, KEY ACC	2	ACC TERM, TERMINAL BLOCK
113	RC3C	TXL	0.5	OG/DB	SPLICE, LED FRONT, ANODE GREY	2	SPLICE, KEY ACC
114	RC4	TXL	0.8	RD/DB	RELAY/FUSE BLOCK	28	SPLICE, CHASSIS
115	RC4A	TXL	0.5	RD/DB	AWD COIL	C	RELAY/FUSE BLOCK
116	RC4B	TXL	0.5	RD/DB	RELAY/FUSE BLOCK	24	SPLICE, LIGHTS B+
117	RC6A	TXL	0.5	RD/YE	SPLICE, LIGHTS B+	2	TAIL LIGHT HARNESS
118	RC6B	TXL	1.0	RD/YE	HEADLIGHT SWITCH	5	SPLICE, LIGHTS B+
119	RC6B1	TXL	0.5	RD/YE	HEADLIGHT SWITCH	5	HEADLIGHT SWITCH
120	RE155	TXL	0.8	RD/DB	SPLICE, EFI B+	2	ECM CODE 4
121	RE156	TXL	0.8	RD/DB	ECM CODE 4	156	SPLICE, EFI B+
122	REA	TXL	1.0	RD/DB	RELAY/FUSE BLOCK	21	SPLICE, EFI B+
123	REB	TFE	0.5	DB	PTO FUEL INJECTOR	2	SPLICE, EFI B+
124	REC	TFE	0.5	DB	MAG FUEL INJECTOR	2	SPLICE, EFI B+
125	RED	TXL	0.8	RD/DB	BRAKE PRESSURE SWITCH	A	SPLICE, EFI B+
126	REF	TXL	0.8	RD/DB	SPLICE, IGNITION POWER	2	SPLICE, EFI B+
127	REG	TXL	0.5	RD/DB	SPLICE, EFI B+	2	SPLICE, EFI B+ 2
128	REG1	TXL	0.5	RD/DB	RELAY/FUSE BLOCK	25	SPLICE, EFI B+ 2
129	REG2	TXL	0.5	RD/DB	SPLICE, EFI B+ 2	1	RELAY/FUSE BLOCK
130	REG3	TXL	0.5	RD/DB	RELAY/FUSE BLOCK	33	SPLICE, EFI B+ 2
131	REJ	TXL	0.5	RD/DB	SPLICE, EFI B+	2	EFI B+, SEATBELT SWITCH
132	RF1	TXL	1.0	OG/BN	RELAY/FUSE BLOCK	13	FAN
133	S8A	TXL	1.0	YE	HEADLIGHT SWITCH	6	SPLICE, HIGH BEAM
134	S8B	TXL	0.8	YE	RH HEADLIGHT	C	SPLICE, HIGH BEAM
135	S8C	TXL	0.8	YE	LH HEADLIGHT	C	SPLICE, HIGH BEAM
136	S8D	TXL	0.5	YE	SPEEDOMETER	8	SPLICE, HIGH BEAM









**HARNES-CHASSIS, RZR 900, EPS, TURF**

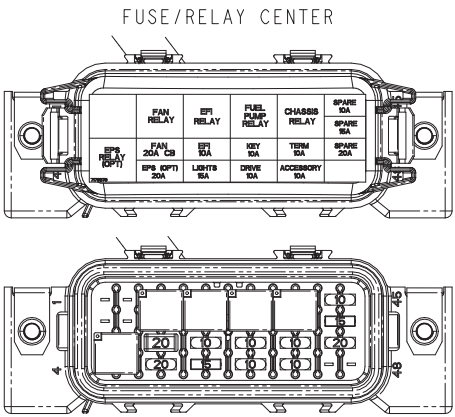
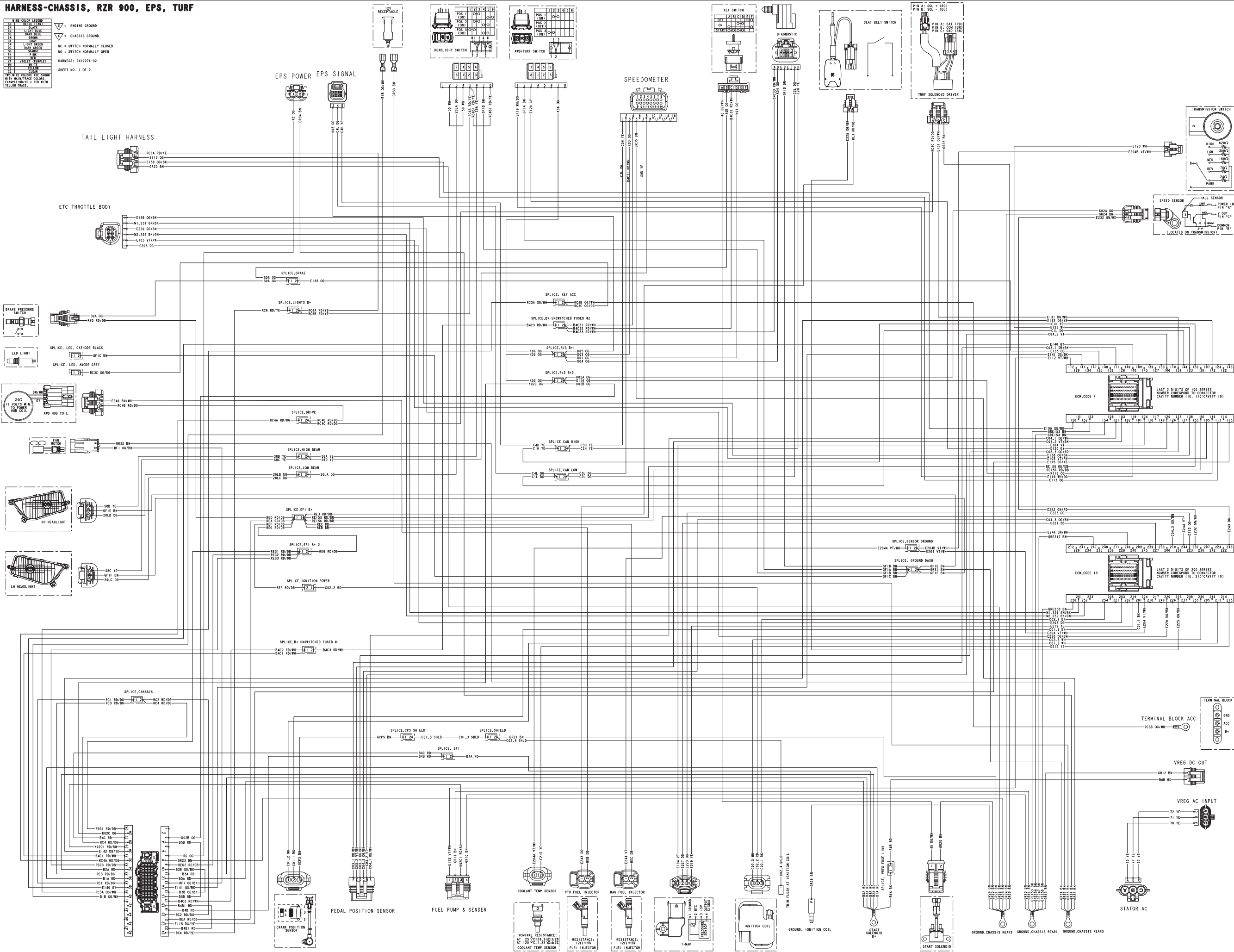
WIRE COLOR LEGEND  
 BK BLACK  
 BL BLUE  
 BRN BROWN  
 GRN GREEN  
 LK LIGHT BLUE  
 LG LIGHT GREEN  
 ORN ORANGE  
 PK PINK  
 RED RED  
 RD RED  
 SLV SILVER  
 TRC TRACED  
 WH WHITE  
 YL YELLOW

ENGINE GROUND  
 CHASSIS GROUND

NC = SWITCH NORMALLY CLOSED  
 NO = SWITCH NORMALLY OPEN

HARNES: 2412274-02  
 SHEET NO. 1 OF 2

NO WIRE COLOR CODE SHOWN WITH MAIN TRACE COLOR. SAMPLE CODE = RED WITH YELLOW TRACE



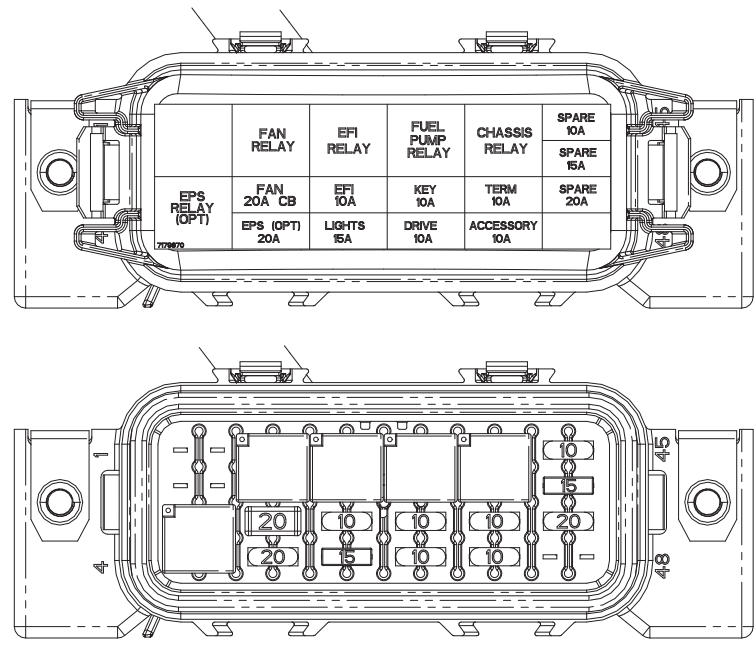
# HARNESS-CHASSIS, RZR 900, EPS, TURF

WIRE COLOR LEGEND	
BG	BEIGE (TAN)
BL	BLACK
BU	LIGHT BLUE
DB	DARK BLUE
BN	BROWN
GY	GRAY
GN	LIGHT GREEN
DG	DARK GREEN
OG	ORANGE
PK	PINK
RD	RED
VT	VIOLET (PURPLE)
WH	WHITE
YE	YELLOW
CL	CLEAR

TWO WIRE COLORS ARE SHOWN WITH MAINTRACE COLORS. EXAMPLE: RD/YE = RED WITH YELLOW TRACE.

E = ENGINE GROUND  
 C = CHASSIS GROUND  
 NC = SWITCH NORMALLY CLOSED  
 NO = SWITCH NORMALLY OPEN  
 HARNESS: 2412276-02  
 SHEET NO. 2 OF 2

## FUSE/RELAY CENTER



INDEX	CCT #	TYPE	GAUGE	COLOR	FROM COMPONENT	FROM PORT	TO COMPONENT	TO PORT	FUNCTION
1	20LA	TXL	1.0	DG	HEADLIGHT SWITCH	3	SPLICE, LOW BEAM	2	LOW BEAM, SWITCH OUT
2	20LB	TXL	0.8	DG	RH HEADLIGHT	A	SPLICE, LOW BEAM	1	LOW BEAM, RH
3	20LC	TXL	0.8	DG	LH HEADLIGHT	A	SPLICE, LOW BEAM	1	LOW BEAM, LH
4	30A	TXL	0.8	OG	SPLICE, BRAKE	1	BRAKE PRESSURE SWITCH	B	BRAKE SWITCH, OUT
5	30B	TXL	0.8	OG	KEY SWITCH	B	SPLICE, BRAKE	1	BRAKE SWITCH, KEY START
6	40	TXL	0.8	DG/WH	KEY SWITCH	A	START SOLENOID	1	START SOLENOID CONTROL GROUND
7	50	TXL	1.0	WH	HEADLIGHT SWITCH	2	HEADLIGHT SWITCH	4	JUMPER, HEADLIGHT SWITCH
8	70	TXL	2.0	YE	STATOR AC	A	VREG AC INPUT	A	STATOR AC1
9	71	TXL	2.0	YE	STATOR AC	B	VREG AC INPUT	B	STATOR AC2
10	72	TXL	2.0	YE	STATOR AC	C	VREG AC INPUT	C	STATOR AC3
11	B1A	TXL	1.0	RD	RELAY/FUSE BLOCK	36	START SOLENOID B+	1	ACC B+, SPLICE IN
12	B1B	TXL	1.0	OG/WH	RELAY/FUSE BLOCK	40	I2V RECEPTACLE FRONT HI	1	I2V ACCESSORY, FUSE OUT
13	B2A	TXL	2.0	RD	START SOLENOID B+	1	RELAY/FUSE BLOCK	34	CHASSIS RELAY POWER IN
14	B3A	TXL	1.0	RD	RELAY/FUSE BLOCK	11	START SOLENOID B+	1	FAN B+, FUSE IN
15	B3B	TXL	1.0	OG/BK	RELAY/FUSE BLOCK	15	RELAY/FUSE BLOCK	10	FAN B+, FUSED RELAY IN
16	B4A	TXL	2.0	RD	SPLICE, EFI	2	START SOLENOID B+	1	EFI, SPLICE IN
17	B4B	TXL	1.0	RD	SPLICE, EFI	1	RELAY/FUSE BLOCK	19	EFI B+, FUSE IN
18	B4B1	TXL	1.0	RD	RELAY/FUSE BLOCK	18	RELAY/FUSE BLOCK	23	UNSWITCHED FUSED B+, EFI RELAY IN
19	B4C	TXL	1.0	RD	SPLICE, EFI	1	RELAY/FUSE BLOCK	27	KEY B+, FUSE IN
20	B4C1	TXL	1.0	RD/WH	RELAY/FUSE BLOCK	31	SPLICE, B+ UNSWITCHED FUSED #1	1	UNSWITCHED FUSED B+, KEY FUSE OUT
21	B4C2	TXL	0.5	RD/WH	RELAY/FUSE BLOCK	17	SPLICE, B+ UNSWITCHED FUSED #1	1	UNSWITCHED FUSED B+, EFI RELAY COIL HI
22	B4C3	TXL	1.0	RD/WH	SPLICE, B+ UNSWITCHED FUSED #1	2	SPLICE, B+ UNSWITCHED FUSED #2	30	UNSWITCHED FUSED B+, SPLICE
23	B4C31	TXL	0.8	RD/WH	SPEEDOMETER	4	SPLICE, B+ UNSWITCHED FUSED #2	2	UNSWITCHED FUSED B+, SPEEDOMETER
24	B4C32	TXL	1.0	RD/WH	KEY SWITCH	C	SPLICE, B+ UNSWITCHED FUSED #2	2	UNSWITCHED FUSED B+, KEY
25	B4C33	TXL	0.5	RD/WH	DIAGNOSTIC	A	SPLICE, B+ UNSWITCHED FUSED #2	2	UNSWITCHED FUSED B+, DIAGNOSTIC
26	B5A	TXL	2.0	RD	RELAY/FUSE BLOCK	12	START SOLENOID B+	1	EPS B+, FUSE IN
27	B5B	TXL	2.0	RD	RELAY/FUSE BLOCK	16	RELAY/FUSE BLOCK	4	UNSWITCHED FUSED B+, EPS FUSE OUT
28	B6A	FUSIBLE LINK	1.0	BK	SPLICE, VREG FUSE LINK	1	START SOLENOID B+	1	FUSE LINK, VOLTAGE REGULATOR OUT
29	B6B	TXL	3.0	RD	VREG DC OUT	A	SPLICE, VREG FUSE LINK	2	VOLTAGE REGULATOR DC OUT
30	CO1-1	TXL	0.5	BK	ECM CODE 13	201	CRANK POSITION SENSOR (-)	2	CRANKSHAFT SENSOR (-)
31	CO1-2	TXL	0.5	WH	ECM CODE 13	213	CRANK POSITION SENSOR	1	CRANKSHAFT SENSOR (+)
32	CO1-3	SHLD	0.35	SHLD	SPLICE, CPS SHIELD	2	SPLICE, SHIELD	1	GROUND, CRANK POSITION SENSOR
33	CO2-1	TXL	0.5	BK	ECM CODE 13	254	IGNITION COIL	3	IGNITION DRIVER 2 PTO
34	CO2-2	TXL	0.5	WH	SPLICE, IGNITION POWER	1	IGNITION COIL	2	EFI B+, COIL
35	CO2-3	TXL	0.5	WH	ECM CODE 13	256	IGNITION COIL	1	IGNITION DRIVER 1 MAG
36	CO2-4	SHLD	0.35	SHLD	TRIM FLUSH AT IGNITION COIL	-	SPLICE, SHIELD	2	GROUND, IGNITION COIL
37	CO3-1	TXL	0.5	DG/BK	ECM CODE 4	111	PEDAL POSITION SENSOR	F	PEDAL POSITION 2
38	CO3-2	TXL	0.5	VT/BK	ECM CODE 4	103	PEDAL POSITION SENSOR	E	PPS2 SENSOR RETURN 3
39	CO3-3	TXL	0.5	OG/RD	ECM CODE 4	125	PEDAL POSITION SENSOR	D	5V PEDAL SUPPLY 2
40	CO4-1	TXL	0.5	DB/WH	ECM CODE 4	121	PEDAL POSITION SENSOR	A	PEDAL POSITION
41	CO4-2	TXL	0.5	VT	ECM CODE 4	106	PEDAL POSITION SENSOR	B	PPS1 SENSOR RETURN 2
42	CO4-3	TXL	0.5	OG/BN	ECM CODE 13	210	PEDAL POSITION SENSOR	C	5V PEDAL SUPPLY 1
43	CIH	TXL	0.5	YE	ECM CODE 4	132	SPLICE, CAN HIGH	1	CAN HIGH, ECM
44	CIL	TXL	0.5	DG	ECM CODE 4	144	SPLICE, CAN LOW	1	CAN LOW, ECM
45	CHH	TXL	0.5	YE	DIAGNOSTIC	H	SPLICE, CAN HIGH	2	CAN HIGH, DIAGNOSTIC
46	CLL	TXL	0.5	DG	DIAGNOSTIC	G	SPLICE, CAN LOW	2	CAN LOW, DIAGNOSTIC
47	C3H	TXL	0.5	YE	SPEEDOMETER	1	SPLICE, CAN HIGH	2	CAN HIGH, SPEEDOMETER
48	C3L	TXL	0.5	DG	SPEEDOMETER	2	SPLICE, CAN LOW	2	CAN LOW, SPEEDOMETER
49	CAH	TXL	0.5	YE	SPLICE, CAN HIGH	1	EPS SIGNAL	8	CAN HI, EPS
50	CAL	TXL	0.5	DG	SPLICE, CAN LOW	1	EPS SIGNAL	4	CAN LO, EPS
51	E104	TXL	0.5	VT	ECM CODE 4	104	T-MAP	1	MAP SENSOR RETURN 4
52	E105	TXL	0.5	VT/PA	ECM CODE 4	105	ETC THROTTLE BODY	2	TPS SENSOR RETURN 1
53	E112	TXL	0.5	VT/WH	ECM CODE 4	112	FUEL PUMP & SENDER	1	FUEL SENSOR
54	E113	TXL	0.5	OG	ECM CODE 4	113	TAIL LIGHT HARNESS	B	LH BRAKE LIGHT
55	E115	TXL	0.5	DG/YE	ECM CODE 4	115	RELAY/FUSE BLOCK	22	EFI RELAY COIL LO
56	E119	TXL	0.5	WH/DG	AWD TURF SWITCH	1	ECM CODE SWITCH	119	TURF REQUEST INPUT
57	E120	TXL	0.5	GY	ECM CODE 4	120	AWD TURF SWITCH	3	AWD REQUEST INPUT
58	E123	TXL	0.5	WH	ECM CODE 4	123	TRANSMISSION SWITCH	B	TRANSMISSION GEAR
59	E131	TXL	0.5	DG/WH	TURF RELAY	2	ECM CODE 4	131	TURF RELAY CONTROL
60	E135	TXL	0.5	OG	SPLICE, BRAKE	2	ECM CODE 4	135	BRAKE SWITCH, ECM IN
61	E138	TXL	0.5	OG/BK	ECM CODE 4	138	ETC THROTTLE BODY	6	3-V SUPPLY, TPS
62	E140	TXL	0.5	GY	ECM CODE 4	140	RELAY/FUSE BLOCK	38	CHASSIS RELAY COIL LO
63	E141	TXL	0.5	OG/BK	ECM CODE 4	141	RELAY/FUSE BLOCK	14	COOLING FAN RELAY
64	E142	TXL	0.5	DG/YE	ECM CODE 4	142	RELAY/FUSE BLOCK	10	FUEL PUMP COIL LO
65	E150	TXL	0.5	OG/BK	TAIL LIGHT HARNESS	C	ECM CODE 4	150	RH BRAKE LIGHT
66	E203	TXL	0.5	DG	ECM CODE 13	203	ETC THROTTLE BODY	1	THROTTLE POSITION SENSOR 1
67	E204	TXL	0.5	VT/WH	ECM CODE 13	204	SPLICE, SENSOR GROUND	2	SENSOR GROUND, ECM
68	E204A	TXL	0.5	VT/WH	COOLANT TEMP SENSOR	1	SPLICE, SENSOR GROUND	1	SENSOR GROUND, TEMP SENSOR
69	E204B	TXL	0.5	VT/WH	TRANSMISSION SWITCH	A	SPLICE, SENSOR GROUND	2	SENSOR GROUND, TRANS
70	E215	TXL	0.5	YE	ECM CODE 13	215	COOLANT TEMP SENSOR	2	COOLANT TEMPERATURE SENSOR
71	E219	TXL	0.5	YE	ECM CODE 13	219	T-MAP	4	MANIFOLD PRESSURE SENSOR SIGNAL
72	E220	TXL	0.5	DG/BN	ECM CODE 13	220	ETC THROTTLE BODY	4	THROTTLE POSITION SENSOR 2
73	E223	TXL	0.5	OG	ECM CODE 13	223	T-MAP	3	5V SENSOR SUPPLY 2, MAP
74	E225	TXL	0.5	OG/BK	ECM CODE 13	225	SEATBELT SWITCH	B	SEATBELT SWITCH
75	E227	TXL	0.5	DB	ECM CODE 13	227	T-MAP	2	MANIFOLD AIR TEMPERATURE SENSOR
76	E232	TXL	0.5	GN/VD	ECM CODE 13	232	VEHICLE SPEED SENSOR	C	VEHICLE SPEED SENSOR
77	E243	TFE	0.5	DG	ECM CODE 13	243	PTO FUEL INJECTOR	1	INJECTOR DRIVER 2 (PTO)
78	E244	TFE	0.5	VT	ECM CODE 13	244	MAG FUEL INJECTOR	1	INJECTOR DRIVER 1 (MAG)
79	E246	TXL	0.5	BN/WH	ECM CODE 13	246	AWD COIL	B	AWD CONTROL
80	GCPS	TXL	0.5	BN	CRANK POSITION SENSOR	3	SPLICE, CPS SHIELD	1	GROUND, CRANK POSITION SENSOR
81	GF1A	TXL	0.5	BN	AWD TURF SWITCH	2	SPLICE, GROUND DASH	1	GROUND, AWD SWITCH
82	GF1B	TXL	0.5	BN	HEADLIGHT SWITCH	7	SPLICE, GROUND DASH	1	GROUND, HEADLIGHT SWITCH
83	GF1C	TXL	0.5	BN	SPLICE, LED, CATHODE BLACK	2	SPLICE, GROUND DASH	1	GROUND, INTERIOR LED
84	GF1D	TXL	0.5	BN	DIAGNOSTIC	D	SPLICE, GROUND DASH	1	GROUND, DIAGNOSTIC
85	GF1E	TXL	0.8	BN	RH HEADLIGHT	B	SPLICE, GROUND DASH	2	GROUND, RH HDLT
86	GF1F	TXL	0.8	BN	LH HEADLIGHT	B	SPLICE, GROUND DASH	2	GROUND, LH HDLT
87	GR10	TXL	0.5	BN	FUEL PUMP & SENDER	4	GROUND, CHASSIS REAR1	4	GROUND, FUEL PUMP
88	GR11	TXL	0.5	BN	FUEL PUMP & SENDER	2	GROUND, CHASSIS REAR1	1	GROUND, FUEL LEVEL
89	GR12	TXL	3.0	BN	VREG DC OUT	B	GROUND, CHASSIS REAR1	1	GROUND, REGULATOR
90	GR20	TXL	0.8	BN	START SOLENOID	2	GROUND, CHASSIS REAR2	1	GROUND, START SOLENOID
91	GR21	TXL	0.5	BN	GROUND, CHASSIS REAR2	1	SPLICE, GROUND DASH	2	GROUND, START SPLICE
92	GR22	TXL	0.8	BN	TAIL LIGHT HARNESS	D	GROUND, CHASSIS REAR2	1	GROUND, TAILLIGHT
93	GR23	TXL	0.5	BN	GROUND, CHASSIS REAR2	1	RELAY/FUSE BLOCK	8	GROUND, EPS RELAY COIL
94	GR24	TXL	0.5	BN	VEHICLE SPEED SENSOR	B	GROUND, CHASSIS REAR2	1	GROUND, SPEED SENSOR
95	GR25	TXL	1.0	BN	TURF RELAY	C	GROUND, CHASSIS REAR2	1	GROUND, TURF RELAY
96	GR26	TXL	0.5	BN	GROUND, IGNITION COIL	P1	GROUND, CHASSIS REAR2	1	GROUND, IGNITION COIL BODY
97	GR31	TXL	1.0	BN	SPLICE, GROUND DASH	2	GROUND, CHASSIS REAR3	1	GROUND, FRONT
98	GR32	TXL	1.0	BN	FAN	A	GROUND, CHASSIS REAR3	1	GROUND, FRONT FAN
99	GR33	TXL	1.0	BN	I2V RECEPTACLE FRONT LO	1	GROUND, CHASSIS REAR3	1	GROUND, FRONT I2V RECEPTACLE
100	GR34	TXL	2.0	BN	EPS POWER	B	GROUND, CHASSIS REAR3	1	GROUND, EPS POWER
101	GR35	TXL	0.8	BN	SPEEDOMETER	5	GROUND, CHASSIS REAR3	1	GROUND, SPEEDOMETER
102	GRE153	TXL	0.8	BN	ECM CODE 4	153	GROUND, CHASSIS REAR1	1	GROUND, ECM
103	GRE154	TXL	0.8	BN	ECM CODE 4	154	GROUND, CHASSIS REAR1	1	GROUND, ECM
104	GRE247	TXL	0.5	BN	ECM CODE 13	247	GROUND, CHASSIS REAR1	1	GROUND, ECM
105	GRE250	TXL	0.8	BN	ECM CODE 13	250	GROUND, CHASSIS REAR1	1	GROUND, ECM
106	K01	TXL	1.0	OG	KEY SWITCH	D	SPLICE, R/S B+2	2	KEY SWITCH B+, KEY OUT
107	K02	TXL	0.5	OG	SPLICE, R/S B+1	1	SPLICE, R/S B+2	1	KEY SWITCH B+, SPLICE
108	K02A	TXL	0.5	OG	VEHICLE SPEED SENSOR	A	SPLICE, R/S B+2	2	KEY SWITCH B+, VSS
109	K02B	TXL	0.5	OG	RELAY/FUSE BLOCK	3	SPLICE, R/S B+2	2	KEY SWITCH B+, EPS REL COIL POWER
110	K02C	TXL	0.8	OG	SPLICE, R/S B+2	1	RELAY/FUSE BLOCK	26	KEY SWITCH B+, FUEL PUMP UNFUSED
111	K02C1	TXL	0.8	RD/BU	RELAY/FUSE BLOCK	29	FUEL PUMP & SENDER	3	FUEL PUMP RELAY OUT
112	K03	TXL	0.5	OG	SPEEDOMETER	3	SPLICE, R/S B+1	2	KEY SWITCH B+, SPEEDOMETER
113	K04	TXL	0.5	OG	DIAGNOSTIC	B	SPLICE, R/S B+1	2	KEY SWITCH B+, DIAGNOSTIC
114	K05	TXL	0.5	OG	EPS SIGNAL	3	SPLICE, R/S B+1	2	KEY SWITCH B+, EPS
115	K06	TXL	0.5	OG	AWD TURF SWITCH	7	SPLICE, R/S B+1	1	KEY SWITCH B+, AWD SWITCH LIGHT
116	K116	TXL	0.5	OG	SPLICE, R/S B+2	2	ECM CODE 4	116	KEY SWITCH B+, ECM
117	M1-251	TXL	0.8	GN/BK	ECM CODE 13	251	ETC THROTTLE BODY	5	ETC MOTOR (+)
118	M2-252	TXL	0.8	BN/WH	ECM CODE 13	252	ETC THROTTLE BODY	3	ETC MOTOR (-)
119	RC1	TXL	2.0	RD/DG	RELAY/FUSE BLOCK	37	SPLICE, CHASSIS	1	CHASSIS RELAY OUT
120	RC2	TXL	1.0	RD/DG	SPLICE, CHASSIS	2	RELAY/FUSE BLOCK	20	CHASSIS RELAY OUT, LIGHTS INPUT
121	RC3	TXL	1.0	RD/DG	RELAY/FUSE BLOCK	35	SPLICE, CHASSIS	1	ACC TERM, FUSE IN
122	RC3A	TXL	1.0	OG/WH	SPLICE, KEY ACC	1	RELAY/FUSE BLOCK	39	ACC TERM, FUSE OUT
123	RC3B	TXL	1.0	OG/WH	SPLICE, KEY ACC	2	TERMINAL BLOCK ACC	1	KEY POWER, TERMINAL BLOCK
124	RC3C	TXL	0.5	OG/DG	SPLICE, LED, ANODE GREY	2	SPLICE, KEY ACC	2	ACC B+, INTERIOR LED
125	RC4	TXL	0.8	RD/DG	RELAY/FUSE BLOCK	28	SPLICE, CHASSIS	2	CHASSIS RELAY, DRIVE INPUT
126	RC4A	TXL	1.0	RD/DG	SPLICE, DRIVE	1	RELAY/FUSE BLOCK	1	SWITCHED B+, DRIVE FUSE OUT
127	RC4B	TXL	0.5	RD/DG	SPLICE, DRIVE	2	AWD COIL	C	SWITCHED B+, AWD COIL
128	RC4C	TXL	1.0	RD/DG	TURF RELAY	A	SPLICE, DRIVE	2	SWITCHED B+, TURF RELAY
129	RC6	TXL	0.5	RD/YE	RELAY/FUSE BLOCK	24	SPLICE, LIGHTS B+	1	LIGHTS B+, LIGHTS FUSE OUT
130	RC6A	TXL	0.5	RD/YE	RELAY/FUSE BLOCK	2	TAIL LIGHT HARNESS	2	LIGHTS, TAILLIGHTS
131	RC6B	TXL	1.0	RD/YE	HEADLIGHT SWITCH	5	SPLICE, LIGHTS B+	2	LIGHTS, HDLT SWITCH IN
132	RC6B1	TXL	0.5	RD/YE	HEADLIGHT SWITCH	5	HEADLIGHT SWITCH	8	JUMPER
133	RE153								