2019–2020 *RZR* XP Turbo / XP4 Turbo
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.

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.

Publication Printed August 2019 (PN 9930585 RO1)

SAFETY WARNINGS

The following signal words and symbols appear throughout this manual and on the vehicle. Your safety is involved when these words and symbols are used. Become familiar with their meanings before reading the manual.

⚠ DANGER
DANGER indicates a hazardous situation which, if not avoided, WILL result in death or serious injury.

⚠ WARNING
SAFETY ALERT WARNING indicates a hazardous situation which, if not avoided, COULD result in death or serious injury.

⚠ CAUTION
SAFETY ALERT CAUTION indicates a hazardous situation which, if not avoided, COULD result in minor to moderate injury.

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

NOTICE
NOTICE 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 SHOX

RydeFX, Registered Trademark of ArvinMeritor

Some Polaris factory publications can be downloaded from www.polarisindustries.com, purchased from www.purepolaris.com or by contacting the nearest Polaris dealer.

REVISION INDEX

REV	DATE	CHANGES
R01	9/13/2019	Initial Release

FEEDBACK FORM

A feedback form has been created for the technician or consumer to provide Polaris with an overall satisfaction rating for this service manual, provide comments on your experience or upload pictures/video. This feedback form is viewable on a mobile device by scanning the QR code or by clicking **here** if viewing this document electronically.

2019–2020 *RZR* XP Turbo / XP4 Turbo

Service Manual

Chapter Summary

1

CHAPTER 1
GENERAL INFORMATION

VEHICLE IDENTIFICATION

MODEL NUMBER DESIGNATION (2015 +)

Example: R15RUE57AC

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

* = 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: 4XARUE573FG000000

WORLD MFG. ID			VEHICLE DESCRIPTORS						VEHICLE IDENTIFIERS							
			CHASSIS	DRIVELINE	CHASSIS MODIFIER	ENGINE SIZE	ENGINE MODIFIER	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	U	E	5	7	3	F	G	0	0	0	0	0	0

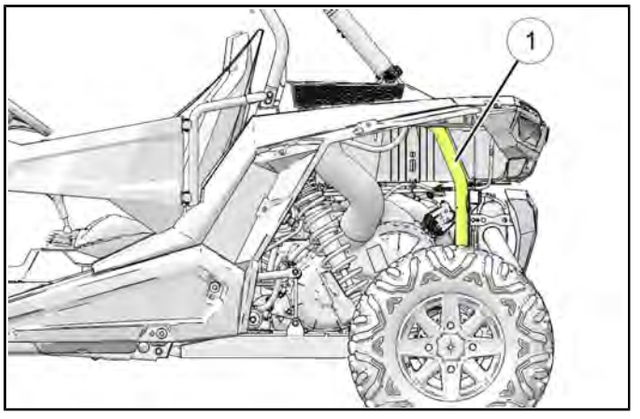
* Model Year: A = 2010; B = 2011; C = 2012; D = 2013; E = 2014; F = 2015; G= 2016; H=2017; J=2018; K=2019

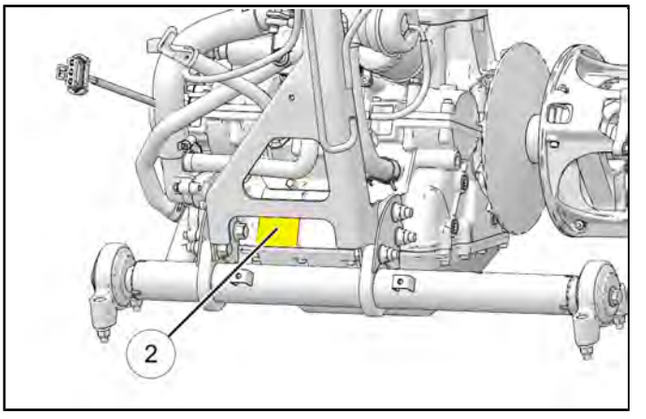
VIN AND ENGINE SERIAL NUMBER LOCATIONS

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 frame ①, behind the PVT system.

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.





REFERENCE 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.
(i.e. In this example, the first two digits are 31 which would use key blank PN 4110141.)

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

PUBLICATION NUMBERS

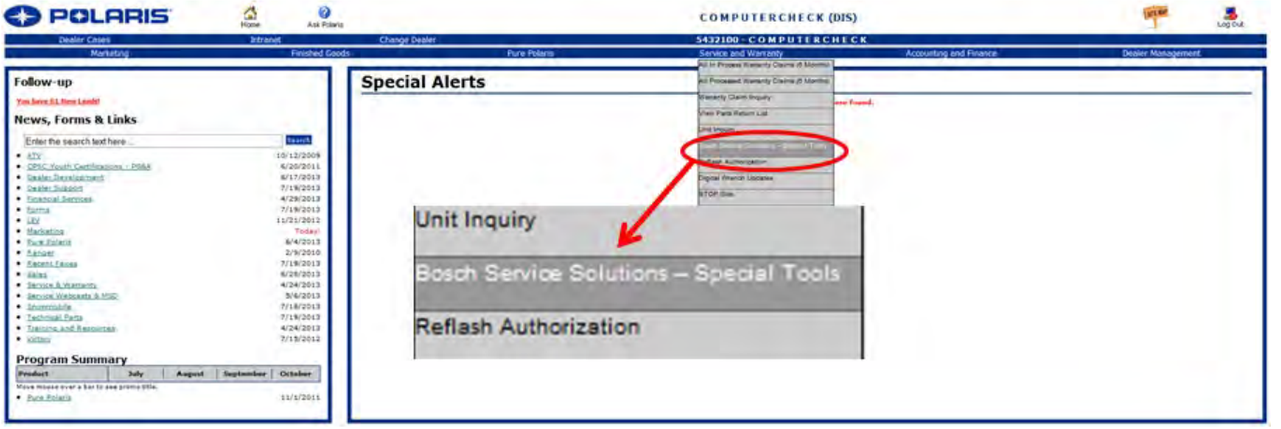
YEAR	MODEL	OWNER'S MANUAL
2019	*RZR* XP / XP 4 Turbo	9929575
2020	*RZR* XP / XP 4 Turbo	9929975

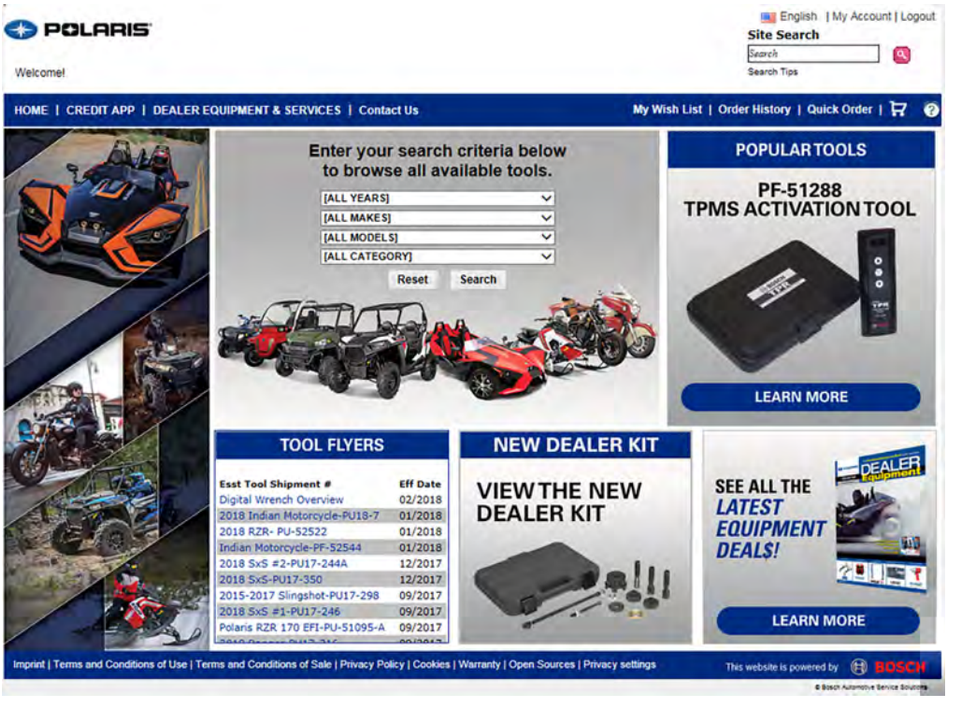
NOTICE
When ordering service parts be sure to use the correct parts manual. Polaris factory publications can be found at www.polaris.com or purchased from www.purepolaris.com.

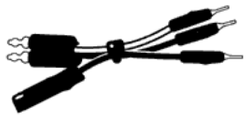
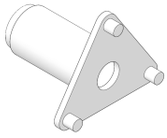
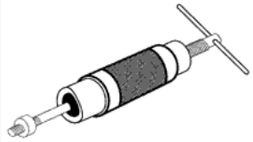
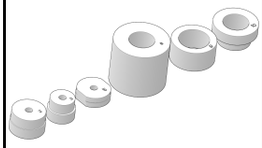
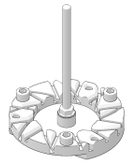
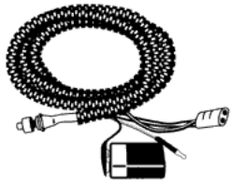
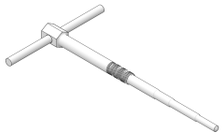
SPECIAL TOOLS

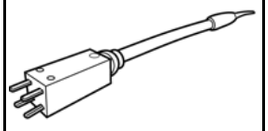
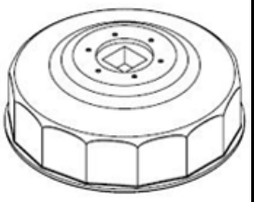
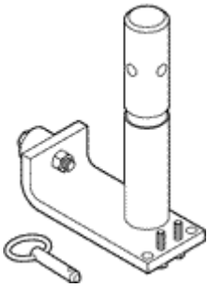
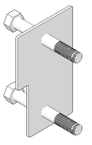
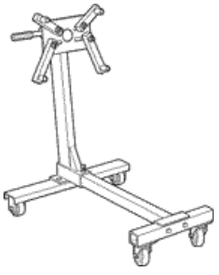
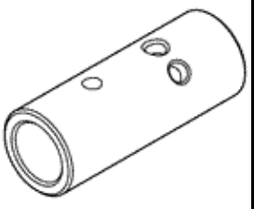
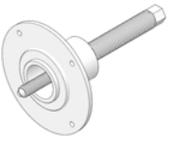
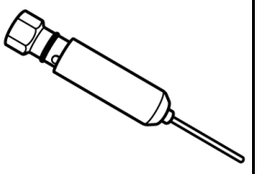
Special tools may be required while servicing this vehicle. Some of the tools listed or depicted are mandatory, while other tools may be substituted with a similar tool, if available. Polaris recommends the use of Polaris Special Tools when servicing any Polaris product. Dealers may order special tools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

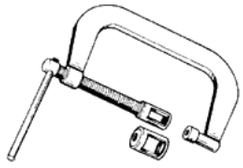
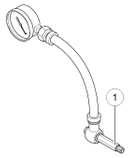
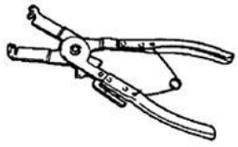
Bosch Automotive Service Solutions:
1-800-345-2233 or http://polaris.service-solutions.com/





2200421 Gas Shock Recharging Kit 	**2460761** Hall Sensor Probe Harness 	**2870341-A** Drive Clutch Spider Remover/Installer 	**2870386** Piston Pin Puller 	**2870630** Timing Light 
2870910-A Roller Pin Tool 	**2870975** Mity-Vac Pressure Test Tool 	**2871226** Clutch Bushing Replacement Tool Kit 	**2871282** Transmission Seal Driver (50 MM) 	**2871358-B** Drive Clutch Holding Fixture 
2871745 Static Timing Light Harness 	**2872085** Drive Clutch Puller 	**2876389** Combination Pliers 	**2878925** Spanner Wrench / Clutch Spreader 	**8700226** CV Boot Clamp Pliers (ear) 
PA-48838 Fuel Pressure Adapter 	**PA-49316** Water Pump Drive & Flywheel Removal Tool 	**PU-43506-A** Fuel Pressure Gauge Kit 	**PU-47471** Smartlink Module Kit 	**PU-48951** CV Boot Clamp Pliers (Stepless) 

PU-49466 Relay Bypass 	**PU-50105** Oil Filter Wrench 	**PU-50296** Battery Tester 	**PU-50338** Hydrometer 	**PU-50518-A** Clutch Compressor 
PU-50562 Engine Stand Adapter 	**PU-50563** Cylinder Holding & Camshaft Timing Plate 	**PU-50564** Water Pump Seal Installer 	**PU-50569** Oil Pressure Gauge Adapter (1/4 NPT) 	**PU-50578** Clutch Spider Nut Socket 
PU-50624 Rolling Engine Stand 	**PU-50625** Engine Stand Adapter Sleeve (2″) 	**PU-50784** Crankshaft Puller/ Installer 	**PU-51410** Shock Rod Holding Tool (7/8″) 	**PU-51039** Gas Shock Fill Tool 
PU-51220 Flywheel Holding Tool 	**PU-51829** Shock Spanner Wrench 2.5–3.0 Inner 	**PU-51830** Shock Spanner Wrench 2.5 Outer 	**PU-51832** Shock Spanner Wrench 3.0 Outer 	**PU-51837** Shock Body Holding Tool 

PU-51838 Shock Body Holding Tool 	**PU-51861** Drive Clutch Holding Tool 	**PU-51862** Transmission Snorkel Tool 	**PV-1253** Valve Spring Compressor 	**PV-43513-A** Valve Spring Compressor Adapter 
PV-43526 Connector Test Kit 	**PV-43531** Oil Presure gauge 	**PV-43568** Fluke Multimeter 	**PV-43570-1** Piston Ring Compressor Pliers 	

MASTER TORQUE TABLE

ITEM		TORQUE
A-Arm Fasteners (front)		**42 ft-lb (57 Nm)**
Air Box Mounting Bolts		**8 ft-lb (11 Nm)**
Air Intake Housing Screw (Engine and PVT)		**35 in-lb (4 Nm)**
Ball Joint Fasteners		**42 ft-lbs (57 Nm)**
Battery	Mount Bracket	**24 in-lbs (3 Nm)**
	Terminal Fasteners	**60 in-lbs (7 Nm)**
Bearing Carrier Mounting Bolts (rear)		**42 ft-lb (57 Nm)**
Body / Cargo Box Screws		**8 ft-lb (11 Nm)**
Brake Bleed Screws		**48 in-lb (5 Nm)**
Brake Caliper Mounting Bolts	front	**30 ft-lbs (42 Nm)**
	rear	**46 ft-lbs (62 Nm)**
Brake Junction Block Mounting Screws		**35 in-lb (4 Nm)**
Brake Line	Banjo Bolts	**15 ft-lbs (20 Nm)**
	Flare Fittings	**15 ft-lbs (20 Nm)**
Brake Pedal Mount Bracket Fasteners		**18 ft-lbs (24 Nm)**
Brake Switch		**15 ft-lbs (20 Nm)**
Cab Frame Bolts		**40 ft-lb (54 Nm)**
Cam Chain Tensioner	Spring Bolt	**15 ft-lb (20 Nm)**
	Mounting Bolts	**7 ft-lb (10 Nm)**
Camshaft Carrier	Carrier Bolts	**7 ft-lb (10 Nm)**
	Sprocket Bolts	**14 ft-lb (19 Nm)**
Cargo Box Bracket Fasteners		**14 ft-lb (19 Nm)**
Charge Air Cooler Bolts		**Torque in sequence to 7 ft-lb (10 Nm)**
Chassis Ground Nut		**5 ft-lb (7 Nm)**
Connecting Rod Bolts		**Step 1: 9 ft-lbs (12 Nm)** **Step 2: 22 ft-lb (30 Nm)** **Step 3: Tighten add'n 90°**
Coolant Bleed Screw		**89 in-lb (10 Nm)**
Coolant Hose Retainer Bolt		**8 ft-lb (11 Nm)**
Coolant Reservoir		**8 ft-lb (11 Nm)**
Coolant Temperature Sensor		**17 ft-lb (23 Nm)**
CPS Retaining Bolt		**9 ft-lb (12 Nm)**
Crankcase Bolts	M6	**9 ft-lb (12 Nm)**
	M8	**26 ft-lb (35 Nm)**
	M10	**Step 1: 9 ft-lb (12 Nm)** **Step 2: 21 ft-lb (28 Nm)** **Step 3: Tighten add'n 90°**

ITEM		TORQUE
Crankcase Oil Gallery Plug		**11 ft-lbs (15 Nm) *apply pipe thread sealant***
Cylinder Head Bolts		**Torque in sequence** **Step 1: 13 ft-lbs (18 Nm)** **Step 2: 26 ft-lb (35 Nm)** **Step 3: Additional 180°** **Step 4: Additional 180°** **Step 5: M6 bolts: 7 ft-lb (10 Nm)**
Door Fasteners		**8 ft-lb (11 Nm)**
Drive Clutch	Mounting Bolt	**96 ft-lb (130 Nm)**
	Cover Plate	**9 ft-lb (12 Nm)**
	Shift Weight	**20 in-lb (2 Nm)**
	Spider Jam Nut	**300 ft-lb (407 Nm)**
Driven Clutch	Helix Cover	**12 ft-lbs (16 Nm)**
	Mounting Bolt	**10 ft-lbs + 90° (14 Nm + 90°)**
	Slider/Button	**35 in-lb (4 Nm)**
Driveshaft Boot Guard Screws		**14 ft-lb (19 Nm)**
ECU Mounting Screws		**24 in-lb (3 Nm)**
Electric Coolant Pump Bracket Fasteners		**8 ft-lb (11 Nm)**
Engine Breather Cover Screws		**7 ft-lb (10 Nm)**
Engine Mount	Bracket Fasteners	**42 ft-lb (57 Nm)**
	Isolator Bolt	**55 ft-lb (75 Nm)**
Engine Mount to Frame		**22 ft-lb (30 Nm)**
Engine Oil Plug		**12 ft-lbs (16 Nm)**
Exhaust Heat Shield Fasteners		**8 ft-lb (11 Nm)**
Exhaust Manifold	Bolts	**17 ft-lb (23 Nm)**
	Nuts	**26 ft-lb (35 Nm)**
Exhaust Pipe to Muffler Nuts		**18 ft-lb (24 Nm)**
Exhaust Pipe to Turbo Bolts		**18 ft-lb (24 Nm)**
Floor Screws		**8 ft-lb (11 Nm)**
Flywheel Bolt		**133 ft-lbs (180 Nm), loosen 180°, retorque to 133 ft-lb (180 Nm)**
Frame Bolts (front to rear)		**40 ft-lb (54 Nm)**
Front Bumper / Fender Screws		**8 ft-In (11 Nm)**
Front Gearcase	Cover Plate Screws	**11 ft-lbs (15 Nm)**
	Drain/Fill Plugs	**10 ft-lbs (14 Nm)**
	Mounting Bolts	**33 ft-lbs (45 Nm)**
Fuel Pump PFA Nut		**70 ft-lbs (95 Nm)**

ITEM		TORQUE
Fuel Rail Mounting Screws		**7 ft-lb (10 Nm)**
Fuel Tank Block-off Panel		**8 ft-lbs (11 Nm)**
Fuel Tank Strap Screw		**8 ft-lbs (11 Nm)**
Fuse Box Fasteners		**5 ft-lb (7 Nm)**
Gear Selector Knob		**40 in-lb (5 Nm)**
Helix Cover Fasteners		**12 ft-lbs (16 Nm)**
Hip Bolster Bolts		**14 ft-lb (19 Nm)**
Hose Clamp		**35 in-lb (4 Nm)**
Hub Castle Nut (front and rear)		**180 ft-lbs (244 Nm)**
Ignition Coil Mounting Bolt		**8 ft-lb (11 Nm)**
Intake Clamps		**49 in-lb (6 Nm)**
Intake Manifold Mounting Fasteners (lower)		**20 ft-lb (27 Nm)**
Intake Manifold to Cyl Head Clamps		**6 ft-lb (8 Nm)**
Knock / Det Sensor		**15 ft-lb (20 Nm)**
Master Cylinder Mount Bolts		**23 ft-lbs (31 Nm)**
Manifold Pressure Banjo Bolt		**7 ft-lb (10 Nm)**
Oil Cooler Bolts		**7 ft-lb (10 Nm)**
Oil Pan Bolts (M8)	M6	**9 ft-lb (12 Nm)**
	M8	**26 ft-lb (35 Nm)**
Oil Pump	Mounting Bolts	**7 ft-lbs (10 Nm)**
	Pickup Screws	**7 ft-lb (10 Nm)**
Oxygen Sensor		**13 ft-lb (18 Nm)**
Power Steering Unit Shield Screws		**15 ft-lb (20 Nm)**
Power Steering Bracket to Frame Nuts		**18 ft-lb (24 Nm)**
Power Steering Unit to Mount Bracket		**30 ft-lb (41 Nm)**
Prop Shaft Support Bearing Fasteners		**33 ft-lbs (45 Nm)**
Prop Shaft to Transmission Fasteners		**22 ft-lb (30 ft-lb)**
PVT Inner Cover Fasteners	inner	(see image inEngine Installation) page for sequence **Step 1: Torque to 37 ft-lbs (50 Nm).** **Step 2: Install through-bolts by adjusting the transmission accordingly.** **Step 3: If previously removed, loosely install bolts by hand.** **Step 4: Torque to 37 ft-lbs (50 Nm).** **Step 5: Torque to 50 ft-lbs (68 Nm).**
	outer	**Step 6: If previously removed, torque to 37 ft-lbs (50 Nm).** **35 in-lb (3 Nm)**
Radiator Bracket		**8 ft-lb (11 Nm)**
Radius Rod Fasteners (Inner)		**50 ft-lb (68 Nm) + 45°**
Radius Rod Fasteners (Outer)		**50 ft-lbs (68 Nm) + 90°**
Seat Frame to Main Frame	T-40	**8 ft-lb (11 Nm)**
	M8	**14 ft-lb (19 Nm)**
	M10	**30 ft-lb (41 Nm)**
Seat Belt Mounting Fasteners		**40 ft-lbs (54 Nm)**
Seat Slider Plate Screws		**4 ft-lb (5 Nm)**
Shift Cable	to shifter	**13 ft-lb (18 Nm)**
	Transmis-sion Bracket	**37 ft-lb (50 Nm)**
	Jam Nut	**16 ft-lb (22 Nm)**
Shock Guard Screws		**14 in-lbs (2 Nm)**
Shock (FOX)	Body Cap	**100 ft-lb (135 Nm)**
	Bearing Asm	**35 ft-lb (47 Nm)**
	Bleed Screw	**14 in-lb (2 Nm)**
	Eyelet	**50 ft-lb (68 Nm)**
	Shaft Nut	**22 ft-lb (30 Nm)**
Shock Mount	front	**42 ft-lbs (57 Nm)**
	rear	**70 ft-lbs (95 Nm)**
Shock Reservoir Mounting Clamps (rear)		**35 in-lb (4 Nm)**
Skid Plate Fasteners		**8 ft-lbs (11 Nm)**
Snorkel Shaft Coupler Jam Nut		**140 ft-lb (190 Nm)**
Spark Arrestor		**8 ft-lb (11 Nm)**
Spark Plug		**9 ft-lbs (12 Nm)**
Speed Sensor Screw		**12 ft-lb (16 Nm)**
Stabilizer Bar Linkage		**42 ft-lbs (57 Nm)**
Stabilizer Bar Mounting Clamps	front	**20 ft-lb (27 Nm)**
	rear	**30 ft-lb (42 Nm)**
Starter Cable Nuts		**40 in-lb (5 Nm)**
Starter Mounting Bolts		**7 ft-lb (10 Nm)**
Starter One-Way Clutch Screws		**9 ft-lb (12 Nm)**
Starter Solenoid	Cable Nuts	**35 in-lb (4 Nm)**
	Mounting Bolts	**8 ft-lb (11 Nm)**
Stator Cover Screws		**9 ft-lb (12 Nm)**
Steering Tilt Shock Fastener		**7 ft-lb (10 Nm)**
Steering Column Mounting Fasteners		**40 ft-lb (54 Nm)**
Steering Rack Mounting Bolts		**50 ft-lbs (68 Nm)**
Steering Shaft to EPS Unit		**25 ft-lb (34 Nm)**
Steering Shaft to Steering Rack		**50 ft-lb (68 Nm)**
Steering Wheel Nut		**65 ft-lbs (88 Nm)**
Suspension Control Module (SCM) Fasteners		**8 ft-lb (11 Nm)**
Taillight Mounting Nuts		**24 in-lb (3 Nm)**

ITEM		TORQUE
Terminal Block Nuts		**30 in-lb (3 Nm)**
Thermostat Cover Bolts		**7 ft-lb (10 Nm)**
Throttle Body / ETC Bolts		**7 ft-lb (10 Nm)**
Throttle Pedal Mounting Fasteners		**8 ft-lb (11 Nm)**
Tie Rod End to Knuckle		**30 ft-lbs (41 Nm) + 90°**
Tie Rod Jam Nuts		**14 ft-lbs (19 Nm)**
TMAP Fastener		**7 ft-lb (10 Nm)**
Trailing Arm to Frame Bolts		**70 ft-lb (95 Nm)**
Trailing Arm to Bearing Carrier Fasteners		**42 ft-lb (54 Nm)**
Transmission	Bell Crank Nut	**18 ft-lb (24 Nm)**
	Case Screws	**20 ft-lbs (27 Nm)**
	Drain/FIll Plugs	**14 ft-lbs (19 Nm)**
	Isolator Bolt (rear)	**33 ft-lb (45 Nm)**
	Rear Mount to Frame	**22 ft-lb (30 Nm)**
	Park Flange Screws	**10 ft-lb (14 Nm)**
	Sector Gear Cover	**12 ft-lb (16 Nm)**
	Snorkel Tube Locking Screw	**10 ft-lb (14 Nm)**
Turbo Actuator Rod Heim Joint Fasteners		**7 ft-lb (10 Nm)**
Turbo Boost Control Valve Bolts		**8 ft-lb (11 Nm)**
Turbo Mounting Bolts		**18 ft-lb (24 Nm)**
Turbo Oil Banjo Bolt		**33 ft-lb (45 Nm)**
Turbo Oil Drain Tube Fasteners		**11 ft-lb (15 Nm)**
Turbo Oil Line Clamps		**35 in-lb (4 Nm)**
Valve Cover Bolts		**7 ft-lbs (10 Nm)**
Visor Mounting Screws		**8 ft-lb (11 Nm)**
Voltage Regulator Fasteners		**8 ft-lb (11 Nm)**
Water Pump Impeller	Impeller	**7 ft-lb (10 Nm)** **(Apply Loctite® 204™ to bolt threads)**
	Cover Bolts	**7 ft-lb (10 Nm)** **(Apply Loctite® 204™ to bolt threads)**
Wheel Lug Nuts		**120 ft-lbs (163 Nm)**

VEHICLE SPECIFICATIONS

2019 *RZR* XP TURBO

CATEGORY	DIMENSION / CAPACITY
Length	119″ / 302.3 cm
Width	64″ / 162.5 cm
Height	73.75″ / 187.3 cm
Wheel Base	90″ / 228.6 cm
Ground Clearance	13.5″ / 34.3 cm
Dry Weight	1478 lbs. / 670.4 kg
Gross Vehicle Weight	2335 lbs. / 1059 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	740 lbs. / 336 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	This vehicle is not equipped with a hitch for towing loads. Do not use this vehicle for towing. Do not modify the vehicle by adding a hitch.
Hitch Tongue Capacity	

ENGINE	
Platform	Turbocharged., 4–Stroke, DOHC
Engine Displacement	925cc
Number of Cylinders	2
Bore & Stroke	93 x 68 mm
Compression Ratio	9:1
Engine Idle Speed	1200 +/- 100 RPM
Engine Max Speed	8800 RPM
Valve Clearance (Intake)	**.006 ± .002" (0.15 ± 0.05 mm)**
Valve Clearance (Exhaust)	**.010 ± .002" (0.25 ± 0.05 mm)**
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	**PS-4 Full Synthetic 5W-50** or **PS-4 Extreme Duty Full Synthetic 10W-50**
Oil Capacity	**2.75 qt (2.6 L)**
Coolant Type	**Polaris 50/50 Extended Life Anti-freeze**
Coolant Capacity	**10.8 qt (10.22 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) 91 Octane (minimum)

ELECTRICAL	
Alternator Max Output	660 Watts @ 3000 RPM
Lights: Main Headlights	Dual Beam LED cluster
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	ME17 ECU
Spark Plug / Gap	MR9F / 0.7–0.8 mm
Battery / Amp Hr	12v Flooded, 575 CCA / 44 A/hr
DC Outlet	Standard 12 Volt
Relays	EFI, Fuel Pump, Chassis, EPS
Fuses	10A Accy 10A Drive 10A EFI 10A Fuel 10A Instr 10A Key 10A Lights 10A Term 10A Unsw 10A Water 25A EPS 30A Fan

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Type	In Line Shift - P/ R / N / L / H
Front Gearcase Lubricant	**Demand Drive Fluid**
Front Gearcase Capacity	**8.5 oz (250 mL)**
Transmission Lubricant	**AGL Synthetic Gearcase Lubricant**
Transmission Capacity	**61 oz (1800 mL)**

STEERING / SUSPENSION	
Toe Out	1/8 - 3/16″ (3.2 - 4.8 mm)
Front Suspension	Independent Dual A-arm Walker Evans 2″ Needle
Front Travel	16″ (40.6 cm)
Rear Suspension	Independent Trailing Arm Walker Evans 2.5″ Needle
Rear Travel	18″ (45.7 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES		
Front Rim / Size		Aluminum 14 x 6
Rear Rim / Size		Aluminum 14 x 8
Front Tire Make / Model / Size		Maxxis Bighorn 29 x 9 R14
Rear Tire Make / Model / Size		Maxxis Bighorn 29 x 11 R14
Tire Air Pressure	Front	18 psi (125 kPa)
	Rear	19 psi (130 kPa)
Brake System		4 Wheel Hydraulic Front: Triple Bore Caliper Rear – Double Bore Caliper
Brake Fluid		**DOT 4**

2019 RZR XP TURBO CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2018 *RZR* XP Turbo	0-1800 Meters (0-6000 Feet)	W-31-70 (5140832)	Black (7044762)	Black / white lettering (7044369)
	1800-3700 Meters (6000–12000 Feet)	W-31-64 (5141004)		

2019 *RZR* XP 4 TURBO

CATEGORY	DIMENSION / CAPACITY
Length	146″ / 370.8 cm
Width	64″ / 162.6 cm
Height	73.75″ / 187.3 cm
Wheel Base	117″ / 297.2 cm
Ground Clearance	13.5″ / 34.3 cm
Dry Weight	1689 lbs. / 766 kg
Gross Vehicle Weight	2700 lbs. / 1225 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	900 lbs. / 408 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	This vehicle is not equipped with a hitch for towing loads. Do not use this vehicle for towing. Do not modify the vehicle by adding a hitch.
Hitch Tongue Capacity	

ENGINE	
Platform	Turbocharged., 4–Stroke, DOHC
Engine Displacement	925cc
Number of Cylinders	2
Bore & Stroke	93 x 68 mm
Compression Ratio	9:1
Engine Idle Speed	1200 +/- 100 RPM
Engine Max Speed	8800 RPM
Valve Clearance (Intake)	**.006 ± .002" (0.15 ± 0.05 mm)**
Valve Clearance (Exhaust)	**.010 ± .002" (0.25 ± 0.05 mm)**
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	**PS-4 Full Synthetic 5W-50** or **PS-4 Extreme Duty Full Synthetic 10W-50**
Oil Capacity	**2.75 qt (2.6 L)**
Coolant Type	**Polaris 50/50 Extended Life Anti-freeze**
Coolant Capacity	**11.7 qt (11.07 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) 91 Octane (minimum)

ELECTRICAL	
Alternator Max Output	660 Watts @ 3000 RPM
Lights: Main Headlights	Dual Beam LED cluster
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	ME17 ECU
Spark Plug / Gap	MR9F / 0.7–0.8 mm
Battery / Amp Hr	12v Flooded, 575 CCA / 44 A/hr
DC Outlet	Standard 12 Volt
Relays	EFI, Fuel Pump, Chassis, EPS
Fuses	10A Accy 10A Drive 10A EFI 10A Fuel 10A Instr 10A Key 10A Lights 15A Term 10A Unsw 10A Water 25A EPS 30A Fan

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Type	In Line Shift - P / R / N / L / H
Front Gearcase Lubricant	**Demand Drive Fluid**
Front Gearcase Capacity	**8.5 oz (250 mL)**
Transmission Lubricant	**AGL Synthetic Gearcase Lubricant**
Transmission Capacity	**61 oz (1800 mL)**

STEERING / SUSPENSION	
Toe Out	1/8 - 3/16″ (3.2 - 4.8 mm)
Front Suspension	Independent Dual A-arm Walker Evans 2″ Needle
Front Travel	16″ (40.6 cm)
Rear Suspension	Independent Trailing Arm Walker Evans 2.5″ Needle
Rear Travel	18″ (45.7 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES		
Front Rim / Size		Aluminum 14 x 6
Rear Rim / Size		Aluminum 14 x 8
Front Tire Make / Model / Size		Maxxis Bighorn 29 x 9 R14
Rear Tire Make / Model / Size		Maxxis Bighorn 29 x 11 R14
Tire Air Pressure	Front	22 psi (152 kPa)
	Rear	22 psi (152 kPa)
Brake System		4 Wheel Hydraulic Front: Triple Bore Caliper Rear – Double Bore Caliper
Brake Fluid		**DOT 4**

2019 RZR XP 4 TURBO CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2018 *RZR* XP4 Turbo	0-1800 Meters (0-6000 Feet)	W-31-68 (5140800)	Black (7044762)	Black / white lettering (7044369)
	1800-3700 Meters (6000–12000 Feet)	W-31-64 (5141004)		

2019 *RZR* XP TURBO FOX EDITION

CATEGORY	DIMENSION / CAPACITY
Length	119″ / 302.3 cm
Width	64″ / 162.5 cm
Height	73.75″ / 187.3 cm
Wheel Base	90″ / 228.6 cm
Ground Clearance	13.5″ / 34.3 cm
Dry Weight	1478 lbs. / 670.4 kg
Gross Vehicle Weight	2335 lbs. / 1059 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	740 lbs. / 336 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	This vehicle is not equipped with a hitch for towing loads. Do not use this vehicle for towing. Do not modify the vehicle by adding a hitch.
Hitch Tongue Capacity	

ENGINE	
Platform	Turbocharged., 4–Stroke, DOHC
Engine Displacement	925cc
Number of Cylinders	2
Bore & Stroke	93 x 68 mm
Compression Ratio	9:1
Engine Idle Speed	1200 +/- 100 RPM
Engine Max Speed	8800 RPM
Valve Clearance (Intake)	**.006 ± .002" (0.15 ± 0.05 mm)**
Valve Clearance (Exhaust)	**.010 ± .002" (0.25 ± 0.05 mm)**
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	**PS-4 Full Synthetic 5W-50** or **PS-4 Extreme Duty Full Synthetic 10W-50**
Oil Capacity	**2.75 qt (2.6 L)**
Coolant Type	**Polaris 50/50 Extended Life Anti-freeze**
Coolant Capacity	**10.8 qt (10.22 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) 91 Octane (minimum)

ELECTRICAL	
Alternator Max Output	660 Watts @ 3000 RPM
Lights: Main Headlights	Dual Beam LED cluster
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	ME17 ECU
Spark Plug / Gap	MR9F / 0.7–0.8 mm
Battery / Amp Hr	12v Flooded, 575 CCA / 44 A/hr
DC Outlet	Standard 12 Volt
Relays	EFI, Fuel Pump, Chassis, EPS
Fuses	10A Accy 10A Drive 10A EFI 10A Fuel 10A Instr 10A Key 10A Lights 10A Term 10A Unsw 10A Water 25A EPS 30A Fan

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Type	In Line Shift - P/ R / N / L / H
Front Gearcase Lubricant	**Demand Drive Fluid**
Front Gearcase Capacity	**8.5 oz (250 mL)**
Transmission Lubricant	**AGL Synthetic Gearcase Lubricant**
Transmission Capacity	**61 oz (1800 mL)**

STEERING / SUSPENSION	
Toe Out	1/8 - 3/16″ (3.2 - 4.8 mm)
Front Suspension	Independent Dual A-arm FOX Internal Bypass 2.5″
Front Travel	16″ (40.6 cm)
Rear Suspension	Independent Trailing Arm FOX Internal Bypass 3.0″
Rear Travel	18″ (45.7 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES		
Front Rim / Size		Aluminum 14 x 6
Rear Rim / Size		Aluminum 14 x 8
Front Tire Make / Model / Size		Maxxis Bighorn 29 x 9 R14
Rear Tire Make / Model / Size		Maxxis Bighorn 29 x 11 R14
Tire Air Pressure	Front	18 psi (125 kPa)
	Rear	19 psi (130 kPa)
Brake System		4 Wheel Hydraulic Front: Triple Bore Caliper Rear – Double Bore Caliper
Brake Fluid		**DOT 4**

2019 RZR XP TURBO CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2018 *RZR* XP Turbo	0-1800 Meters (0-6000 Feet)	W-31-70 (5140832)	Black (7044762)	Black / white lettering (7044369)
	1800-3700 Meters (6000–12000 Feet)	W-31-64 (5141004)		

2019 *RZR* XP 4 TURBO FOX EDITION

CATEGORY	DIMENSION / CAPACITY
Length	146″ / 370.8 cm
Width	64″ / 162.6 cm
Height	73.75″ / 187.3 cm
Wheel Base	117″ / 297.2 cm
Ground Clearance	13.5″ / 34.3 cm
Dry Weight	1689 lbs. / 766 kg
Gross Vehicle Weight	2700 lbs. / 1225 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	900 lbs. / 408 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	This vehicle is not equipped with a hitch for towing loads. Do not use this vehicle for towing. Do not modify the vehicle by adding a hitch.
Hitch Tongue Capacity	

ENGINE	
Platform	Turbocharged., 4–Stroke, DOHC
Engine Displacement	925cc
Number of Cylinders	2
Bore & Stroke	93 x 68 mm
Compression Ratio	9:1
Engine Idle Speed	1200 +/- 100 RPM
Engine Max Speed	8800 RPM
Valve Clearance (Intake)	**.006 ± .002" (0.15 ± 0.05 mm)**
Valve Clearance (Exhaust)	**.010 ± .002" (0.25 ± 0.05 mm)**
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	**PS-4 Full Synthetic 5W-50** or **PS-4 Extreme Duty Full Synthetic 10W-50**
Oil Capacity	**2.75 qt (2.6 L)**
Coolant Type	**Polaris 50/50 Extended Life Anti-freeze**
Coolant Capacity	**11.7 qt (11.07 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) 91 Octane (minimum)

ELECTRICAL	
Alternator Max Output	660 Watts @ 3000 RPM
Lights: Main Headlights	Dual Beam LED cluster
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	ME17 ECU
Spark Plug / Gap	MR9F / 0.7–0.8 mm
Battery / Amp Hr	12v Flooded, 575 CCA / 44 A/hr
DC Outlet	Standard 12 Volt
Relays	EFI, Fuel Pump, Chassis, EPS
Fuses	10A Accy 10A Drive 10A EFI 10A Fuel 10A Instr 10A Key 10A Lights 15A Term 10A Unsw 10A Water 25A EPS 30A Fan

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Type	In Line Shift - P / R / N / L / H
Front Gearcase Lubricant	**Demand Drive Fluid**
Front Gearcase Capacity	**8.5 oz (250 mL)**
Transmission Lubricant	**AGL Synthetic Gearcase Lubricant**
Transmission Capacity	**61 oz (1800 mL)**

STEERING / SUSPENSION	
Toe Out	1/8 - 3/16″ (3.2 - 4.8 mm)
Front Suspension	Independent Dual A-arm FOX Internal Bypass 2.5″
Front Travel	16″ (40.6 cm)
Rear Suspension	Independent Trailing Arm FOX Internal Bypass 3.0″
Rear Travel	18″ (45.7 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES		
Front Rim / Size		Aluminum 14 x 6
Rear Rim / Size		Aluminum 14 x 8
Front Tire Make / Model / Size		Maxxis Bighorn 29 x 9 R14
Rear Tire Make / Model / Size		Maxxis Bighorn 29 x 11 R14
Tire Air Pressure	Front	22 psi (152 kPa)
	Rear	22 psi (152 kPa)
Brake System		4 Wheel Hydraulic Front: Triple Bore Caliper Rear – Double Bore Caliper
Brake Fluid		**DOT 4**

2019 RZR XP 4 TURBO CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2018 *RZR* XP4 Turbo	0-1800 Meters (0-6000 Feet)	W-31-68 (5140800)	Black (7044762)	Black / white lettering (7044369)
	1800-3700 Meters (6000–12000 Feet)	W-31-64 (5141004)		

2019 *RZR* XP TURBO DYNAMIX EDITION

CATEGORY	DIMENSION / CAPACITY
Length	119″ / 302.3 cm
Width	64″ / 162.5 cm
Height	73.75″ / 187.3 cm
Wheel Base	90″ / 228.6 cm
Ground Clearance	13.5″ / 34.3 cm
Dry Weight	1500 lbs. / 680.0 kg
Gross Vehicle Weight	2335 lbs. / 1059 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	740 lbs. / 336 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	This vehicle is not equipped with a hitch for towing loads. Do not use this vehicle for towing. Do not modify the vehicle by adding a hitch.
Hitch Tongue Capacity	

ENGINE	
Platform	Turbocharged., 4–Stroke, DOHC
Engine Displacement	925cc
Number of Cylinders	2
Bore & Stroke	93 x 68 mm
Compression Ratio	9:1
Engine Idle Speed	1200 +/- 100 RPM
Engine Max Speed	8800 RPM
Valve Clearance (Intake)	**.006 ± .002" (0.15 ± 0.05 mm)**
Valve Clearance (Exhaust)	**.010 ± .002" (0.25 ± 0.05 mm)**
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	**PS-4 Full Synthetic 5W-50** or **PS-4 Extreme Duty Full Synthetic 10W-50**
Oil Capacity	**2.75 qt (2.6 L)**
Coolant Type	**Polaris 50/50 Extended Life Anti-freeze**
Coolant Capacity	**10.8 qt (10.22 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) 91 Octane (minimum)

ELECTRICAL	
Alternator Max Output	900 Watts @ 3000 RPM
Lights: Main Headlights	Dual Beam LED cluster
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	ME17 ECU
Spark Plug / Gap	MR9F / 0.7–0.8 mm
Battery / Amp Hr	12v Flooded, 575 CCA / 44 A/hr
DC Outlet	Standard 12 Volt

ELECTRICAL	
Relays	Start, EFI, Pump, Chassis, EPS, Accy, Shocks, SCM
Fuses	7.5A Chassis 7.5A Fuel 7.5A Instr Accy 7.5A Instr Unsw 7.5A Key 7.5A Lights 7.5A SCM 7.5A Shocks 7.5A Water 10A EFI 10A Socket 10A Term Accy 25A EPS 30A Fan

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Type	In Line Shift - P/ R / N / L / H
Front Gearcase Lubricant	**Demand Drive Fluid**
Front Gearcase Capacity	**8.5 oz (250 mL)**
Transmission Lubricant	**AGL Synthetic Gearcase Lubricant**
Transmission Capacity	**61 oz (1800 mL)**

STEERING / SUSPENSION	
Toe Out	1/8 - 3/16″ (3.2 - 4.8 mm)
Front Suspension	Independent Dual A-arm FOX 2.5″ PODIUM Live Valve with Bottom-out Control
Front Travel	16″ (40.6 cm)
Rear Suspension	Independent Trailing Arm FOX 2.5″ PODIUM Live Valve with Bottom-out Control
Rear Travel	18″ (45.7 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES		
Front Rim / Size		Aluminum 14 x 6
Rear Rim / Size		Aluminum 14 x 8
Front Tire Make / Model / Size		Maxxis Bighorn 29 x 9 R14
Rear Tire Make / Model / Size		Maxxis Bighorn 29 x 11 R14
Tire Air Pressure	Front	18 psi (125 kPa)
	Rear	19 psi (130 kPa)
Brake System		4 Wheel Hydraulic Front: Triple Bore Caliper Rear – Double Bore Caliper
Brake Fluid		**DOT 4**

2019 RZR XP TURBO CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2018 *RZR* XP Turbo	0-1800 Meters (0-6000 Feet)	W-31-70 (5140832)	Black (7044762)	Black / white lettering (7044369)
	1800-3700 Meters (6000–12000 Feet)	W-31-64 (5141004)		

2019 *RZR* XP 4 TURBO DYNAMIX EDITION

CATEGORY	DIMENSION / CAPACITY
Length	146″ / 370.8 cm
Width	64″ / 162.6 cm
Height	73.75″ / 187.3 cm
Wheel Base	117″ / 297.2 cm
Ground Clearance	13.5″ / 34.3 cm
Dry Weight	1696 lbs. / 769 kg
Gross Vehicle Weight	2700 lbs. / 1225 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	900 lbs. / 408 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	This vehicle is not equipped with a hitch for towing loads. Do not use this vehicle for towing. Do not modify the vehicle by adding a hitch.
Hitch Tongue Capacity	

ENGINE	
Platform	Turbocharged., 4–Stroke, DOHC
Engine Displacement	925cc
Number of Cylinders	2
Bore & Stroke	93 x 68 mm
Compression Ratio	9:1
Engine Idle Speed	1200 +/- 100 RPM
Engine Max Speed	8800 RPM
Valve Clearance (Intake)	**.006 ± .002" (0.15 ± 0.05 mm)**
Valve Clearance (Exhaust)	**.010 ± .002" (0.25 ± 0.05 mm)**
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	**PS-4 Full Synthetic 5W-50** or **PS-4 Extreme Duty Full Synthetic 10W-50**
Oil Capacity	**2.75 qt (2.6 L)**
Coolant Type	**Polaris 50/50 Extended Life Anti-freeze**
Coolant Capacity	**10.8 qt (10.22 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) 91 Octane (minimum)

ELECTRICAL	
Alternator Max Output	900 Watts @ 3000 RPM
Lights: Main Headlights	Dual Beam LED cluster
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	ME17 ECU
Spark Plug / Gap	MR9F / 0.7–0.8 mm
Battery / Amp Hr	12v Flooded, 575 CCA / 44 A/hr
DC Outlet	Standard 12 Volt

ELECTRICAL	
Relays	Start, EFI, Pump, Chassis, EPS, Accy, Shocks, SCM
Fuses	7.5A Chassis 7.5A Fuel 7.5A Instr Accy 7.5A Instr Unsw 7.5A Key 7.5A Lights 7.5A SCM 7.5A Shocks 7.5A Water 10A EFI 10A Socket 10A Term Accy 25A EPS 30A Fan

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Type	In Line Shift - P/ R / N / L / H
Front Gearcase Lubricant	**Demand Drive Fluid**
Front Gearcase Capacity	**8.5 oz (250 mL)**
Transmission Lubricant	**AGL Synthetic Gearcase Lubricant**
Transmission Capacity	**61 oz (1800 mL)**

STEERING / SUSPENSION	
Toe Out	1/8 - 3/16″ (3.2 - 4.8 mm)
Front Suspension	Independent Dual A-arm FOX 2.5″ PODIUM Live Valve with Bottom-out Control
Front Travel	16″ (40.6 cm)
Rear Suspension	Independent Trailing Arm FOX 2.5″ PODIUM Live Valve with Bottom-out Control
Rear Travel	18″ (45.7 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES		
Front Rim / Size		Aluminum 14 x 6
Rear Rim / Size		Aluminum 14 x 8
Front Tire Make / Model / Size		Maxxis Bighorn 29 x 9 R14
Rear Tire Make / Model / Size		Maxxis Bighorn 29 x 11 R14
Tire Air Pressure	Front	18 psi (125 kPa)
	Rear	19 psi (130 kPa)
Brake System		4 Wheel Hydraulic Front: Triple Bore Caliper Rear – Double Bore Caliper
Brake Fluid		**DOT 4**

2019 RZR XP 4 TURBO CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2018 *RZR* XP4 Turbo	0-1800 Meters (0-6000 Feet)	W-31-68 (5140800)	Black (7044762)	Black / white lettering (7044369)
	1800-3700 Meters (6000–12000 Feet)	W-31-64 (5141004)		

2020 *RZR* XP TURBO

CATEGORY	DIMENSION / CAPACITY
Length	119″ / 302.3 cm
Width	64″ / 162.5 cm
Height	73.75″ / 187.3 cm
Wheel Base	90″ / 228.6 cm
Ground Clearance	13.5″ / 34.3 cm
Dry Weight	1478 lbs. / 670.4 kg
Gross Vehicle Weight	2335 lbs. / 1059 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	740 lbs. / 336 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	This vehicle is not equipped with a hitch for towing loads. Do not use this vehicle for towing. Do not modify the vehicle by adding a hitch.
Hitch Tongue Capacity	

ENGINE	
Platform	Turbocharged., 4–Stroke, DOHC
Engine Displacement	925cc
Number of Cylinders	2
Bore & Stroke	93 x 68 mm
Compression Ratio	9:1
Engine Idle Speed	1200 +/- 100 RPM
Engine Max Speed	8800 RPM
Valve Clearance (Intake)	**.006 ± .002" (0.15 ± 0.05 mm)**
Valve Clearance (Exhaust)	**.010 ± .002" (0.25 ± 0.05 mm)**
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	**PS-4 Full Synthetic 5W-50** or **PS-4 Extreme Duty Full Synthetic 10W-50**
Oil Capacity	**2.75 qt (2.6 L)**
Coolant Type	**Polaris 50/50 Extended Life Anti-freeze**
Coolant Capacity	**10.8 qt (10.22 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) 91 Octane (minimum)

ELECTRICAL	
Alternator Max Output	660 Watts @ 3000 RPM
Lights: Main Headlights	Dual Beam LED cluster
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	ME17 ECU
Spark Plug / Gap	MR9F / 0.7–0.8 mm
Battery / Amp Hr	12v Flooded, 575 CCA / 44 A/hr
DC Outlet	Standard 12 Volt
Relays	EFI, Fuel Pump, Chassis, EPS
Fuses	10A Accy 10A Drive 10A EFI 10A Fuel 10A Instr 10A Key 10A Lights 10A Term 10A Unsw 10A Water 25A EPS 30A Fan

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Type	In Line Shift - P/ R / N / L / H
Front Gearcase Lubricant	**Demand Drive Fluid**
Front Gearcase Capacity	**8.5 oz (250 mL)**
Transmission Lubricant	**AGL Synthetic Gearcase Lubricant**
Transmission Capacity	**61 oz (1800 mL)**

STEERING / SUSPENSION	
Toe Out	1/8 - 3/16″ (3.2 - 4.8 mm)
Front Suspension	Independent Dual A-arm Walker Evans 2″ Needle
Front Travel	16″ (40.6 cm)
Rear Suspension	Independent Trailing Arm Walker Evans 2.5″ Needle
Rear Travel	18″ (45.7 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES		
Front Rim / Size		Aluminum 14 x 6
Rear Rim / Size		Aluminum 14 x 8
Front Tire Make / Model / Size		Maxxis Bighorn 29 x 9 R14
Rear Tire Make / Model / Size		Maxxis Bighorn 29 x 11 R14
Tire Air Pressure	Front	18 psi (125 kPa)
	Rear	19 psi (130 kPa)
Brake System		4 Wheel Hydraulic Front: Triple Bore Caliper Rear – Double Bore Caliper
Brake Fluid		**DOT 4**

2020 RZR XP TURBO CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2018 *RZR* XP Turbo	0-1800 Meters (0-6000 Feet)	W-31-70 (5140832)	Black (7044762)	Black / white lettering (7044369)
	1800-3700 Meters (6000–12000 Feet)	W-31-64 (5141004)		

2020 *RZR* XP 4 TURBO

CATEGORY	DIMENSION / CAPACITY
Length	146″ / 370.8 cm
Width	64″ / 162.6 cm
Height	73.75″ / 187.3 cm
Wheel Base	117″ / 297.2 cm
Ground Clearance	13.5″ / 34.3 cm
Dry Weight	1689 lbs. / 766 kg
Gross Vehicle Weight	2700 lbs. / 1225 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	900 lbs. / 408 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	This vehicle is not equipped with a hitch for towing loads. Do not use this vehicle for towing. Do not modify the vehicle by adding a hitch.
Hitch Tongue Capacity	

ENGINE	
Platform	Turbocharged., 4–Stroke, DOHC
Engine Displacement	925cc
Number of Cylinders	2
Bore & Stroke	93 x 68 mm
Compression Ratio	9:1
Engine Idle Speed	1200 +/- 100 RPM
Engine Max Speed	8800 RPM
Valve Clearance (Intake)	**.006 ± .002" (0.15 ± 0.05 mm)**
Valve Clearance (Exhaust)	**.010 ± .002" (0.25 ± 0.05 mm)**
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	**PS-4 Full Synthetic 5W-50** or **PS-4 Extreme Duty Full Synthetic 10W-50**
Oil Capacity	**2.75 qt (2.6 L)**
Coolant Type	**Polaris 50/50 Extended Life Anti-freeze**
Coolant Capacity	**11.7 qt (11.07 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) 91 Octane (minimum)

ELECTRICAL	
Alternator Max Output	660 Watts @ 3000 RPM
Lights: Main Headlights	Dual Beam LED cluster
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	ME17 ECU
Spark Plug / Gap	MR9F / 0.7–0.8 mm
Battery / Amp Hr	12v Flooded, 575 CCA / 44 A/hr
DC Outlet	Standard 12 Volt
Relays	EFI, Fuel Pump, Chassis, EPS
Fuses	10A Accy 10A Drive 10A EFI 10A Fuel 10A Instr 10A Key 10A Lights 15A Term 10A Unsw 10A Water 25A EPS 30A Fan

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Type	In Line Shift - P / R / N / L / H
Front Gearcase Lubricant	**Demand Drive Fluid**
Front Gearcase Capacity	**8.5 oz (250 mL)**
Transmission Lubricant	**AGL Synthetic Gearcase Lubricant**
Transmission Capacity	**61 oz (1800 mL)**

STEERING / SUSPENSION	
Toe Out	1/8 - 3/16″ (3.2 - 4.8 mm)
Front Suspension	Independent Dual A-arm Walker Evans 2″ Needle
Front Travel	16″ (40.6 cm)
Rear Suspension	Independent Trailing Arm Walker Evans 2.5″ Needle
Rear Travel	18″ (45.7 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES		
Front Rim / Size		Aluminum 14 x 6
Rear Rim / Size		Aluminum 14 x 8
Front Tire Make / Model / Size		Maxxis Bighorn 29 x 9 R14
Rear Tire Make / Model / Size		Maxxis Bighorn 29 x 11 R14
Tire Air Pressure	Front	22 psi (152 kPa)
	Rear	22 psi (152 kPa)
Brake System		4 Wheel Hydraulic Front: Triple Bore Caliper Rear – Double Bore Caliper
Brake Fluid		**DOT 4**

2020 RZR XP 4 TURBO CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2018 *RZR* XP4 Turbo	0-1800 Meters (0-6000 Feet)	W-31-68 (5140800)	Black (7044762)	Black / white lettering (7044369)
	1800-3700 Meters (6000–12000 Feet)	W-31-64 (5141004)		

2020 *RZR* XP TURBO FOX EDITION

CATEGORY	DIMENSION / CAPACITY
Length	119″ / 302.3 cm
Width	64″ / 162.5 cm
Height	73.75″ / 187.3 cm
Wheel Base	90″ / 228.6 cm
Ground Clearance	13.5″ / 34.3 cm
Dry Weight	1478 lbs. / 670.4 kg
Gross Vehicle Weight	2335 lbs. / 1059 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	740 lbs. / 336 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	This vehicle is not equipped with a hitch for towing loads. Do not use this vehicle for towing. Do not modify the vehicle by adding a hitch.
Hitch Tongue Capacity	

ENGINE	
Platform	Turbocharged., 4–Stroke, DOHC
Engine Displacement	925cc
Number of Cylinders	2
Bore & Stroke	93 x 68 mm
Compression Ratio	9:1
Engine Idle Speed	1200 +/- 100 RPM
Engine Max Speed	8800 RPM
Valve Clearance (Intake)	**.006 ± .002" (0.15 ± 0.05 mm)**
Valve Clearance (Exhaust)	**.010 ± .002" (0.25 ± 0.05 mm)**
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	**PS-4 Full Synthetic 5W-50** or **PS-4 Extreme Duty Full Synthetic 10W-50**
Oil Capacity	**2.75 qt (2.6 L)**
Coolant Type	**Polaris 50/50 Extended Life Anti-freeze**
Coolant Capacity	**10.8 qt (10.22 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) 91 Octane (minimum)

ELECTRICAL	
Alternator Max Output	660 Watts @ 3000 RPM
Lights: Main Headlights	Dual Beam LED cluster
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	ME17 ECU
Spark Plug / Gap	MR9F / 0.7–0.8 mm
Battery / Amp Hr	12v Flooded, 575 CCA / 44 A/hr
DC Outlet	Standard 12 Volt
Relays	EFI, Fuel Pump, Chassis, EPS
Fuses	10A Accy 10A Drive 10A EFI 10A Fuel 10A Instr 10A Key 10A Lights 10A Term 10A Unsw 10A Water 25A EPS 30A Fan

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Type	In Line Shift - P/ R / N / L / H
Front Gearcase Lubricant	**Demand Drive Fluid**
Front Gearcase Capacity	**8.5 oz (250 mL)**
Transmission Lubricant	**AGL Synthetic Gearcase Lubricant**
Transmission Capacity	**61 oz (1800 mL)**

STEERING / SUSPENSION	
Toe Out	1/8 - 3/16″ (3.2 - 4.8 mm)
Front Suspension	Independent Dual A-arm FOX Internal Bypass 2.5″
Front Travel	16″ (40.6 cm)
Rear Suspension	Independent Trailing Arm FOX Internal Bypass 3.0″
Rear Travel	18″ (45.7 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES		
Front Rim / Size		Aluminum 14 x 6
Rear Rim / Size		Aluminum 14 x 8
Front Tire Make / Model / Size		Maxxis Bighorn 29 x 9 R14
Rear Tire Make / Model / Size		Maxxis Bighorn 29 x 11 R14
Tire Air Pressure	Front	18 psi (125 kPa)
	Rear	19 psi (130 kPa)
Brake System		4 Wheel Hydraulic Front: Triple Bore Caliper Rear – Double Bore Caliper
Brake Fluid		**DOT 4**

2020 RZR XP TURBO CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2018 *RZR* XP Turbo	0-1800 Meters (0-6000 Feet)	W-31-70 (5140832)	Black (7044762)	Black / white lettering (7044369)
	1800-3700 Meters (6000–12000 Feet)	W-31-64 (5141004)		

2020 *RZR* XP 4 TURBO FOX EDITION

CATEGORY	DIMENSION / CAPACITY
Length	146″ / 370.8 cm
Width	64″ / 162.6 cm
Height	73.75″ / 187.3 cm
Wheel Base	117″ / 297.2 cm
Ground Clearance	13.5″ / 34.3 cm
Dry Weight	1689 lbs. / 766 kg
Gross Vehicle Weight	2700 lbs. / 1225 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	900 lbs. / 408 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	This vehicle is not equipped with a hitch for towing loads. Do not use this vehicle for towing. Do not modify the vehicle by adding a hitch.
Hitch Tongue Capacity	

ENGINE	
Platform	Turbocharged., 4–Stroke, DOHC
Engine Displacement	925cc
Number of Cylinders	2
Bore & Stroke	93 x 68 mm
Compression Ratio	9:1
Engine Idle Speed	1200 +/- 100 RPM
Engine Max Speed	8800 RPM
Valve Clearance (Intake)	**.006 ± .002" (0.15 ± 0.05 mm)**
Valve Clearance (Exhaust)	**.010 ± .002" (0.25 ± 0.05 mm)**
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	**PS-4 Full Synthetic 5W-50** or **PS-4 Extreme Duty Full Synthetic 10W-50**
Oil Capacity	**2.75 qt (2.6 L)**
Coolant Type	**Polaris 50/50 Extended Life Anti-freeze**
Coolant Capacity	**11.7 qt (11.07 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) 91 Octane (minimum)

ELECTRICAL	
Alternator Max Output	660 Watts @ 3000 RPM
Lights: Main Headlights	Dual Beam LED cluster
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	ME17 ECU
Spark Plug / Gap	MR9F / 0.7–0.8 mm
Battery / Amp Hr	12v Flooded, 575 CCA / 44 A/hr
DC Outlet	Standard 12 Volt
Relays	EFI, Fuel Pump, Chassis, EPS
Fuses	10A Accy 10A Drive 10A EFI 10A Fuel 10A Instr 10A Key 10A Lights 15A Term 10A Unsw 10A Water 25A EPS 30A Fan

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Type	In Line Shift - P / R / N / L / H
Front Gearcase Lubricant	**Demand Drive Fluid**
Front Gearcase Capacity	**8.5 oz (250 mL)**
Transmission Lubricant	**AGL Synthetic Gearcase Lubricant**
Transmission Capacity	**61 oz (1800 mL)**

STEERING / SUSPENSION	
Toe Out	1/8 - 3/16″ (3.2 - 4.8 mm)
Front Suspension	Independent Dual A-arm FOX Internal Bypass 2.5″
Front Travel	16″ (40.6 cm)
Rear Suspension	Independent Trailing Arm FOX Internal Bypass 3.0″
Rear Travel	18″ (45.7 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES		
Front Rim / Size		Aluminum 14 x 6
Rear Rim / Size		Aluminum 14 x 8
Front Tire Make / Model / Size		Maxxis Bighorn 29 x 9 R14
Rear Tire Make / Model / Size		Maxxis Bighorn 29 x 11 R14
Tire Air Pressure	Front	22 psi (152 kPa)
	Rear	22 psi (152 kPa)
Brake System		4 Wheel Hydraulic Front: Triple Bore Caliper Rear – Double Bore Caliper
Brake Fluid		**DOT 4**

2020 RZR XP 4 TURBO CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2018 *RZR* XP4 Turbo	0-1800 Meters (0-6000 Feet)	W-31-68 (5140800)	Black (7044762)	Black / white lettering (7044369)
	1800-3700 Meters (6000–12000 Feet)	W-31-64 (5141004)		

2020 *RZR* XP TURBO DYNAMIX EDITION

CATEGORY	DIMENSION / CAPACITY
Length	119″ / 302.3 cm
Width	64″ / 162.5 cm
Height	73.75″ / 187.3 cm
Wheel Base	90″ / 228.6 cm
Ground Clearance	13.5″ / 34.3 cm
Dry Weight	1500 lbs. / 680.0 kg
Gross Vehicle Weight	2335 lbs. / 1059 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	740 lbs. / 336 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	This vehicle is not equipped with a hitch for towing loads. Do not use this vehicle for towing. Do not modify the vehicle by adding a hitch.
Hitch Tongue Capacity	

ENGINE	
Platform	Turbocharged., 4–Stroke, DOHC
Engine Displacement	925cc
Number of Cylinders	2
Bore & Stroke	93 x 68 mm
Compression Ratio	9:1
Engine Idle Speed	1200 +/- 100 RPM
Engine Max Speed	8800 RPM
Valve Clearance (Intake)	**.006 ± .002" (0.15 ± 0.05 mm)**
Valve Clearance (Exhaust)	**.010 ± .002" (0.25 ± 0.05 mm)**
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	**PS-4 Full Synthetic 5W-50** or **PS-4 Extreme Duty Full Synthetic 10W-50**
Oil Capacity	**2.75 qt (2.6 L)**
Coolant Type	**Polaris 50/50 Extended Life Anti-freeze**
Coolant Capacity	**10.8 qt (10.22 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) 91 Octane (minimum)

ELECTRICAL	
Alternator Max Output	900 Watts @ 3000 RPM
Lights: Main Headlights	Dual Beam LED cluster
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	ME17 ECU
Spark Plug / Gap	MR9F / 0.7–0.8 mm
Battery / Amp Hr	12v Flooded, 575 CCA / 44 A/hr
DC Outlet	Standard 12 Volt
Relays	Start, EFI, Pump, Chassis, EPS, Accy, Shocks, SCM
Fuses	7.5A Chassis 7.5A Fuel 7.5A Instr Accy 7.5A Instr Unsw 7.5A Key 7.5A Lights 7.5A SCM 7.5A Shocks 7.5A Water 10A EFI 10A Socket 10A Term Accy 25A EPS 30A Fan

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Type	In Line Shift - P/ R / N / L / H
Front Gearcase Lubricant	**Demand Drive Fluid**
Front Gearcase Capacity	**8.5 oz (250 mL)**
Transmission Lubricant	**AGL Synthetic Gearcase Lubricant**
Transmission Capacity	**61 oz (1800 mL)**

STEERING / SUSPENSION	
Toe Out	1/8 - 3/16″ (3.2 - 4.8 mm)
Front Suspension	Independent Dual A-arm FOX 2.5″ PODIUM Live Valve with Bottom-out Control
Front Travel	16″ (40.6 cm)
Rear Suspension	Independent Trailing Arm FOX 2.5″ PODIUM Live Valve with Bottom-out Control
Rear Travel	18″ (45.7 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES		
Front Rim / Size		Aluminum 14 x 6
Rear Rim / Size		Aluminum 14 x 8
Front Tire Make / Model / Size		Maxxis Bighorn 29 x 9 R14
Rear Tire Make / Model / Size		Maxxis Bighorn 29 x 11 R14
Tire Air Pressure	Front	18 psi (125 kPa)
	Rear	19 psi (130 kPa)
Brake System		4 Wheel Hydraulic Front: Triple Bore Caliper Rear – Double Bore Caliper
Brake Fluid		**DOT 4**

2020 RZR XP TURBO CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2018 *RZR* XP Turbo	0-1800 Meters (0-6000 Feet)	W-31-70 (5140832)	Black (7044762)	Black / white lettering (7044369)
	1800-3700 Meters (6000–12000 Feet)	W-31-64 (5141004)		

2020 *RZR* XP 4 TURBO DYNAMIX EDITION

CATEGORY	DIMENSION / CAPACITY
Length	146″ / 370.8 cm
Width	64″ / 162.6 cm
Height	73.75″ / 187.3 cm
Wheel Base	117″ / 297.2 cm
Ground Clearance	13.5″ / 34.3 cm
Dry Weight	1696 lbs. / 769 kg
Gross Vehicle Weight	2700 lbs. / 1225 kg
Cargo Box Capacity	300 lbs. / 136 kg
Maximum Weight Capacity (Payload)	900 lbs. / 408 kg (Includes riders, cargo and accessories)
Hitch Towing Capacity	This vehicle is not equipped with a hitch for towing loads. Do not use this vehicle for towing. Do not modify the vehicle by adding a hitch.
Hitch Tongue Capacity	

ENGINE	
Platform	Turbocharged., 4–Stroke, DOHC
Engine Displacement	925cc
Number of Cylinders	2
Bore & Stroke	93 x 68 mm
Compression Ratio	9:1
Engine Idle Speed	1200 +/- 100 RPM
Engine Max Speed	8800 RPM
Valve Clearance (Intake)	**.006 ± .002" (0.15 ± 0.05 mm)**
Valve Clearance (Exhaust)	**.010 ± .002" (0.25 ± 0.05 mm)**
Engine Hot Light	Instrument Cluster Indicator
Lubrication	Wet Sump
Oil Requirements	**PS-4 Full Synthetic 5W-50** or **PS-4 Extreme Duty Full Synthetic 10W-50**
Oil Capacity	**2.75 qt (2.6 L)**
Coolant Type	**Polaris 50/50 Extended Life Anti-freeze**
Coolant Capacity	**10.8 qt (10.22 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) 91 Octane (minimum)

ELECTRICAL	
Alternator Max Output	900 Watts @ 3000 RPM
Lights: Main Headlights	Dual Beam LED cluster
Taillights	0.2 Watt LED cluster
Brake Lights	2.9 Watt LED cluster
Ignition System	ME17 ECU
Spark Plug / Gap	MR9F / 0.7–0.8 mm
Battery / Amp Hr	12v Flooded, 575 CCA / 44 A/hr
DC Outlet	Standard 12 Volt
Relays	Start, EFI, Pump, Chassis, EPS, Accy, Shocks, SCM
Fuses	7.5A Chassis 7.5A Fuel 7.5A Instr Accy 7.5A Instr Unsw 7.5A Key 7.5A Lights 7.5A SCM 7.5A Shocks 7.5A Water 10A EFI 10A Socket 10A Term Accy 25A EPS 30A Fan

DRIVETRAIN	
Transmission Type	Polaris Automatic PVT
Shift Type	In Line Shift - P/ R / N / L / H
Front Gearcase Lubricant	**Demand Drive Fluid**
Front Gearcase Capacity	**8.5 oz (250 mL)**
Transmission Lubricant	**AGL Synthetic Gearcase Lubricant**
Transmission Capacity	**61 oz (1800 mL)**

STEERING / SUSPENSION	
Toe Out	1/8 - 3/16″ (3.2 - 4.8 mm)
Front Suspension	Independent Dual A-arm FOX 2.5″ PODIUM Live Valve with Bottom-out Control
Front Travel	16″ (40.6 cm)
Rear Suspension	Independent Trailing Arm FOX 2.5″ PODIUM Live Valve with Bottom-out Control
Rear Travel	18″ (45.7 cm)
Spring Adjustment	Threaded Spanner Wrench Adjustment

WHEELS / BRAKES		
Front Rim / Size		Aluminum 14 x 6
Rear Rim / Size		Aluminum 14 x 8
Front Tire Make / Model / Size		Maxxis Bighorn 29 x 9 R14
Rear Tire Make / Model / Size		Maxxis Bighorn 29 x 11 R14
Tire Air Pressure	Front	18 psi (125 kPa)
	Rear	19 psi (130 kPa)
Brake System		4 Wheel Hydraulic Front: Triple Bore Caliper Rear – Double Bore Caliper
Brake Fluid		**DOT 4**

2020 RZR XP 4 TURBO CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2018 *RZR* XP4 Turbo	0-1800 Meters (0-6000 Feet)	W-31-68 (5140800)	Black (7044762)	Black / white lettering (7044369)
	1800-3700 Meters (6000–12000 Feet)	W-31-64 (5141004)		

MISC. SPECIFICATIONS AND CHARTS

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
π (3.14) x Radius² x Height =		= cylinder volume
°C to °F:	9/5 (°C + 32)	= °F
°F to °C:	5/9 (°F − 32)	= °C

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

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″

FRACTION	DECIMAL	MM TO INCHES
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″
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″	

NOTES

CHAPTER 2
MAINTENANCE

2

PERIODIC MAINTENANCE - GENERAL

LUBRICANTS / SERVICE PRODUCTS

PRODUCT	SIZE (QUANTITY)	PART NUMBER
PS-4	1 qt (12)	2876244
	1 gal (4)	2876245
	16 gal keg	2876247
	55 gal drum	2876246
PS-4 Extreme Duty	1 qt (12)	2878920
	2 qt (8)	2878922
	1 gal (4)	2878919
	16 gal keg	2879003
	55 gal drum	2879002
	330 gal tote	2879001
AGL	1 qt (12)	2878068
	1 gal (4)	2878069
	2.5 gal (2)	2878070
Demand Drive	1 qt (12)	2877922
	2.5 gal (2)	2877923
Gas Shock Oil	1 qt (6)	2870995
	2.5 gal (2)	2872279
Antifreeze / Coolant 50/50 Extended Life	1 qt (12)	2880514
	1 gal (6)	2880513
	55 gal drum	2880512
Chain Lube	16 oz aerosol (12)	2872348
Fogging Oil	12 oz aerosol (12)	2870791
	1 qt (12)	2871517
All Season Grease	Four 3 oz packs (6)	2871322
	14 oz cartridge	2871423
U-Joint Grease	3 oz tube (24)	2871515
	14 oz cartridge	2871551
Carbon Clean	12 oz bottle (12)	2871326
Fuel Stabilizer	16 oz (12)	2870652
	2.5 gal (2)	2872280

PRE-RIDE INSPECTION

ITEM	INSPECTION / CHECK
Air Filter	• Air filter / air box is clean • Filter is properly installed • Air box cover is secured and fastened
Brake System	• Check brake fluid level is between MIN and MAX • Check brake pedal is not soft when pushed • Verify both brake lever and pedal stop and hold the vehicle • Inspect for leaks
Cooling System	• Verify coolant level is filled to the FULL COLD mark on coolant reservoir (if engine is cold) • Inspect hoses and radiator for leaks • Extract debris from radiator
Engine Oil	• Verify oil level is in the SAFE range on the dipstick • Inspect oil for color and contaminants
Engine Stop Switch	• Ensure operation
Exhaust	• Check fasteners • Check spark arrester condition / attachment • Inspect heat shields
Frame / Body Fasteners	• Inspect, ensure tightness, check none are missing
Front / Rear Suspension	• Inspect bushings • Check for damage to the control arms / trailing arms • Check for leaking shocks • Check shock mounting fasteners
Fuel	• Inspect fuel lines for leaks and damage • Start your ride on a full tank
Gauge Cluster	• Ensure operation of indicator lamps
Headlights / Taillights	• Ensure all lights are operational • Adjust headlight aim as required
Shift Lever	• Ensure operation in all ranges (P, R, N, L, H)
Steering System	• Check for proper EPS operation (if equipped) • Check for tightness/play in the steering wheel when turned lock to lock
Throttle	• Ensure smooth operation • Snaps closed with handlebars in any position
Tires	• Check for proper air pressure in all tires • Inspect for tire damage / objects in tire • Ensure adequate tread depth
Wheels / Lug Nuts	• Ensure rim is not cracked / bent • Verify proper lug nut torque
Winch (if equipped)	• Inspect cable / line and switch • Ensure operation

MAINTENANCE INTERVALS

The maintenance interval charts outline required maintenance and inspection based on vehicle hours / miles. Each table states the number of hours / miles that service is required on the vehicle. Some items or components may need to be serviced more often due to severe use, such as operation in water or under severe loads. When the vehicle goes beyond 500 hours / 5000 miles, return to the 25 hours / 250 mile chart and start the interval process over.

25 HOUR / 250 MILE (400 KM) SERVICE

COMPONENT		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	Engine Oil & Filter Change (Break-In)	Perform a break-in oil and filter change at 25 hours or one month; perform every 50 hours or 6 months thereafter
XU	Spark Arrestor	Clean
XU	Front Gearcase Lubricant	Initial fluid level inspection; add lubricant if needed
XU	Transmission Lubricant (AGL)	Initial fluid level inspection; add lubricant if needed

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

D - Have an authorized Polaris dealer or qualified person perform these services.

50 HOUR / 500 MILE (800 KM) SERVICE

ITEM		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	Front Gearcase Lubricant	Inspect / add lubricant if needed
XU	Transmission Lubricant (AGL)	Inspect / add lubricant if needed
XU	General Lubrication	Lubricate all fittings, pivots, cables, etc.
D	Throttle Pedal	Inspect; replace if it sticks
	Throttle Body Intake Ducts/Flange	Inspect ducts for proper sealing / air leaks
	Shift Cable / Linkage	Inspect; adjust as needed
D	Steering	Lubricate (if applicable)
XU	Front / Rear Suspension	Lubricate (if applicable)
D	Cooling System	Inspect coolant strength seasonally; pressure test system yearly
D	Drive Belt	Inspect; replace as needed
XU / D	Clutches (Drive and Driven)	Inspect; clean; replace worn parts
XU	Engine Oil Lines/Fasteners	Inspect for leaks and loose fittings

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

D - Have an authorized Polaris dealer or qualified person perform these services.

75 HOUR / 750 MILE (1200 KM)SERVICE

COMPONENT		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	Engine Oil & Filter Change	Change oil and filter, inspect used oil for contaminants
XU	Spark Arrestor	Clean
XU	Front Gearcase Lubricant	Inspect / add lubricant if needed
XU	Transmission Lubricant (AGL)	Inspect / add lubricant if needed

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

D - Have an authorized Polaris dealer or qualified person perform these services.

100 HOUR / 1000 MILE (1600 KM) SERVICE

ITEM		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	General Lubrication	Lubricate all fittings, pivots, cables, etc.
D	Throttle Pedal	Inspect; replace if it sticks
	Throttle Body Intake Ducts/Flange	Inspect ducts for proper sealing / air leaks
	Shift Cable / Linkage	Inspect; adjust as needed
D	Steering	Lubricate (if applicable)
XU	Front / Rear Suspension	Lubricate (if applicable)
D	Cooling System	Inspect coolant strength seasonally; pressure test system yearly
D	Drive Belt	Inspect; replace as needed
XU	Engine Oil Lines/Fasteners	Inspect for leaks and loose fittings
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension as needed
XU	Front Gearcase Lubricant	Change lubricant
XU	Transmission Lubricant (AGL)	Change lubricant
D	Fuel System	Check for leaks at fill cap, fuel line / rail, and fuel pump.
D	Spark Plug Inspection	Inspect; replace as needed; torque to specification
XU	Radiator	Inspect; clean external surfaces
XU	Cooling Hoses	Inspect for leaks; pressure test system
XU	Engine Mounts	Inspect, torque to specification
	Exhaust Silencer / Pipe	Inspect
XU	Wiring	Inspect for wear, routing, security; inspect connectors subjected to water, mud, etc.
XU / D	Clutches (Drive and Driven)	Inspect; clean; replace worn parts
D	Front Wheel Bearings	Inspect; replace as needed
XU	Shocks	Visually inspect shock seals; change oil and seals if leaking
	Cam Chain Tensioner	Inspect/clean; replace as needed

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

D - Have an authorized Polaris dealer or qualified person perform these services.

125 HOUR / 1250 MILE (2000 KM) SERVICE

COMPONENT		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	Engine Oil & Filter Change	Change oil and filter, inspect used oil for contaminants
XU	Spark Arrestor	Clean
XU	Front Gearcase Lubricant	Inspect / add lubricant if needed
XU	Transmission Lubricant (AGL)	Inspect / add lubricant if needed

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

D - Have an authorized Polaris dealer or qualified person perform these services.

150 HOUR / 1500 MILE (2400 KM) SERVICE

ITEM		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	Front Gearcase Lubricant	Inspect / add lubricant if needed
XU	Transmission Lubricant (AGL)	Inspect / add lubricant if needed
XU	General Lubrication	Lubricate all fittings, pivots, cables, etc.
D	Throttle Pedal	Inspect; replace if it sticks
	Throttle Body Intake Ducts/Flange	Inspect ducts for proper sealing / air leaks
	Shift Cable / Linkage	Inspect; adjust as needed
D	Steering	Lubricate (if applicable)
XU	Front / Rear Suspension	Lubricate (if applicable)
D	Cooling System	Inspect coolant strength seasonally; pressure test system yearly
D	Drive Belt	Inspect; replace as needed
XU / D	Clutches (Drive and Driven)	Inspect; clean; replace worn parts
XU	Engine Oil Lines/Fasteners	Inspect for leaks and loose fittings

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

D - Have an authorized Polaris dealer or qualified person perform these services.

175 HOUR / 1750 MILE (2800 KM) SERVICE

COMPONENT		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	Engine Oil & Filter Change	Change oil and filter, inspect used oil for contaminants
XU	Spark Arrestor	Clean
XU	Front Gearcase Lubricant	Inspect / add lubricant if needed
XU	Transmission Lubricant (AGL)	Inspect / add lubricant if needed

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

D - Have an authorized Polaris dealer or qualified person perform these services.

200 HOUR / 2000 MILE (3200 KM) SERVICE

ITEM		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	General Lubrication	Lubricate all fittings, pivots, cables, etc.
D	Throttle Pedal	Inspect; replace if it sticks
	Throttle Body Intake Ducts/Flange	Inspect ducts for proper sealing / air leaks
	Shift Cable / Linkage	Inspect; adjust as needed
D	Steering	Lubricate (if applicable)
XU	Front / Rear Suspension	Lubricate (if applicable)
D	Cooling System	Inspect coolant strength seasonally; pressure test system yearly
D	Drive Belt	Inspect; replace as needed
XU / D	Clutches (Drive and Driven)	Inspect; clean; replace worn parts
XU	Engine Oil Lines/Fasteners	Inspect for leaks and loose fittings
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension as needed
XU	Front Gearcase Lubricant	Change lubricant
XU	Transmission Lubricant (AGL)	Change lubricant
D	Fuel System	Check for leaks at fill cap, fuel line / rail, and fuel pump.
D	Spark Plug Inspection	Inspect; replace as needed; torque to specification
XU	Radiator	Inspect; clean external surfaces
XU	Cooling Hoses	Inspect for leaks; pressure test system
XU	Engine Mounts	Inspect, torque to specification
	Exhaust Silencer / Pipe	Inspect
XU	Wiring	Inspect routing and for wear; inspect connectors subjected to water/mud.
D	Front Wheel Bearings	Inspect; replace as needed
XU / D	Shocks	Change shock oil and inspect seals
D	Brake Fluid	Change every two years (DOT 4)
	Spark Arrestor	Clean daily if driven in mud / water; replace a damaged arrestor before operating
	Cam Chain Tensioner	Inspect/clean; replace as needed
D	Valve Clearance	Inspect; adjust as needed

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

D - Have an authorized Polaris dealer or qualified person perform these services.

225 HOUR / 2250 MILE (3600 KM) SERVICE

COMPONENT		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	Engine Oil & Filter Change	Change oil and filter, inspect used oil for contaminants
XU	Spark Arrestor	Clean
XU	Front Gearcase Lubricant	Inspect / add lubricant if needed
XU	Transmission Lubricant (AGL)	Inspect / add lubricant if needed

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

D - Have an authorized Polaris dealer or qualified person perform these services.

250 HOUR / 2500 MILE (4000 KM) SERVICE

ITEM		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	Front Gearcase Lubricant	Inspect / add lubricant if needed
XU	Transmission Lubricant (AGL)	Inspect / add lubricant if needed
XU	General Lubrication	Lubricate all fittings, pivots, cables, etc.
D	Throttle Pedal	Inspect; replace if it sticks
	Throttle Body Intake Ducts/Flange	Inspect ducts for proper sealing / air leaks
	Shift Cable / Linkage	Inspect; adjust as needed
D	Steering	Lubricate (if applicable)
XU	Front / Rear Suspension	Lubricate (if applicable)
D	Cooling System	Inspect coolant strength seasonally; pressure test system yearly
D	Drive Belt	Inspect; replace as needed
XU / D	Clutches (Drive and Driven)	Inspect; clean; replace worn parts
XU	Engine Oil Lines/Fasteners	Inspect for leaks and loose fittings

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

D - Have an authorized Polaris dealer or qualified person perform these services.

275 HOUR / 2750 MILE (4400 KM) SERVICE

COMPONENT		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	Engine Oil & Filter Change	Change oil and filter, inspect used oil for contaminants
XU	Spark Arrestor	Clean
XU	Front Gearcase Lubricant	Inspect / add lubricant if needed
XU	Transmission Lubricant (AGL)	Inspect / add lubricant if needed

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

D - Have an authorized Polaris dealer or qualified person perform these services.

300 HOUR / 3000 MILE (4800 KM) SERVICE

ITEM		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	General Lubrication	Lubricate all fittings, pivots, cables, etc.
D	Throttle Pedal	Inspect; replace if it sticks
	Throttle Body Intake Ducts/Flange	Inspect ducts for proper sealing / air leaks
	Shift Cable / Linkage	Inspect; adjust as needed
D	Steering	Lubricate (if applicable)
XU	Front / Rear Suspension	Lubricate (if applicable)
D	Cooling System	Inspect coolant strength seasonally; pressure test system yearly
D	Drive Belt	Inspect; replace as needed
XU / D	Clutches (Drive and Driven)	Inspect; clean; replace worn parts
XU	Engine Oil Lines/Fasteners	Inspect for leaks and loose fittings
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension as needed
XU	Front Gearcase Lubricant	Change lubricant
XU	Transmission Lubricant (AGL)	Change lubricant
D	Fuel System	Check for leaks at fill cap, fuel line / rail, and fuel pump.
D	Spark Plug Inspection	Inspect; replace as needed; torque to specification
XU	Radiator	Inspect; clean external surfaces
XU	Cooling Hoses	Inspect for leaks; pressure test system
XU	Engine Mounts	Inspect, torque to specification
	Exhaust Silencer / Pipe	Inspect
XU	Wiring	Inspect for wear, routing, security; inspect connectors subjected to water, mud, etc.
D	Front Wheel Bearings	Inspect; replace as needed
XU	Shocks	Visually inspect shock seals; change oil and seals if leaking
	Cam Chain Tensioner	Inspect/clean; replace as needed

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

D - Have an authorized Polaris dealer or qualified person perform these services.

325 HOUR / 3250 MILE (5200 KM) SERVICE

COMPONENT		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	Engine Oil & Filter Change	Change oil and filter, inspect used oil for contaminants
XU	Spark Arrestor	Clean
XU	Front Gearcase Lubricant	Inspect / add lubricant if needed
XU	Transmission Lubricant (AGL)	Inspect / add lubricant if needed

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

D - Have an authorized Polaris dealer or qualified person perform these services.

350 HOUR / 3500 MILE (5600 KM) SERVICE

ITEM		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	Front Gearcase Lubricant	Inspect / add lubricant if needed
XU	Transmission Lubricant (AGL)	Inspect / add lubricant if needed
XU	General Lubrication	Lubricate all fittings, pivots, cables, etc.
D	Throttle Pedal	Inspect; replace if it sticks
	Throttle Body Intake Ducts/Flange	Inspect ducts for proper sealing / air leaks
	Shift Cable / Linkage	Inspect; adjust as needed
D	Steering	Lubricate (if applicable)
XU	Front / Rear Suspension	Lubricate (if applicable)
D	Cooling System	Inspect coolant strength seasonally; pressure test system yearly
D	Drive Belt	Inspect; replace as needed
XU / D	Clutches (Drive and Driven)	Inspect; clean; replace worn parts
XU	Engine Oil Lines/Fasteners	Inspect for leaks and loose fittings

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

D - Have an authorized Polaris dealer or qualified person perform these services.

375 HOUR / 3750 MILE (6000 KM) SERVICE

COMPONENT		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	Engine Oil & Filter Change	Change oil and filter, inspect used oil for contaminants
XU	Spark Arrestor	Clean
XU	Front Gearcase Lubricant	Inspect / add lubricant if needed
XU	Transmission Lubricant (AGL)	Inspect / add lubricant if needed

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

D - Have an authorized Polaris dealer or qualified person perform these services.

400 HOUR / 4000 MILE (6400 KM) SERVICE

ITEM		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	General Lubrication	Lubricate all fittings, pivots, cables, etc.
D	Throttle Pedal	Inspect; replace if it sticks
	Throttle Body Intake Ducts/Flange	Inspect ducts for proper sealing / air leaks
	Shift Cable / Linkage	Inspect; adjust as needed
D	Steering	Lubricate (if applicable)
XU	Front / Rear Suspension	Lubricate (if applicable)
D	Cooling System	Inspect coolant strength seasonally; pressure test system yearly
D	Drive Belt	Inspect; replace as needed
XU / D	Clutches (Drive and Driven)	Inspect; clean; replace worn parts
XU	Engine Oil Lines/Fasteners	Inspect for leaks and loose fittings
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension as needed
XU	Front Gearcase Lubricant	Change lubricant
XU	Transmission Lubricant (AGL)	Change lubricant
D	Fuel System	Check for leaks at fill cap, fuel line / rail, and fuel pump.
D	Spark Plug Inspection	Inspect; replace as needed; torque to specification
XU	Radiator	Inspect; clean external surfaces
XU	Cooling Hoses	Inspect for leaks; pressure test system
XU	Engine Mounts	Inspect, torque to specification
	Exhaust Silencer / Pipe	Inspect
XU	Wiring	Inspect for wear, routing, security; inspect connectors subjected to water, mud, etc.
D	Front Wheel Bearings	Inspect; replace as needed
XU / D	Shocks	Change shock oil and inspect seals
D	Brake Fluid	Change every two years (DOT 4)
	Spark Arrestor	Clean daily if driven in mud / water; replace a damaged arrestor before operating
	Cam Chain Tensioner	Inspect/clean; replace as needed
D	Valve Clearance	Inspect; adjust as needed

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

D - Have an authorized Polaris dealer or qualified person perform these services.

425 HOUR / 4250 MILE (6800 KM) SERVICE

COMPONENT		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	Engine Oil & Filter Change	Change oil and filter, inspect used oil for contaminants
XU	Spark Arrestor	Clean
XU	Front Gearcase Lubricant	Inspect / add lubricant if needed
XU	Transmission Lubricant (AGL)	Inspect / add lubricant if needed

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

D - Have an authorized Polaris dealer or qualified person perform these services.

450 HOUR / 4500 MILE (7200 KM) SERVICE

ITEM		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	Front Gearcase Lubricant	Inspect / add lubricant if needed
XU	Transmission Lubricant (AGL)	Inspect / add lubricant if needed
XU	General Lubrication	Lubricate all fittings, pivots, cables, etc.
D	Throttle Pedal	Inspect; replace if it sticks
	Throttle Body Intake Ducts/Flange	Inspect ducts for proper sealing / air leaks
	Shift Cable / Linkage	Inspect; adjust as needed
D	Steering	Lubricate (if applicable)
XU	Front / Rear Suspension	Lubricate (if applicable)
D	Cooling System	Inspect coolant strength seasonally; pressure test system yearly
D	Drive Belt	Inspect; replace as needed
XU / D	Clutches (Drive and Driven)	Inspect; clean; replace worn parts
XU	Engine Oil Lines/Fasteners	Inspect for leaks and loose fittings

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

D - Have an authorized Polaris dealer or qualified person perform these services.

475 HOUR / 4750 MILE (7600 KM) SERVICE

COMPONENT		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	Engine Oil & Filter Change	Change oil and filter, inspect used oil for contaminants
XU	Spark Arrestor	Clean
XU	Front Gearcase Lubricant	Inspect / add lubricant if needed
XU	Transmission Lubricant (AGL)	Inspect / add lubricant if needed

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

D - Have an authorized Polaris dealer or qualified person perform these services.

500 HOUR / 5000 MILE (8000 KM) SERVICE

ITEM		REMARKS
XU / D	Brake Pads / Parking Brake Pads (INT'L)	Inspect pad wear
	Fuel System	Turn key on to pressurize fuel pump; check lines / fittings for leaks and abrasion
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension after first 25 hours
XU	Engine Breather	Inspect;clean
	Battery	Check terminals; clean; test
XU	General Lubrication	Lubricate all fittings, pivots, cables, etc.
D	Throttle Pedal	Inspect; replace if it sticks
	Throttle Body Intake Ducts/Flange	Inspect ducts for proper sealing / air leaks
	Shift Cable / Linkage	Inspect; adjust as needed
D	Steering	Lubricate (if applicable)
XU	Front / Rear Suspension	Lubricate (if applicable)
D	Cooling System	Inspect coolant strength seasonally; pressure test system yearly
D	Drive Belt	Inspect; replace as needed
XU	Engine Oil Lines/Fasteners	Inspect for leaks and loose fittings
XU / D	Parking Brake Cable Adjustment (INT'L)	Inspect; adjust tension as needed
XU	Front Gearcase Lubricant	Change lubricant
XU	Transmission Lubricant (AGL)	Change lubricant
D	Fuel System	Check for leaks at fill cap, fuel line / rail, and fuel pump.
D	Spark Plug Inspection	Inspect; replace as needed; torque to specification
XU	Radiator	Inspect; clean external surfaces
XU	Cooling Hoses	Inspect for leaks; pressure test system
XU	Engine Mounts	Inspect, torque to specification
	Exhaust Silencer / Pipe	Inspect
XU	Wiring	Inspect for wear, routing, security; inspect connectors subjected to water, mud, etc.
XU / D	Clutches (Drive and Driven)	Inspect; clean; replace worn parts
D	Front Wheel Bearings	Inspect; replace as needed
XU / D	Shocks	Change shock oil and inspect seals
D	Brake Fluid	Change every two years (DOT 4)
	Spark Arrestor	Clean daily if driven in mud / water; replace a damaged arrestor before operating
	Cam Chain Tensioner	Inspect; replace as needed
D	Valve Clearance	Inspect; adjust as needed
D	Spark Plug Replacement	Replace; torque to specification
XU	Coolant	Replace coolant
D	Toe Adjustment	Inspect periodically; adjust when parts are replaced
	Cam Chain Tensioner	Inspect/clean; replace as needed

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

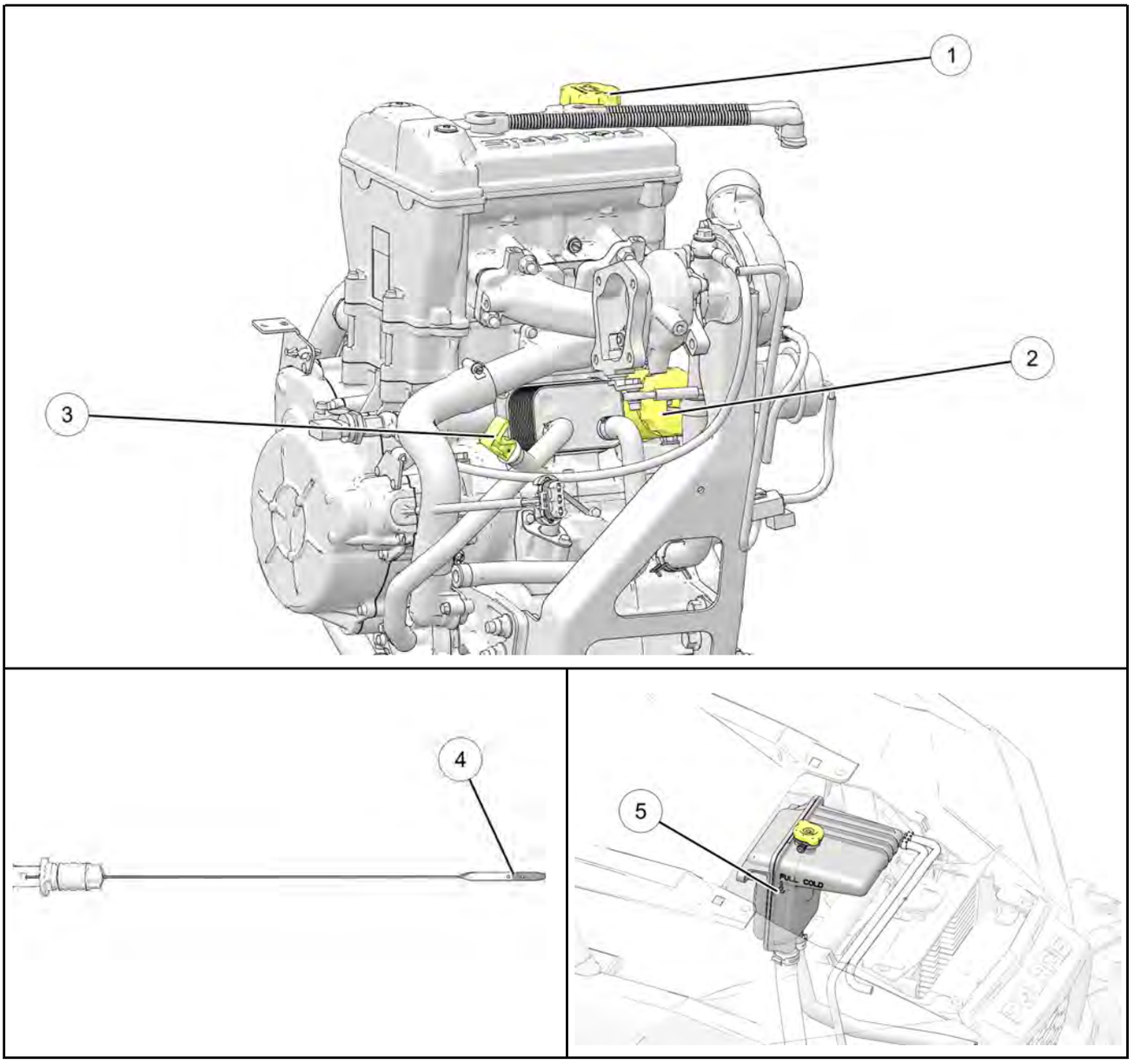
D - Have an authorized Polaris dealer or qualified person perform these services.

When the vehicle goes beyond 500 hours / 5000 miles, return to the 25 hours / 250 mile chart and start the interval process over.

MAINTENANCE QUICK REFERENCE

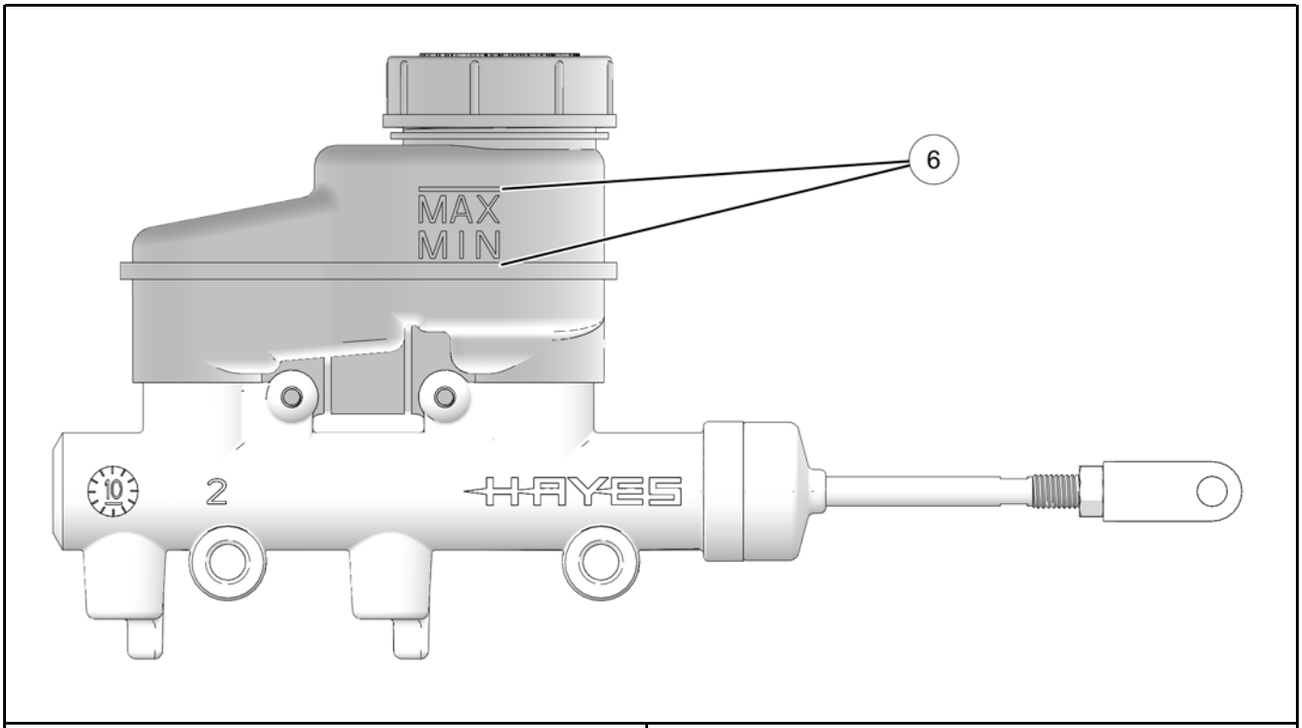
ITEM	LUBE REC.	METHOD	FREQUENCY*
Oil Fill Cap ①: - Under Cargo Box Access Panel **Oil Filter ②:** - Driver's side rear wheel well **Dipstick ③:** - Passenger's side rear wheel well	Polaris PS-4 or Polaris PS-4 Extreme Duty	Add oil to proper level ④ on dipstick	Perform a break-in oil and filter change at 25 hrs or one month; perform every 50 hrs thereafter
Engine Coolant - Under Front Hood / Access Panel	Polaris 50/50 Coolant	Maintain coolant level in coolant reservoir bottle ⑤.	Check level daily; change coolant every two years

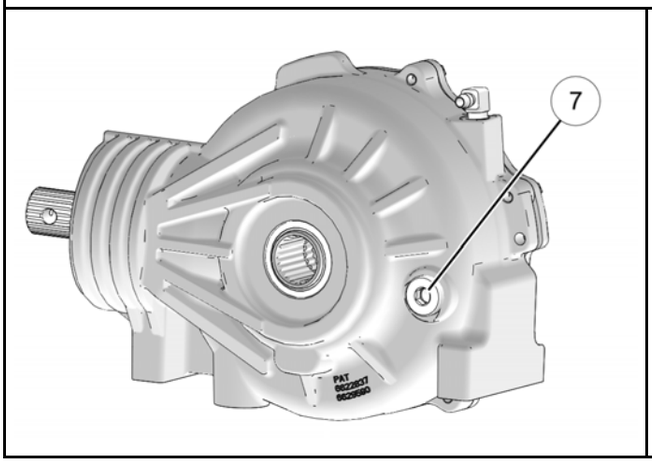
** More often under severe use, such as operation in water or under severe loads.*

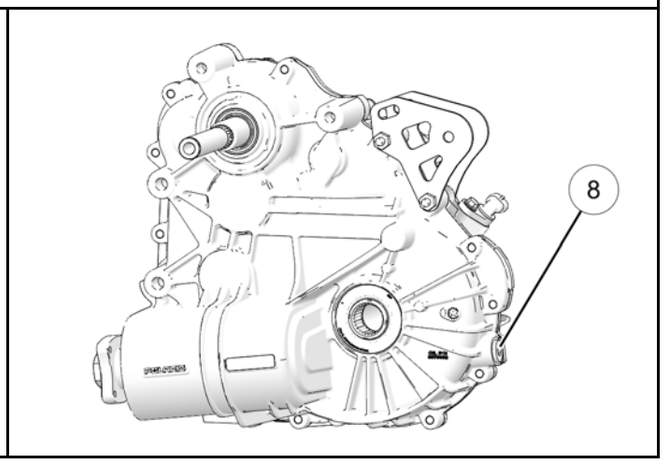


ITEM	LUBE REC.	METHOD	FREQUENCY*
Brake Fluid	Polaris DOT 4 Brake Fluid	Maintain fluid level between “MAX and “MIN” lines on the master cylinder reservoir ⑥	Check level during pre-ride inspection; change fluid every two years
Front Gearcase	Polaris Demand Drive	Add lubricant until it is visible at the fill hole threads ⑦ ~8.5 oz. (250 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 ⑧ **~64 oz (1900 mL)**	

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



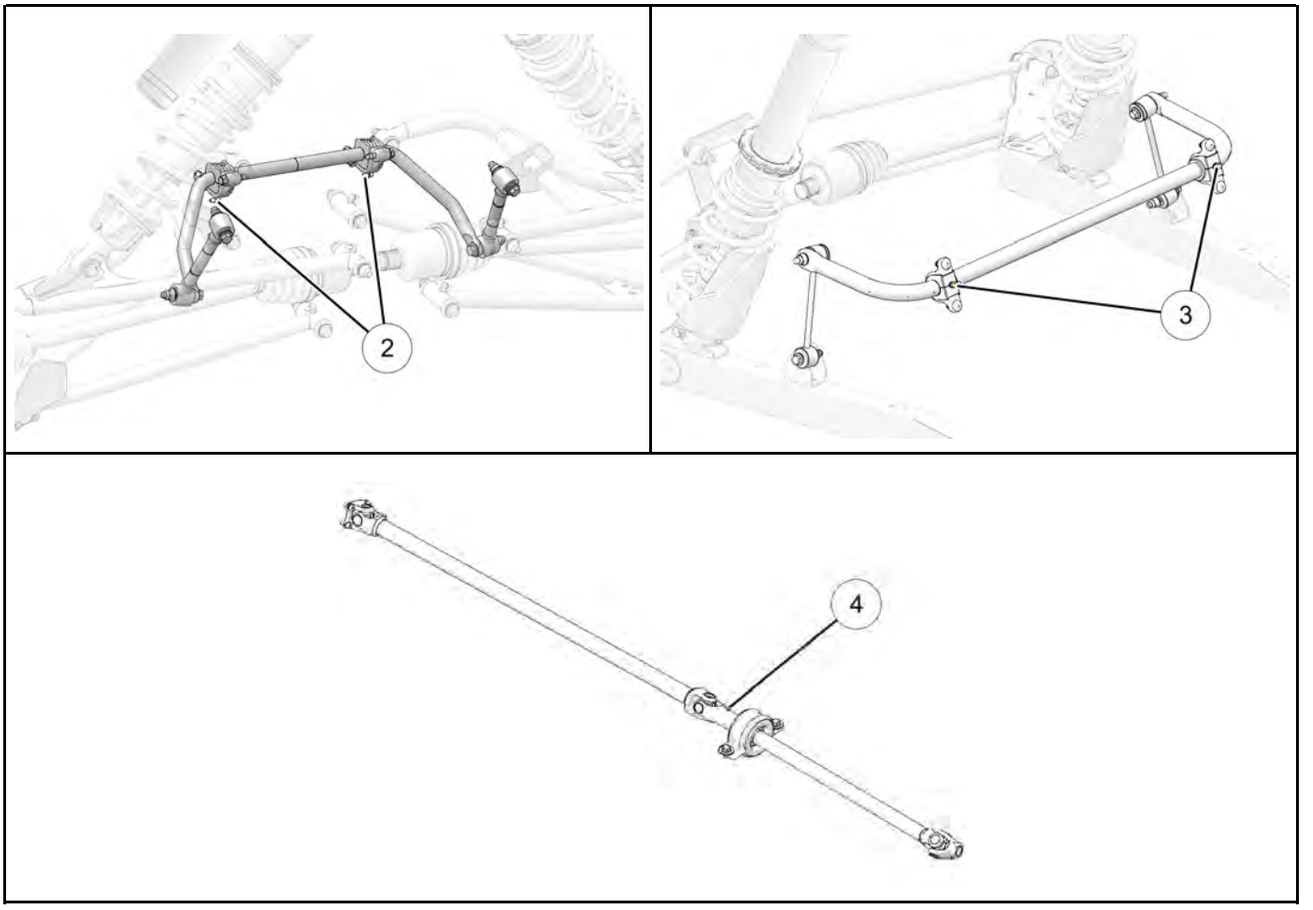




GREASE LUBRICATION POINTS

There are grease fittings on the front stabilizer bar mounts, rear stabilizer bar mounts, and on the prop shaft slip yoke. Apply grease until all traces of water have been purged out at each of these areas.

ITEM	METHOD	RECOMMENDED LUBE	FREQUENCY
Front Stabilizer Bar Bushings	Grease t fittings on each side of the vehicle ②	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
Rear Stabilizer Bar Bushings	Grease two fittings through the skid plate access holes on each side of the vehicle ③	Polaris All Season Grease	
Propshaft Yokes	Grease fittings ④ on the slip yoke	Polaris Premium U-Joint Grease	



ENGINE / EXHAUST

ENGINE OIL LEVEL

The engine is 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.

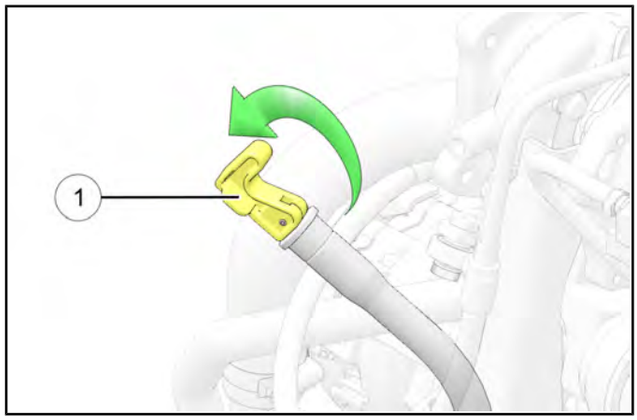
Access the oil dipstick through the opening in front of the passenger rear tire.

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 Engine Oil.

FLUID CAPACITY
Recommended Engine Oil: **PS-4 (PN 2876244)** *Ambient Temp Range: -35° F to 100° F* **PS-4 Extreme Duty (PN 2878920)** *Ambient Temp Range: 0° F to 120° F* **Capacity:2.75 qt (2.6 L)**

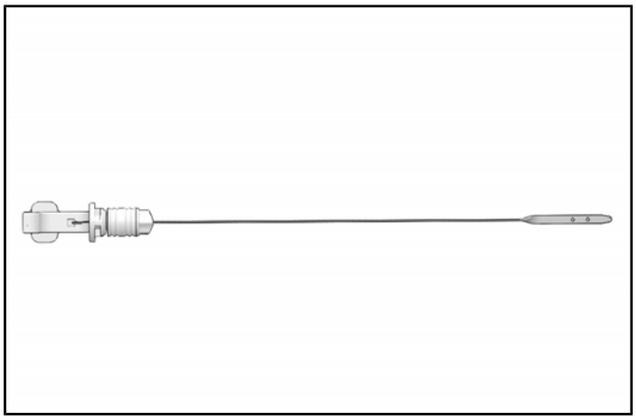
1. Position vehicle on a level surface and place transmission in PARK.
2. Allow engine to cool down before draining oil.
3. Remove the access panel between the seats to access the dipstick.
4. Unlock the dipstick lever ①. Remove the dipstick and wipe it dry with a clean rag.



5. Reinstall the dipstick to fully seat it. Do not lock the dipstick.

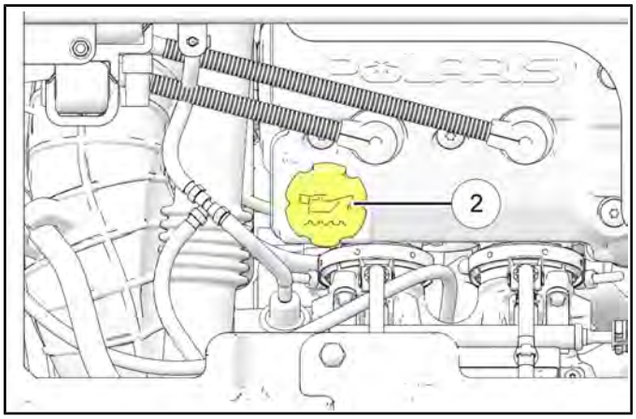
IMPORTANT
Make certain the dipstick is inserted all the way down to ensure an accurate reading.

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 (between the holes) on the dipstick. Do NOT overfill.



NOTICE
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. Remove the cargo box access panel. Add engine oil through the oil fill cap ② located on top of the engine valve cover.



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

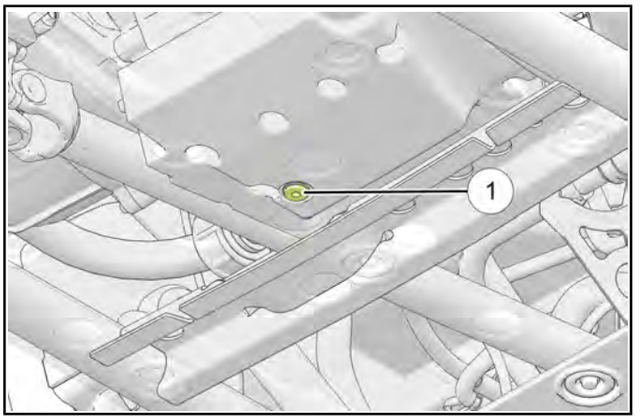
ENGINE OIL AND FILTER CHANGE

⚠ WARNING

Spilled oil and flammable cleaning products left on engine components or in the engine area may pose a fire hazard. Use shop rags to clean any spilled oil. If needed, use a non-flammable solvent on the rag to aid the cleaning process. Do not use any device such as pressurized water or air as this may disperse the oil onto engine components and could pose a fire hazard.

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

1. Position vehicle on a level surface and place transmission in PARK.
2. Allow engine to cool down before draining oil.
3. Place a drain pan under the engine crankcase and remove the drain plug ①.



4. Access the oil filter through the driver's side rear wheel well.

NOTICE

The engine should be off for at least 2 minutes prior to removing the oil filter.

5. Place shop rags under the filter to catch any spilled oil during removal. Using the Oil Filter Wrench, turn the oil filter counter-clockwise to remove it. Tip the open end of the oil filter up to minimize oil spill. Ensure all shop rags are removed after cleaning up any spilled oil.

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

6. Clean the filter sealing surface on the engine crankcase with a clean rag and ensure the original oil filter o-ring is not stuck to the crankcase.
7. Lubricate the o-ring on the new oil filter with a film of clean engine oil. Check to make sure the o-ring is in good condition. Tighten to specification.

TORQUE

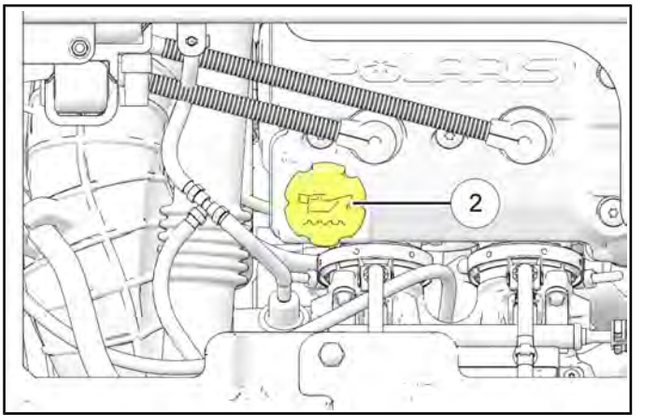
Oil Filter:
Turn by hand until filter O-ring contacts sealing surface, then turn an additional 3/4 turn.

8. Inspect the sealing washer on the drain plug for burrs or nicks. Replace the washer if it is damaged.
9. Reinstall the engine crankcase drain plug. Torque drain plug to specification.

TORQUE

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

10. Remove the cargo box access panel. Add engine oil through the oil fill cap ② located on top of the engine valve cover.



11. Fill the engine to the recommended specification.

FLUID CAPACITY

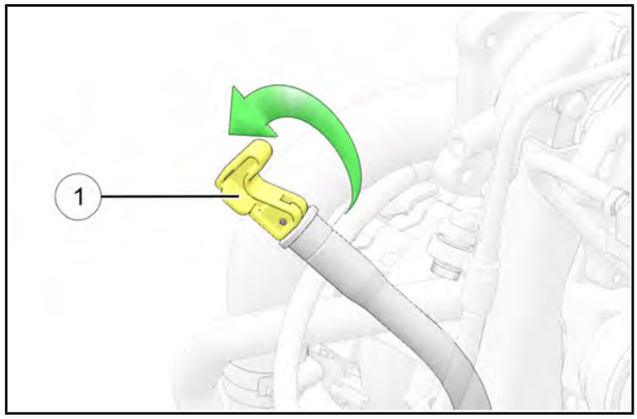
Recommended Engine Oil:
PS-4 (PN 2876244)
Ambient Temp Range: -35° F to 100° F

PS-4 Extreme Duty (PN 2878920)
Ambient Temp Range: 0° F to 120° F

Capacity:2.75 qt (2.6 L)

12. Start engine and allow it to idle for 30 seconds.
13. Stop the engine and inspect for oil leaks. Wait at least 15 seconds before removing the oil dipstick.

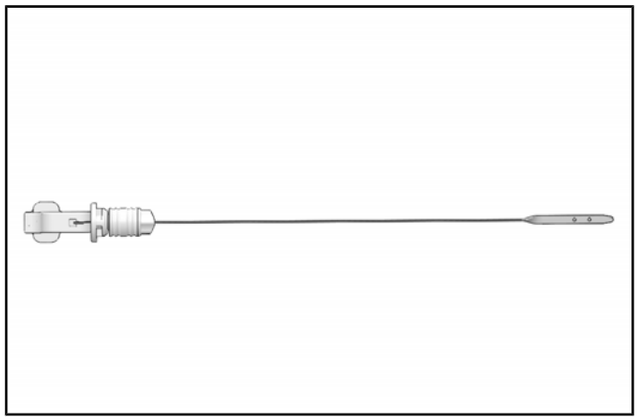
14. Unlock the dipstick lever ①. Remove the dipstick and wipe it dry with a clean rag.



15. Reinstall the dipstick to fully seat it. Do not lock the dipstick.

IMPORTANT
Make certain the dipstick is inserted all the way down to ensure an accurate reading.

16. Remove the dipstick and check the oil level.
17. Add the recommended oil as necessary to bring the oil level within the SAFE range (between the holes) on the dipstick. Do NOT overfill.

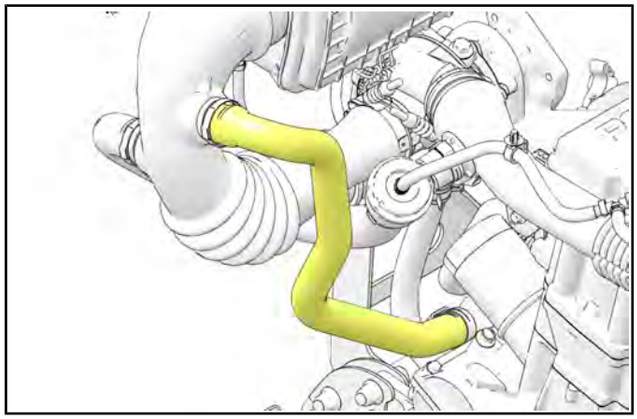


NOTICE
A rising oil level between checks during cold weather operation can indicate contaminants such as gas or moisture collecting in the crankcase. If the oil level is over the upper mark, change the oil immediately.

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

ENGINE CRANKCASE BREATHER HOSE

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



IMPORTANT
Make sure the vent hose is not kinked, restricted or cut.

ENGINE CYLINDER LEAKDOWN 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: 15% *If leakage exceeds service limit, inspect the engine for the cause.*

NOTICE
A brand new or rebuilt engine will have higher leakdown than an engine with 5 hours of runtime. Leakdown should decrease once the rings are broken in.

VALVE CLEARANCE ADJUSTMENT

CAUTION

Do not rotate the engine backwards. The timing chain may jump teeth and lead to poor performance and/or severe engine damage.

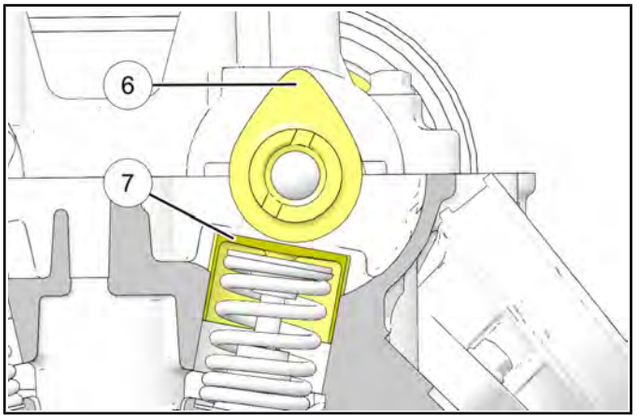
NOTICE

Always inspect valve clearance prior to final engine assembly.

IMPORTANT

The engine has a 270° offset crank. There will always be at least one valve open at any position of the crank. Turn the camshaft until two valves are not loaded.

1. Remove the valve cover (if it is not already off).
2. Rotate the camshaft until the cam lobes above the valves you are inspecting are facing up ⑥.



3. Measure the valve clearance ⑦ using a thickness (feeler) gauge. Record the measurement if clearance is out of specification.

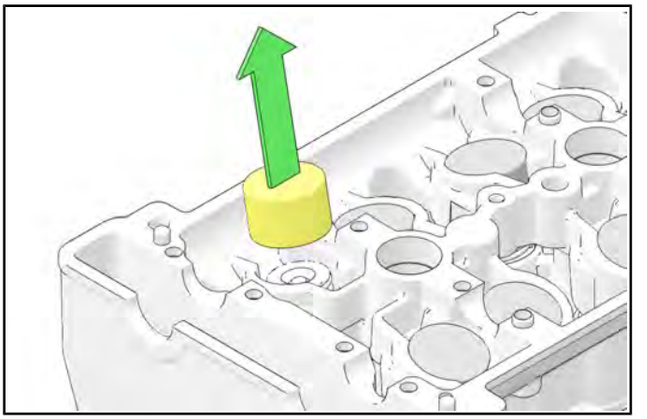
MEASUREMENT
Intake Valve Clearance (cold): **.006 ± .002" (0.15 ± 0.05 mm)**
Exhaust Valve Clearance (cold): **.010 ± .002" (0.25 ± 0.05 mm)**

4. Repeat steps 6 and 7 until all eight valves have been inspected.
5. If any of the valve clearance measurements are out of specification, remove the camshaft carriers and camshafts and proceed with this procedure.

NOTICE

If all valve clearance measurements are within specification, remove the camshaft carriers and proceed to Camshaft Installation / Timing.

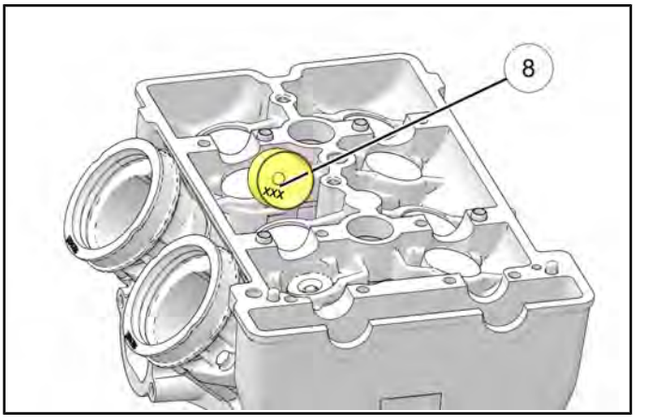
6. Remove the valve tappet from a valve that was out of specification.



NOTICE

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.

7. Record the 3 digit number ⑧ on the bottom of the tappet.



8. Reference the valve clearance measurement recorded for that valve, along with the 3-digit tappet number.
9. Refer to Valve Lash - Tappet Selection page 3.96 and select the proper tappet.

10. Install the appropriate tappet into the cylinder head.

NOTICE
Lubricate the outer portion of the valve bucket upon installation.

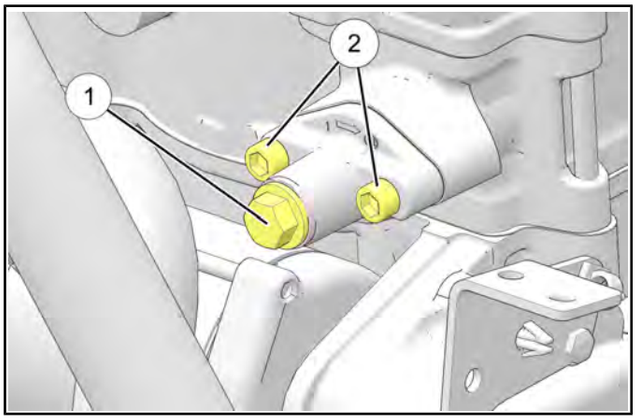
11. Repeat steps 10-14 until all necessary valves have been adjusted.
12. Reinstall the camshafts and camshaft carriers and tighten the bolts evenly to specification.

TORQUE
Camshaft Carrier Bolts: **7 ft-lb (10 Nm)**

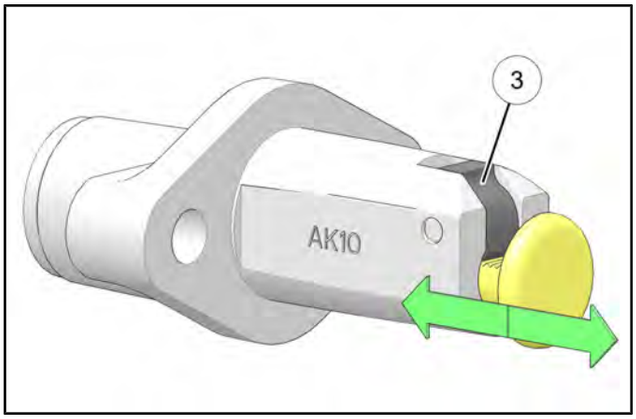
13. Measure and confirm that valve clearance is now within specification for each valve.
14. If valve clearance is not within specification, repeat this procedure.
15. If all valve clearance measurements are now within specification, remove the camshaft carriers and proceed to Camshaft Installation / Timing page

CAM CHAIN TENSIONER INSPECTION

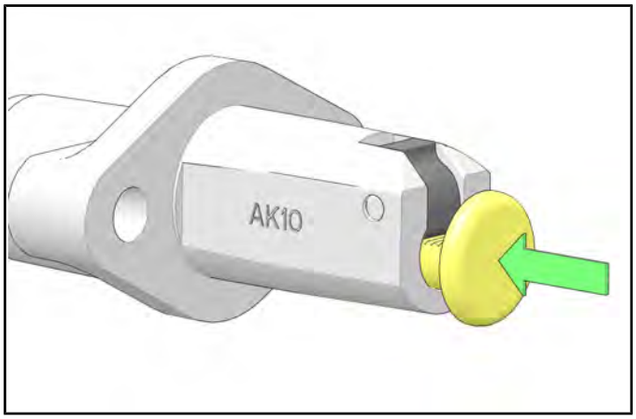
1. Locate the cam chain tensioner on the MAG side of the engine near the starter.
2. Remove the plunger bolt ① and the spring.



3. Remove the two tensioner mounting bolts ②.
4. Push on the tensioner lock ③ and manually move the plunger in and out. It should move freely. If it does not move freely, replace the tensioner assembly.



5. Retract the plunger all the way in and install into the cylinder.



6. Install the two mounting bolts. Torque fasteners to specification.

TORQUE
Tensioner Mounting Bolts: **7 ft-lb (10 Nm)**

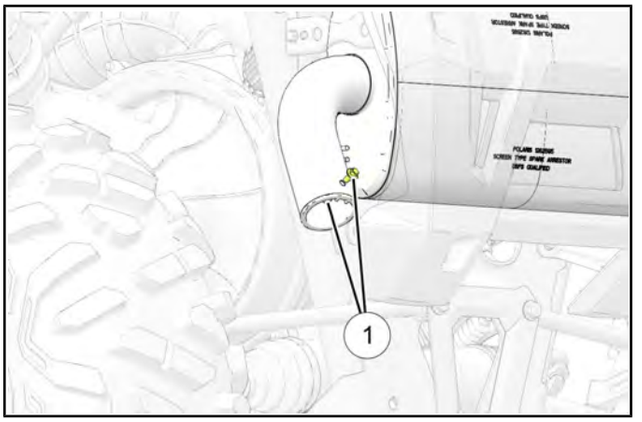
7. Install the plunger bolt. Torque fastener to specification.

TORQUE
Plunger Bolt: **15 ft-lb (20 Nm)**

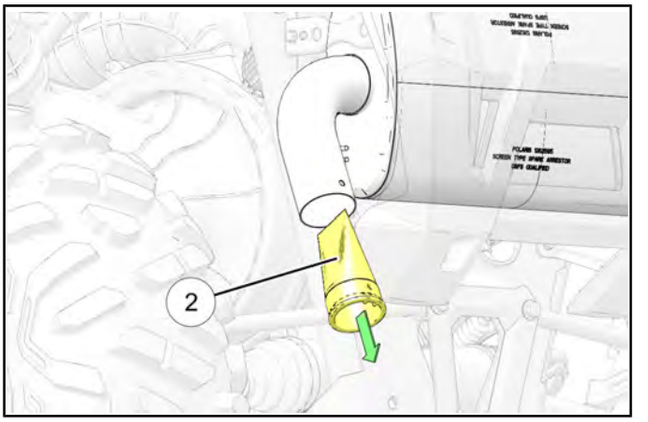
SPARK ARRESTOR

The spark arrestor should be cleaned after every oil change to remove accumulated carbon. A plugged spark arrestor will affect engine performance. Replace a cracked or damaged spark arrestor before running the vehicle.

1. Remove the spark arrestor retaining fasteners ①.



2. Remove the arrestor from the end of the muffler.
3. Use a non-synthetic brush to clean the screen ② on the arrestor. If necessary, blow debris from the screen with compressed air.

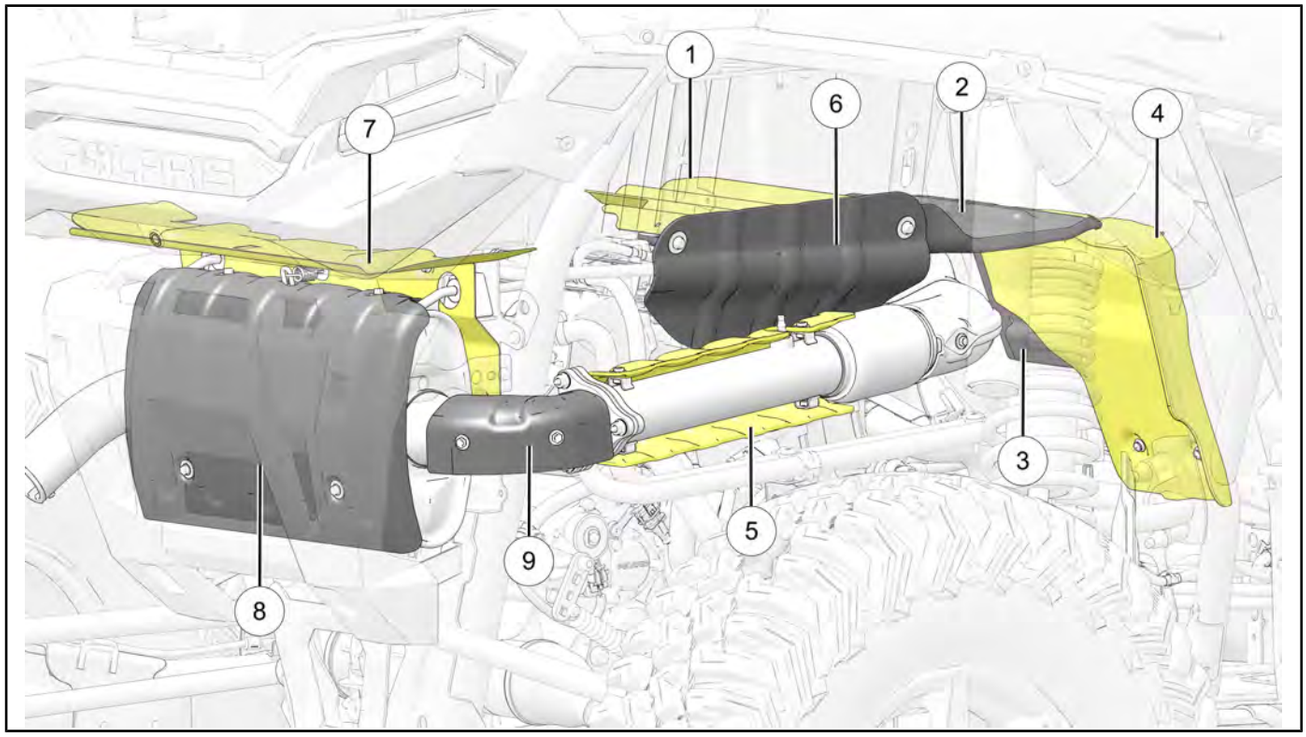


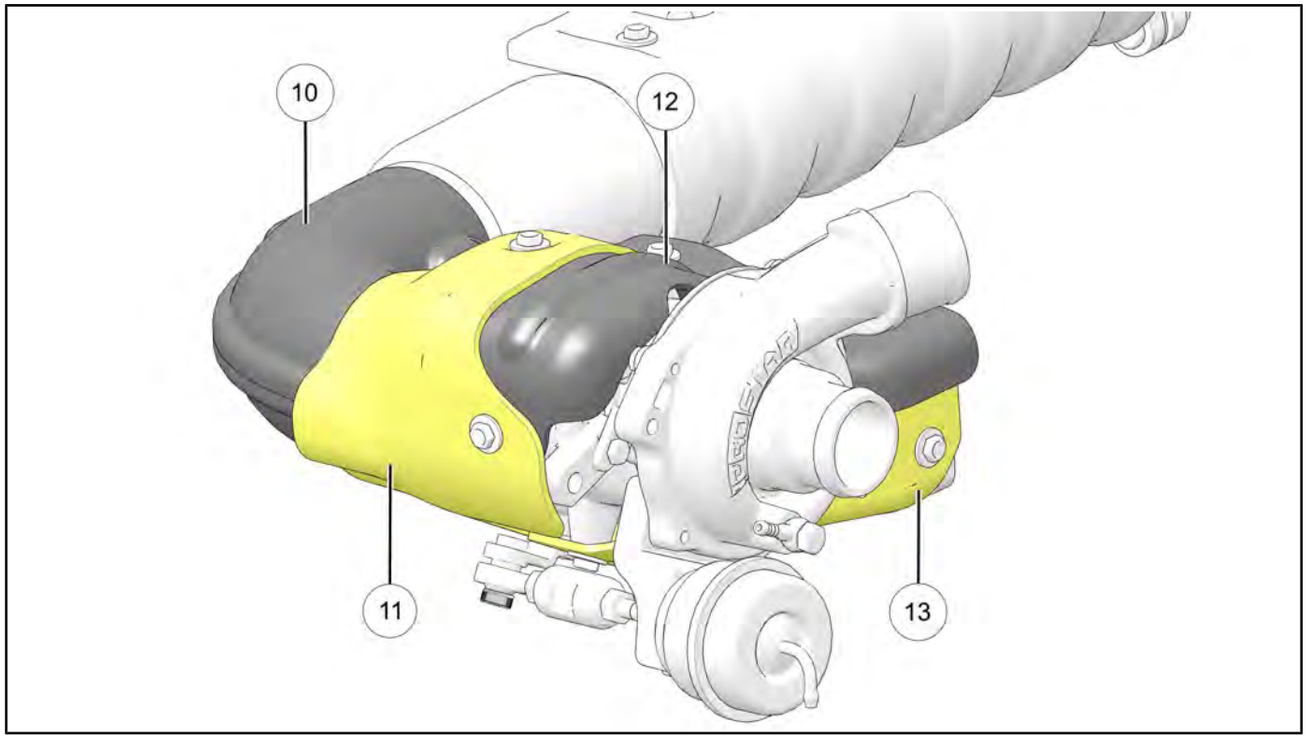
4. Inspect the screen for wear and damage. Replace if damaged.
5. Reinstall the spark arrestor. Torque fasteners to specification.

TORQUE
Spark Arrestor Fasteners: **8 ft-lb (11 Nm)**

HEAT SHIELD INSPECTION

Verify all shields are properly installed and not damaged. If a shield is damaged or missing, it **MUST** be replaced.





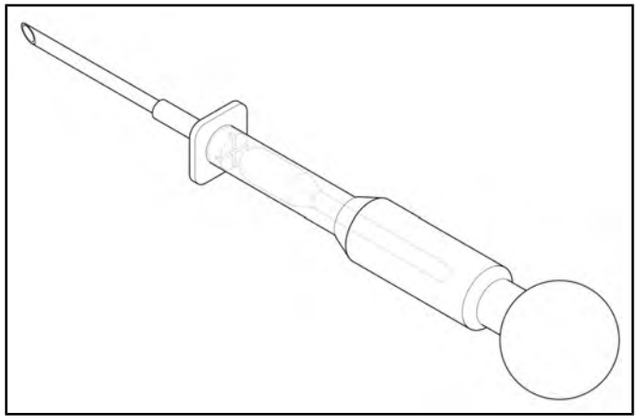
① Box Access Panel Heat Shield	⑥ Engine Heat Shield	⑪ Turbo Outlet Heat Shield
② Front Box Heat Shield	⑦ Rear Heat Shield	⑫ Turbo Upper Heat Shield
③ Front Access Panel Heat Shield	⑧ Silencer Heat Shield	⑬ Turbo Lower Heat Shield

④ Rear Close-off Heat Shield	⑨ Inlet Silencer Heat Shield	
⑤ Headpipe Inner Heat Shield	⑩ Front Head Pipe Heat Shield	

COOLING SYSTEM

COOLANT STRENGTH

Test the strength of the coolant using an antifreeze hydrometer.

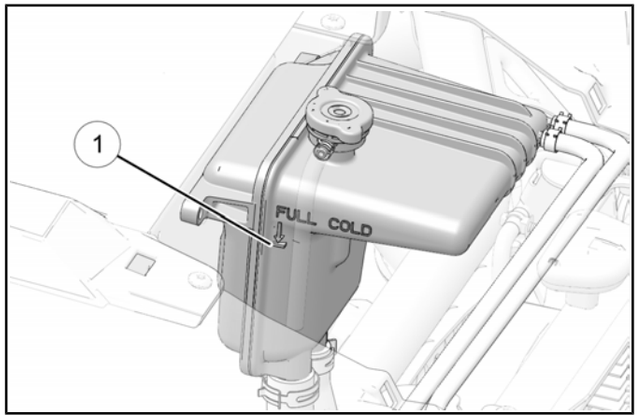


- A 50/50 mixture of antifreeze and distilled water will provide the optimum cooling, corrosion protection, and antifreeze protection.
- Do not use tap water, straight antifreeze or straight water in the system. Tap water contains minerals and impurities which build up in the system.
- Straight water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

Recommended Coolant:
Polaris 50/50 Extended Life Anti-freeze
2880514 (quart)
2880513 (gallon)

COOLANT LEVEL INSPECTION

The coolant tank is located under the front hood of the vehicle. The coolant level should be filled to the FULL COLD level ① 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 tank. If not, perform the following procedure:

1. Ensure the vehicle is positioned on a level surface.
2. View the coolant level tank.

⚠ 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. If the coolant level is below the FULL COLD line, inspect the vehicle for signs of leaking on the radiator, engine, and coolant hoses.
4. Remove the pressure cap. Using a funnel, add the recommended 50/50 coolant mixture to the FULL COLD level on the tank.

Recommended Coolant:
Polaris 50/50 Extended Life Anti-freeze
2880514 (quart)
2880513 (gallon)

5. Reinstall the pressure cap.

NOTICE

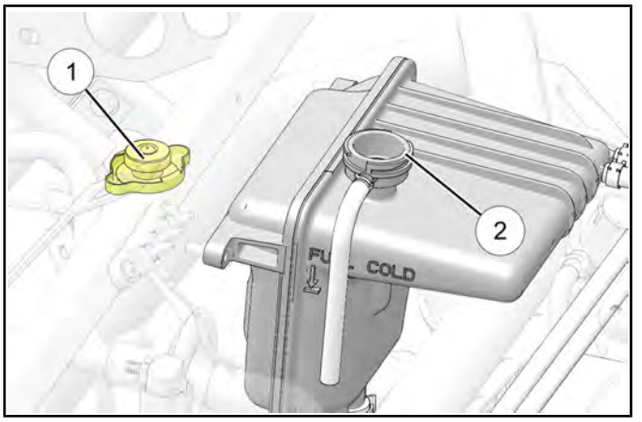
Use of a non-standard pressure cap will not allow the recovery system to function properly.

6. If coolant was required, start engine and check for leaks. Make sure radiator fins are clean to prevent overheating.

COOLING SYSTEM PRESSURE TEST

1. Remove the hood.

2. Remove pressure cap ① and pressure test the cap using a commercially available pressure tester. The pressure cap relief pressure is 13 psi. Replace the cap if it does not meet this specification.



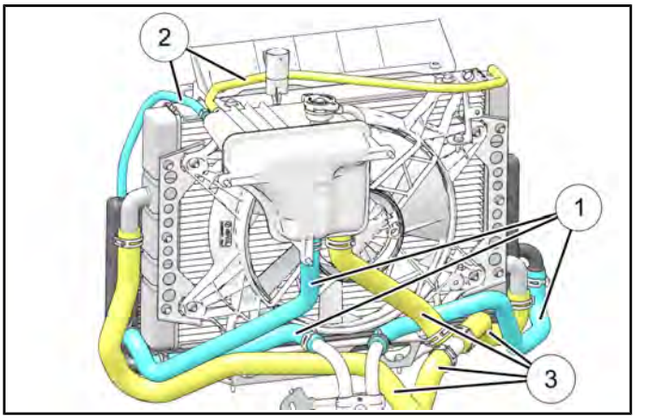
⚠ WARNING

Never remove pressure cap when engine is warm or hot. The cooling system is under pressure and serious burns may result. Allow the engine to cool before servicing.

3. To test the cooling system, connect the pressure tester to the cooling neck ② with the correct adapter.
4. The system must maintain 10 psi for five minutes or longer. If pressure loss is evident within five minutes, check the filler neck, radiator, hoses, clamps and water pump weep hole for leakage.

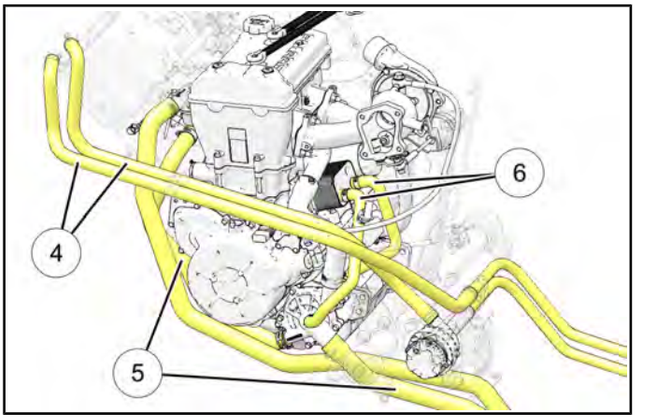
COOLANT HOSE INSPECTION

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



① Charge Air Radiator Hoses
② System Overflow Hoses
③ Engine Coolant Hoses

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

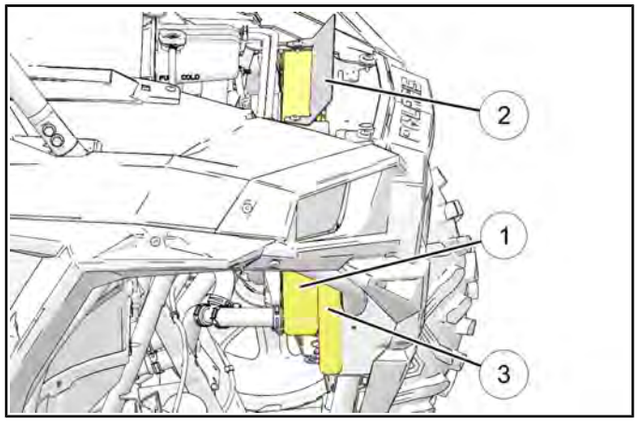


④ Charge Air Cooler Hoses
⑤ Water Pump Hoses
⑥ Oil Cooler Coolant Hoses

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

RADIATOR INSPECTION / CLEANING

1. Check engine radiator ① air passages for restrictions or damage.



NOTICE

The cooling fins are viewable by looking around the diverter plate ② on the top of the radiator.

2. Carefully straighten any bent radiator fins.
3. Also check the charge air radiator ③ fins for restrictions or damage.
4. 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.

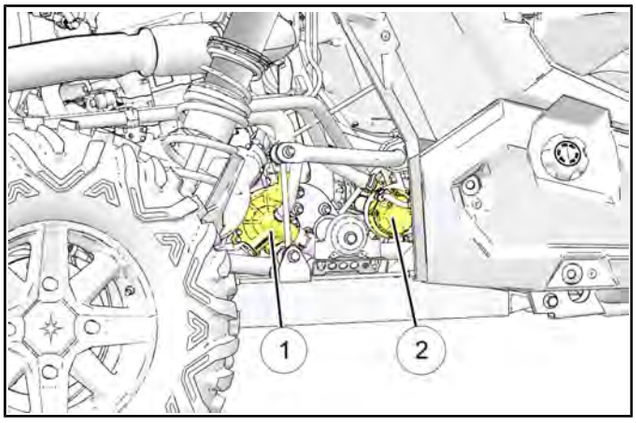
COOLANT FLUSH

1. Allow the vehicle to cool down before working with the cooling system.

⚠ CAUTION

Escaping steam/coolant can cause burns. Never remove the pressure cap or coolant hose while the engine is warm/hot.

2. Place a drain pan below the engine water pump ① and the charge air cooler water pump ②.



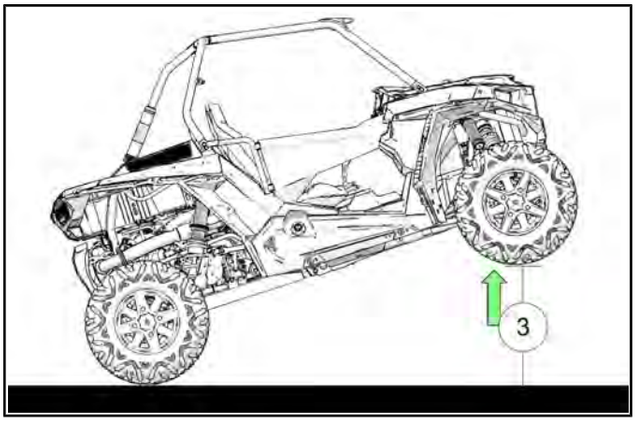
3. Remove the pressure cap from the coolant reservoir.
4. Remove a coolant hose from both water pumps and allow the vehicle to completely drain.

NOTICE

You may need to elevate the front of the vehicle to allow all coolant to drain from the radiators and then elevate the rear of the vehicle to allow coolant to drain from the engine and charge air cooler.

5. A wet vac may also be used to evacuate coolant from the system.
6. Connect the coolant hoses at both water pumps and properly position the clamps..
7. Ensure the transmission is in park and chock the rear tires.

8. Elevate the front of the vehicle at approx. 2 feet (60 cm) ③.



9. Safely secure the vehicle.
10. Slowly fill the cooling system at the coolant reservoir with 50/50 extended life coolant. Refer to Chapter 1 – General Specifications for approximate coolant system capacity.

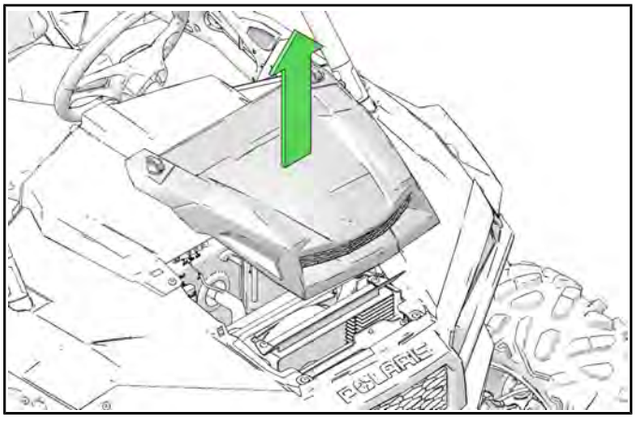
NOTICE
Elevating the unit will help reduce any air pockets in the system when filling with coolant.

11. Fill the reservoir to the FULL COLD line.
12. Proceed to bleed the cooling system. See Cooling System Bleeding page 2.40.

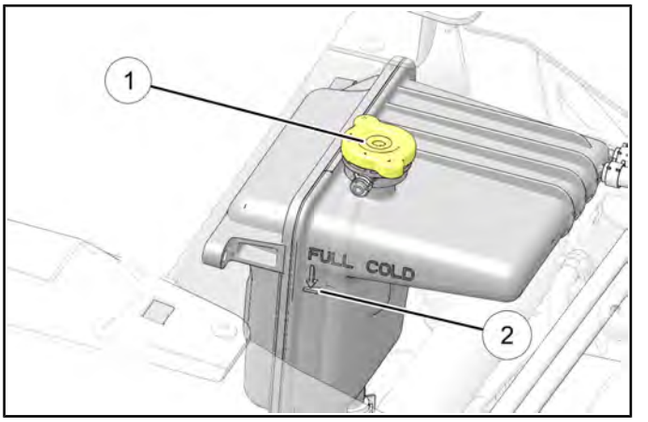
COOLING SYSTEM BLEEDING

ENGINE COOLING SYSTEM BLEEDING

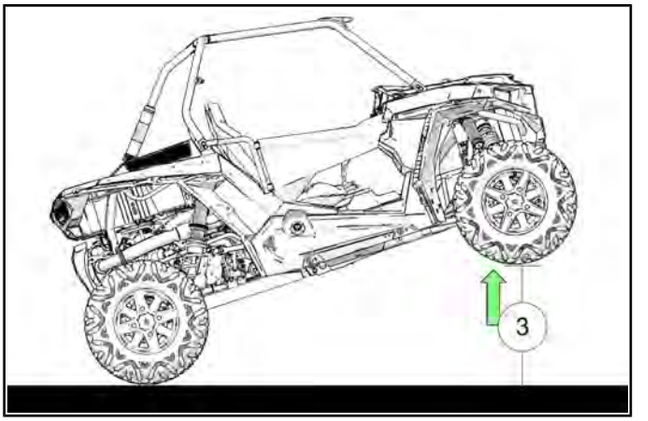
1. Remove the hood panel.



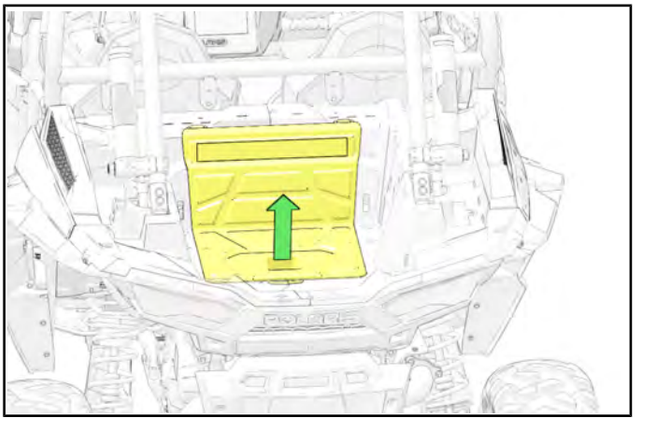
2. Remove the coolant pressure cap ①. Fill coolant to the FULL COLD line ② on the coolant tank.



3. Elevate the front of the vehicle at approx. 2 feet (60 cm) ③.

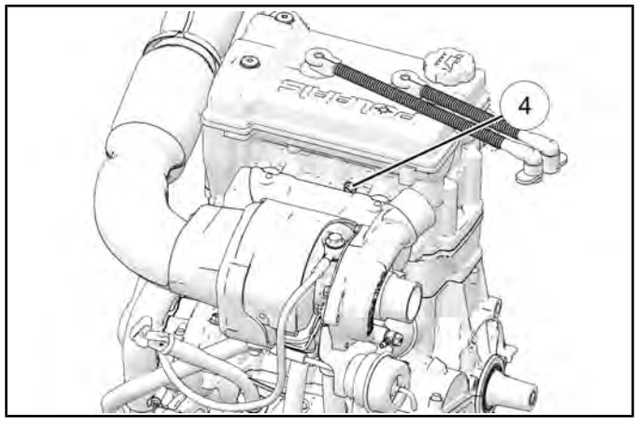


4. Remove the cargo box engine access panel.



5. Place a drain pan below the engine to catch any coolant out of the engine bleed hole.

6. Crack open the coolant bleed screw ④ on the engine, located above the exhaust head pipe on the PTO side.



NOTICE
Remove the heat shield on top of the engine for better access to the bleed screw

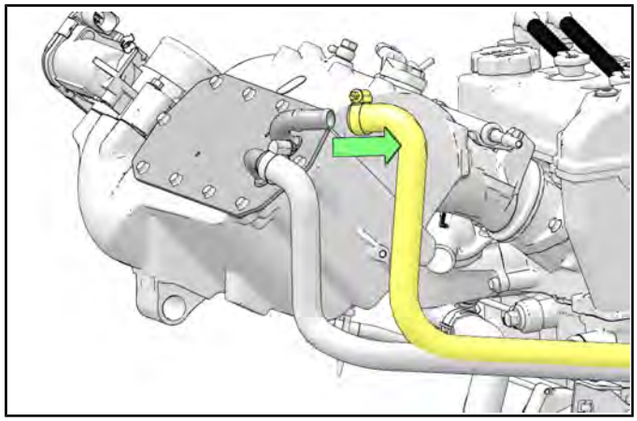
7. As soon as there is no more air coming out of the engine bleeder (no bubbles), close the bleed screw.
8. Fill the coolant bottle to the FULL COLD line.
9. Leave the pressure cap off and allow the engine to warm up to operating temp (thermostat open).
10. If the coolant volume in the reservoir rapidly expands and wants to fill the bottle, crack the bleed screw on the engine again once the engine cools down.

⚠ CAUTION
Escaping coolant/steam can cause burns. Always allow the engine to cool before opening the bleed screw.

11. Warm the engine up to operating temperature again. The engine should take 3-5 minutes to warm up and the fan should cycle normally if all the air has been purged from the system.

CHARGE AIR COOLING SYSTEM BLEEDING

1. Remove the inlet hose going to the charge air cooler. Ensure the hose and the charge air cooler are full of coolant. Fill as required.



2. The electric pump should be strong enough to purge a small volume of air.
3. Run the engine for a few minutes to allow the electric pump to push coolant through the system.
4. Fill the coolant reservoir bottle to the FULL COLD line.

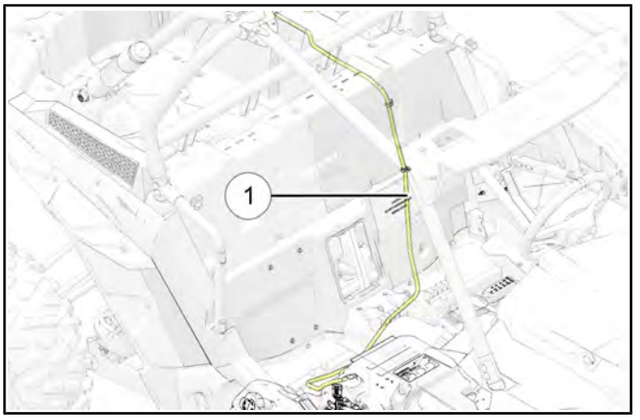
FUEL SYSTEM AND AIR INTAKE

FUEL TANK VENT INSPECTION

Symptoms of a restricted fuel tank vent include the following:

- collapsing or expanding fuel tank
- hiss / rush of air when fuel tank cap is removed
- engine miss or hesitation
- loss of engine performance
- high exhaust temperatures

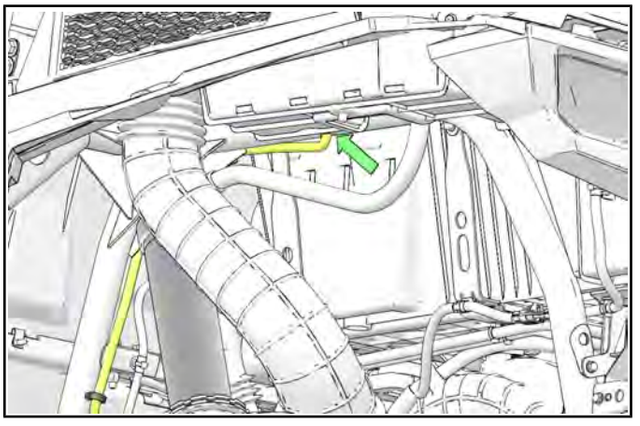
1. Remove the seats and the engine service panel.
2. Check the fuel tank vent line ① for signs of wear, deterioration or damage. Replace vent line if necessary.



3. Be sure the vent line is routed properly as shown and secured with cable tie(s).

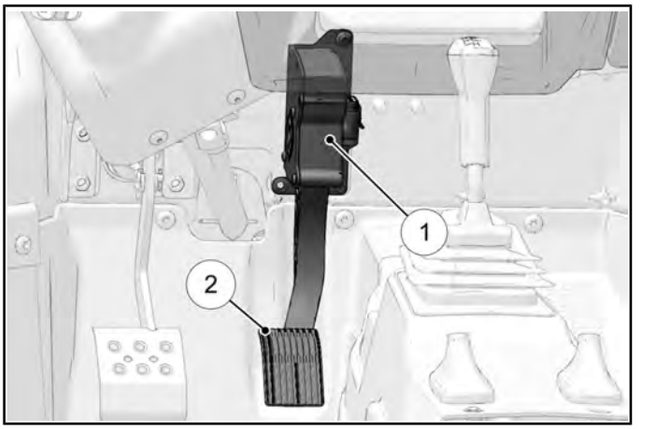
NOTE
Make sure vent line is not kinked or pinched.

4. The vent hose should route towards the driver's side rear of the vehicle and terminate into the frame tube.



THROTTLE PEDAL INSPECTION

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



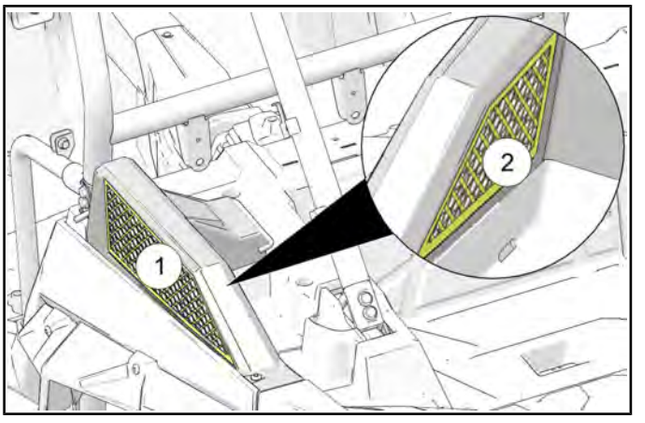
The throttle pedal should move freely and always return back to its idle position when released.

Check throttle pedal periodically.

ENGINE INTAKE PRE-FILTER SERVICE

It is recommended that the engine intake pre-filter be inspected daily. The filter should be inspected using the following procedure:

1. The engine intake pre-filter is located just above the right rear wheel fender.
2. Inspect the pre-filter on the outboard ① and inboard ② sides. If necessary, clean with soapy water and air dry.

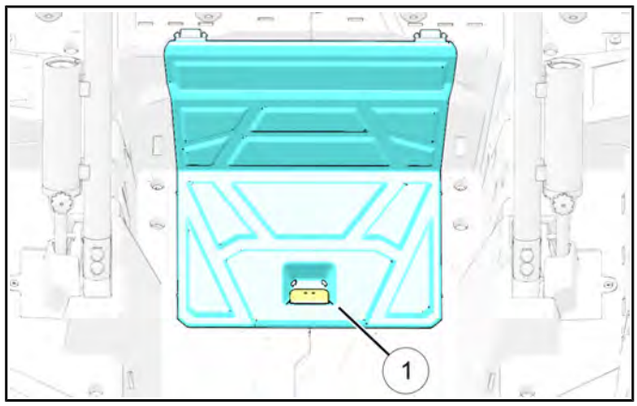


CAUTION
Compressed air or high pressure hose may damage the frog skin pre-filter on the intake.

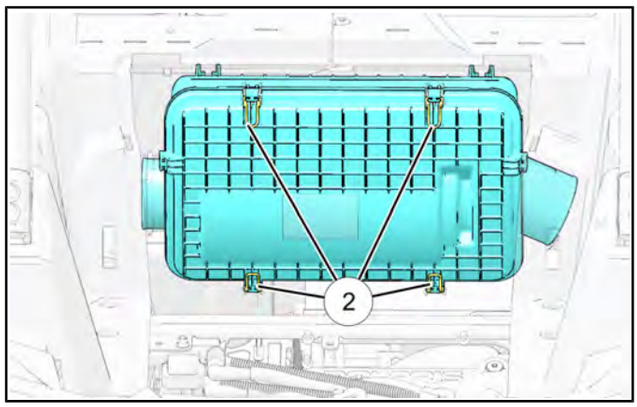
AIR FILTER SERVICE

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.

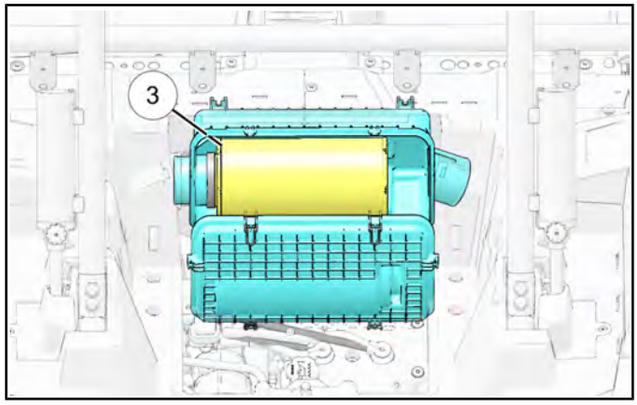
1. Remove the cargo box access panel ①.



2. Disengage the four cover latches 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.

NOTICE
If the filter has been soaked with fuel or oil it must be replaced.

5. Inspect the air filter and replace if necessary.

NOTICE
DO NOT attempt to clean the air filter.

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

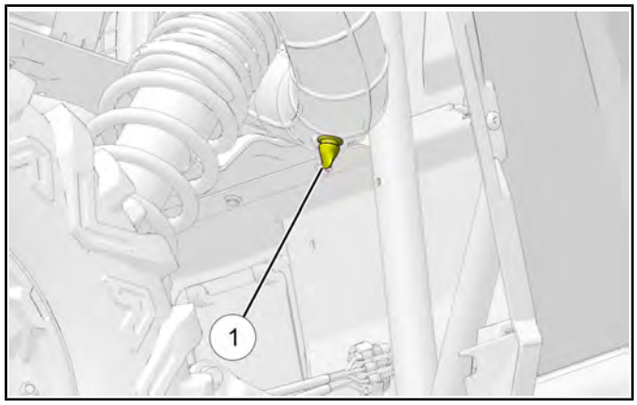
NOTICE
Be sure the lower tabs on the air box cover are properly engaged into the airbox.

7. Engage the cover latches.
8. Reinstall the cargo box access panel.

INTAKE DUCT DRAIN INSPECTION

It is recommended that the intake drain be inspected daily.

1. Access the intake baffle box drain ① through the left rear wheel well.



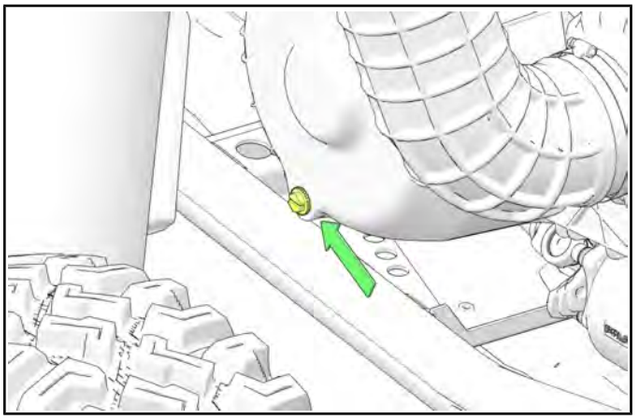
2. Check the drain to ensure it is not plugged with debris so it can drain properly. If needed, remove the drain from the baffle box during inspection.

PVT / FINAL DRIVE / WHEEL AND TIRE

PVT DRAIN

If water is ingested into the PVT system:

1. Remove the clutch cover drain plug.



2. Allow the water to drain out. Reinstall the plug.
3. Place the transmission in Park. Apply the brakes.
4. Start the engine and apply varying throttle for 10–15 seconds to expel any moisture from the PVT and air dry the belt and clutches.

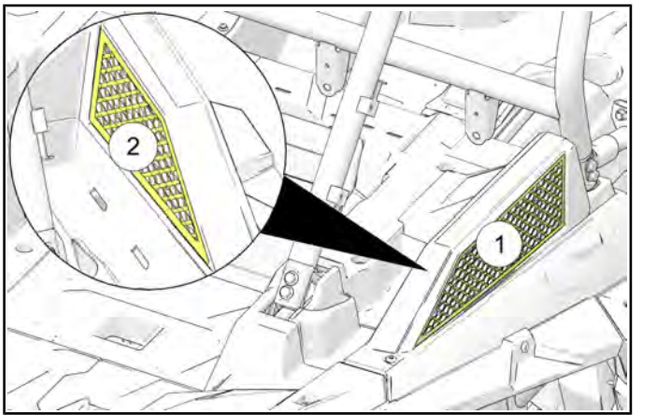
CAUTION
Do not hold the throttle wide open for more than 10 seconds.

5. Allow the engine RPM to settle to idle speed. Apply the brakes. Shift the transmission into Low.
6. Test run the vehicle for slippage. If the belt slips, repeat steps 1-5.

PVT INTAKE PRE-FILTER SERVICE

It is recommended that the PVT intake pre-filter be inspected daily. The filter should be inspected using the following procedure:

1. The PVT intake pre-filter is located just above the left rear wheel fender.
2. Inspect the pre-filter on the outboard ① and inboard ② sides. If necessary, clean with soapy water and air dry.



CAUTION
Compressed air or high pressure hose may damage the pre-filter material on the intake.

FRONT GEARCASE LUBRICATION

NOTICE
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.

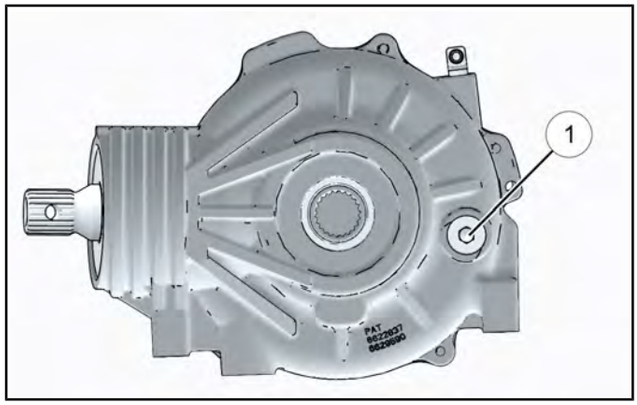
The front gearcase fluid level should be checked and changed in accordance with the maintenance schedule.

- 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.



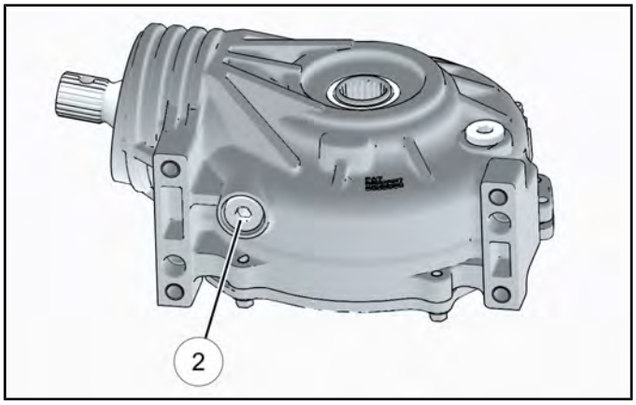
3. If fluid level is not even with the bottom threads, add the recommended fluid as needed. Do not overfill.
4. Reinstall the fill plug and torque to specification.

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

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.

1. Remove the fill plug.
2. Place a drain pan under the front gearcase drain plug.
3. Remove the drain plug ② and allow fluid to drain completely.



4. Clean the drain plug magnetic surface.
5. Reinstall the drain plug and torque to specification.
6. Add the recommended amount of fluid through the fill hole. Maintain the fluid level even with the bottom threads of the fill plug hole.

FLUID CAPACITY
Recommended Front Gearcase Fluid: **Demand Drive Fluid 2877922 (quart)** **Capacity:** approx. **8.5 oz (250 mL)**

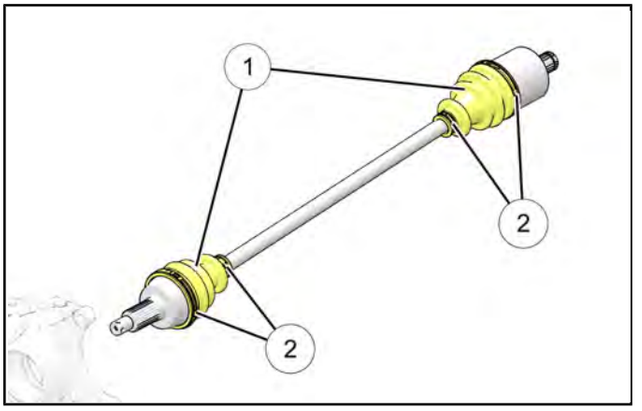
7. Reinstall the fill plug and torque to specification.

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

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

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 for drive shaft boot replacement.



WHEEL REMOVAL

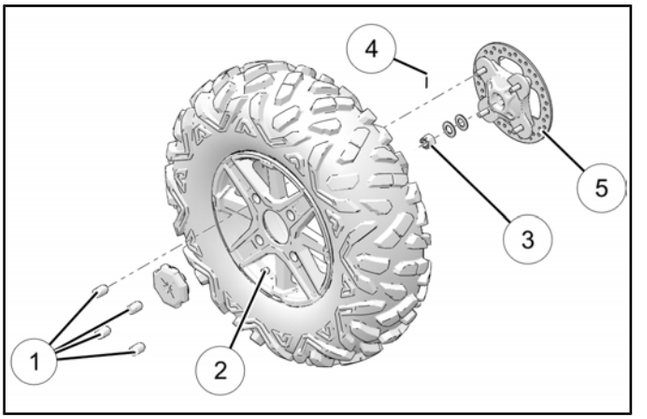
1. Position the vehicle on a level surface.
2. Place the transmission in PARK and stop the engine.
3. Loosen the wheel nuts slightly. If wheel hub removal is required, remove the wheel cap, cotter pin and loosen the hub nut slightly.
4. Elevate the appropriate side of the vehicle by placing a suitable 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 ⑤. 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 ① and finger tighten them.
4. Carefully lower the vehicle to the ground.
5. Torque the wheel nuts and/or hub nut ③ to the proper torque specification.

TORQUE
Wheel Lug Nuts: **120 ft-lbs (163 Nm)** Hub Castle Nuts: **180 ft-lbs (244 Nm)**

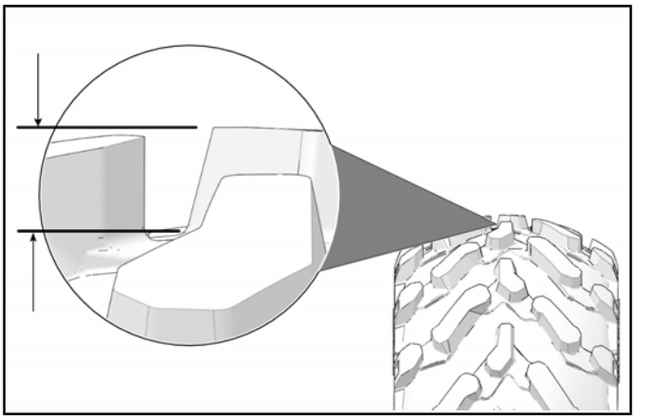
6. If hub nut was removed, install a new cotter pin ④ after the hub nut has been tightened. If the holes do not line up, turn the hub nut counter-clockwise until the cotter pin can be installed.



CAUTION
If wheels are improperly installed it could affect vehicle handling and tire wear.

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.



MEASUREMENT
Tire Lug Service Limit: **Replace if 1/8″ (3 mm) or less.**

⚠ WARNING

Operating with worn tires will increase the possibility of the vehicle skidding easily with possible loss of control. Worn tires can cause an accident. Always replace tires when the usable tread depth has worn out.

TIRE PRESSURE

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

TIRE PRESSURE SPECIFICATION (COLD)

MODEL	FRONT	REAR
RZR XP Turbo	18 PSI (125 kPa)	19 PSI (130 kPa)
RZR XP4 Turbo	22 PSI (152 kPa)	22 PSI (152 kPa)

TRANSMISSION

TRANSMISSION LUBRICATION

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

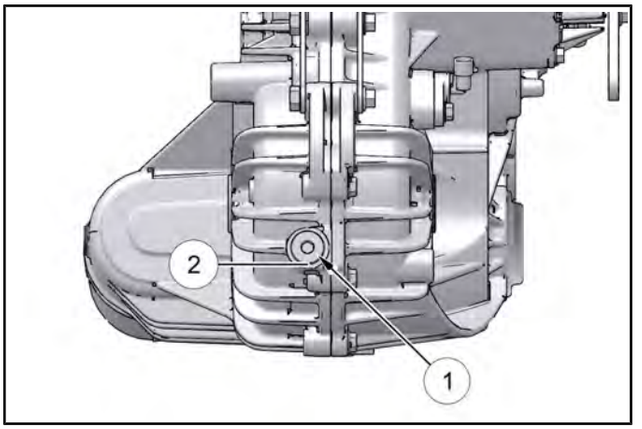
The transmission lubricant level should be checked and changed in accordance with the maintenance schedule.

- 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 OIL 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.



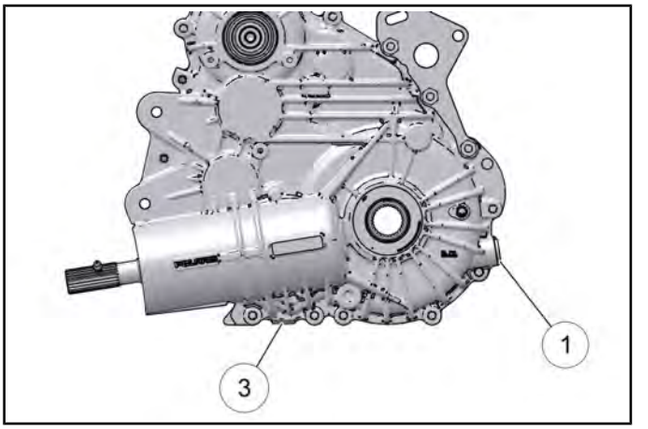
3. If lubricant level is not even with bottom threads ②, add recommended lubricant as needed. Do not overfill.
4. Reinstall the fill plug and torque to specification.

TORQUE
Transmission Fill / Drain Plug: **14 ft-lbs (19 Nm)**

TRANSMISSION OIL 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.

1. Remove the fill plug.
2. Place a drain pan under the transmission drain plug.
3. Remove drain plug ③ and allow lubricant to drain completely.



4. Clean the drain plug magnetic surface.
5. Reinstall the drain plug and torque to specification.
6. 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.

FLUID CAPACITY
Recommended Transmission Lubricant: **AGL Synthetic Gearcase Lubricant** **Capacity: 61 oz (1800 mL)**

7. Reinstall the fill plug and torque to specification.

TORQUE
Transmission Fill / Drain Plug: **14 ft-lbs (19 Nm)**

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

STEERING

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.

NOTICE
Check front end alignment whenever steering components are replaced.

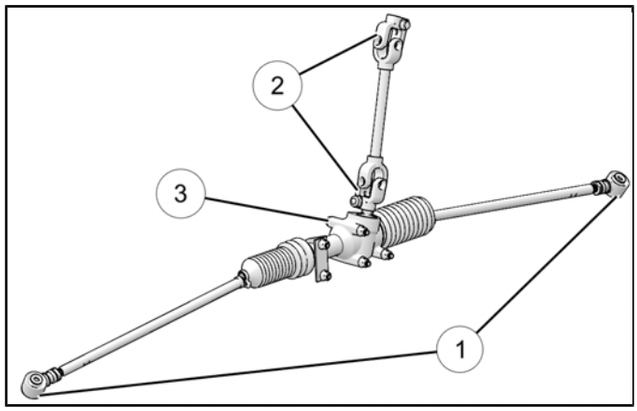
⚠ WARNING
Due to the critical nature of the procedures outlined in this chapter, Polaris recommends steering component repair and adjustment be performed by an authorized Polaris MSD certified technician.

STEERING WHEEL FREE-PLAY

Check steering wheel for specified free-play and operation.

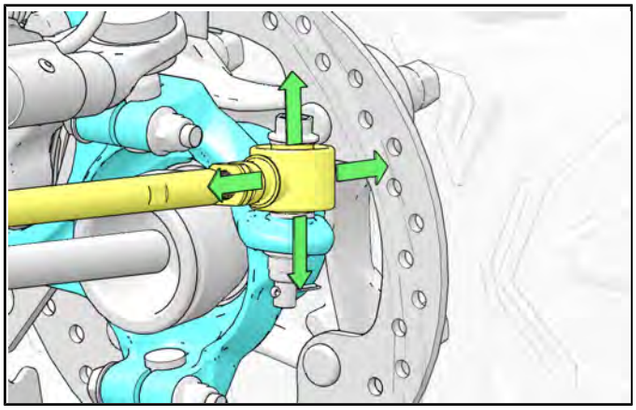
1. Position the vehicle on level ground.
2. Lightly turn the steering wheel left and right.
3. There should be about 0.8-1.0″ (20-25 mm) of free-play.
4. If there is excessive free-play or the steering feels rough, inspect the following components.

- Tie Rod Ends ①
- Steering Shaft U-Joints ②
- Steering Gearbox ③

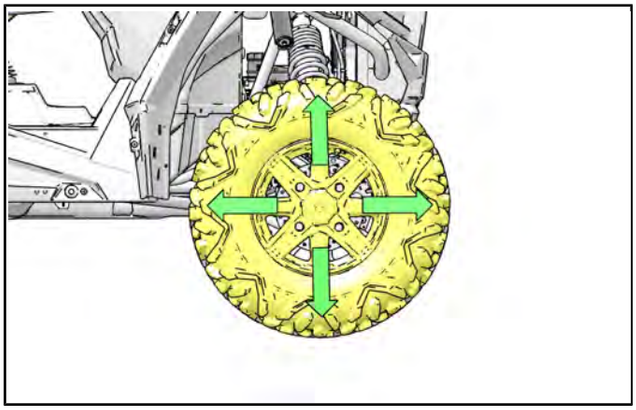


TIE ROD END / WHEEL HUB INSPECTION

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



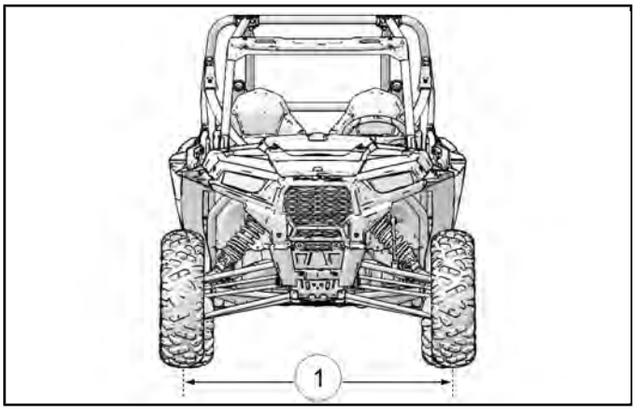
- Replace any worn steering components. Steering should move freely through entire range of travel without binding.
- Elevate front end of machine so front wheels are off the ground. Check for any looseness in front wheel/hub assembly by grasping the tire firmly at top and bottom first, and then at front 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 Front Bearing Carrier Inspection / Removal page and Rear Bearing Carrier Inspection / Removal page 8.6 for wheel bearing service procedures.

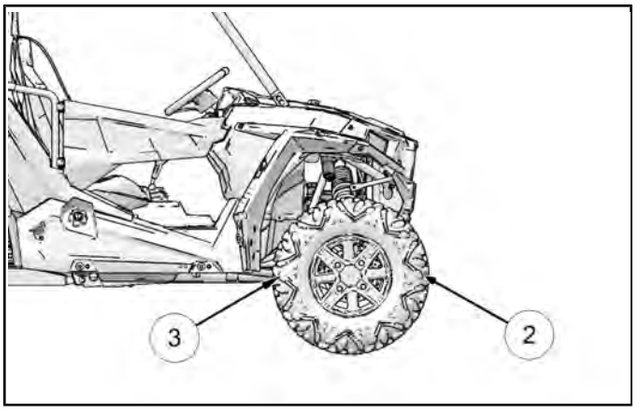
WHEEL TOE ALIGNMENT INSPECTION

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 approximately 10″ (25.4 cm) from the floor or as close to the hub/axle center line as possible ①.



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

3. Measure the distance between the marks and record the measurement. Call this measurement ②.

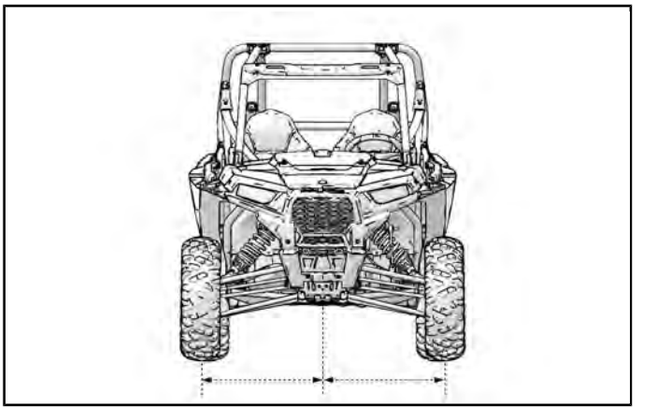


4. Rotate the tires 180° by moving the vehicle forward. Position chalk marks facing rearward, even with the hub/axle center line.
5. Measure the distance between the marks and record. Call this measurement ③. Subtract measurement ③ from measurement ②, this is the vehicle toe. Toe-out means the measurement at the front of the tire ② is wider than the measurement at the rear ③.

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

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.



NOTICE
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.

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

- After alignment is complete, torque jam nuts to specification.

TORQUE
Tie Rod Jam Nut: **14 ft-lbs (19 N·m)**

CAUTION
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.

- Vehicles equipped with Dynamix suspension having a steering shaft, EPS unit, steering rack, or tie rod removed/adjusted/disconnected MUST have Steering Angle Sensor Centering procedure performed once everything is reinstalled. Refer to Steering Angle Sensor Centering (Dynamix) page 12.35.

SUSPENSION

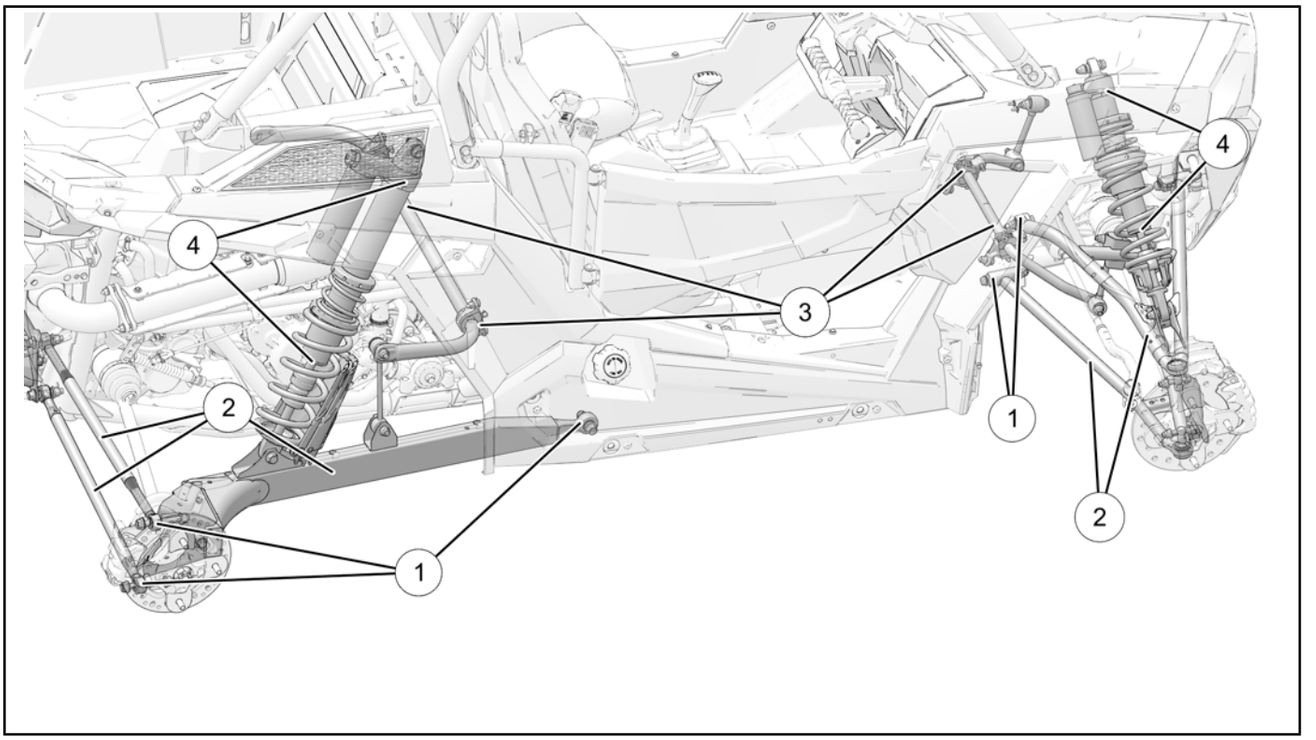
SUSPENSION INSPECTION

① Inspect all control arm bushings/bearings to make sure they are not broken, missing or extremely loose .

② Check for damage/impact to all control arms and/or trailing arms and radius rods.

③ Inspect stabilizer bar and stabilizer bar bushings for damage/wear.

④ Ensure the shocks are not leaking oil. especially around the shock caps and shaft seals.



SUSPENSION LUBRICATION

Refer to Grease Lubrication Points page 2.28 for suspension lubrication.

NOTICE
There are no grease fittings on the front control arm pivot points or the rear trailing arms.

BRAKE SYSTEM

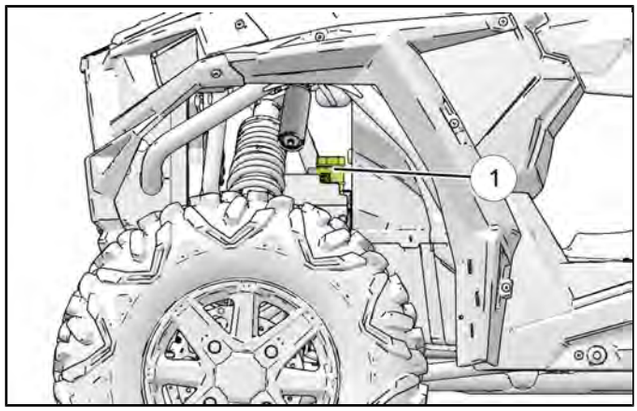
BRAKE FLUID INSPECTION

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.



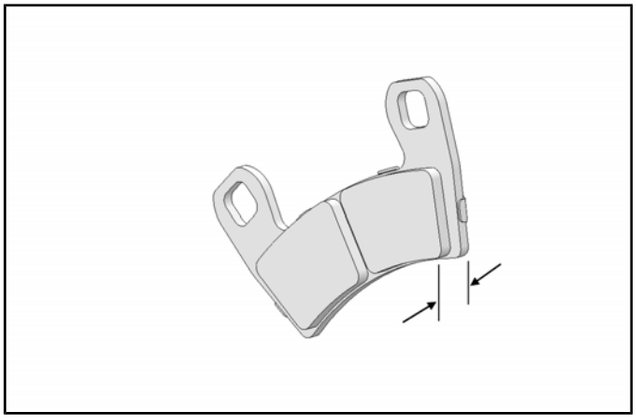
4. If the fluid level is lower than the MIN level line, add brake fluid until it reaches the MAX level line.
5. Install the reservoir cap and apply the brake pedal forcefully for a few seconds and check for fluid leakage around the master cylinder fittings and the brake caliper fittings.

BRAKE 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.

BRAKE PAD INSPECTION

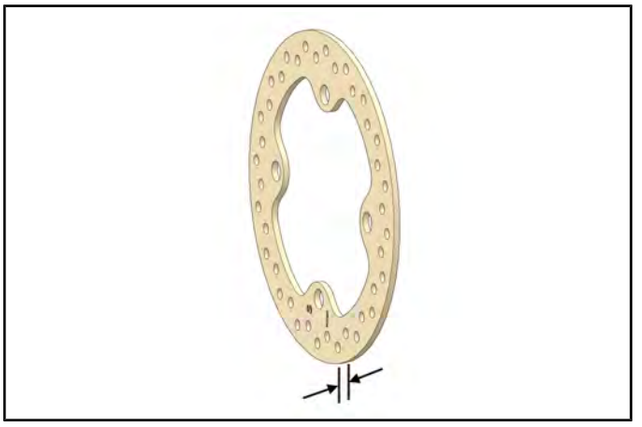
Measure the thickness of the pad material and backing plate with a caliper. Replace pads if worn beyond the service limit.



MEASUREMENT
Brake Pad Thickness: **.296 ± .007″(7.53 ± .19 mm)** **.180″ (4.6 mm)**

BRAKE DISC INSPECTION

1. Visually inspect disc for scoring, scratches and gouges. Replace disc if deep scratches are evident.
2. Using a micrometer, measure disc thickness at eight different points around the pad contact surface.



MEASUREMENT
Brake Disc Thickness **.295 ± .008″(7.5 ± .2 mm)** Service Limit: **.268″ (6.8 mm)** Brake Disc Thickness Variance: **Service Limit: 0.002″ (0.051 mm)**

3. Mount a dial indicator. Slowly rotate the disc and read runout on the dial indicator Replace disc if runout exceeds specifications.

MEASUREMENT
Brake Disc Runout: **.010″ (0.25 mm)**

ELECTRICAL AND 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.

NOTICE

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 12.44. Do not use the vehicle’s stator/alternator to charge a new battery.

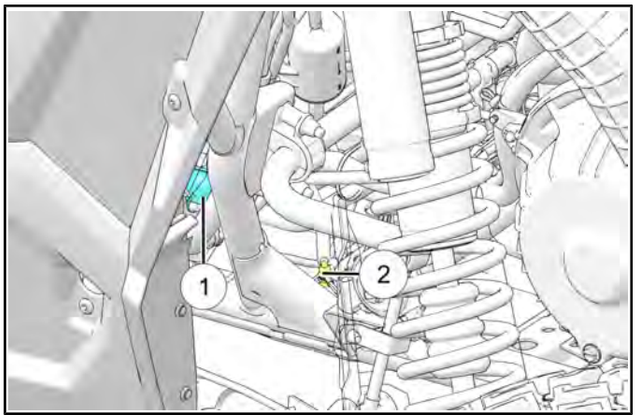
BATTERY CHARGING / OFF SEASON STORAGE

Refer to Charging Procedure page 12.44 and Battery Off Season Storage page 12.43 in the electrical chapter.

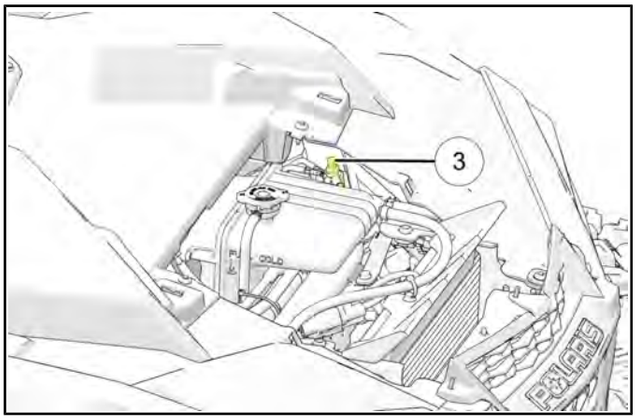
ENGINE / CHASSIS ELECTRICAL GROUND

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

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



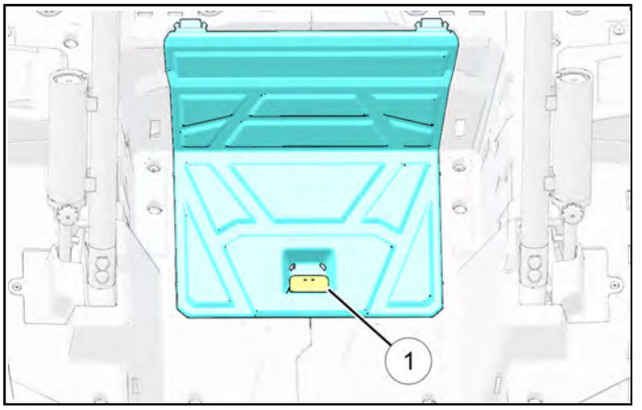
2. The front chassis ground connection ③ can be accessed by removing the front hood.



SPARK PLUG SERVICE

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

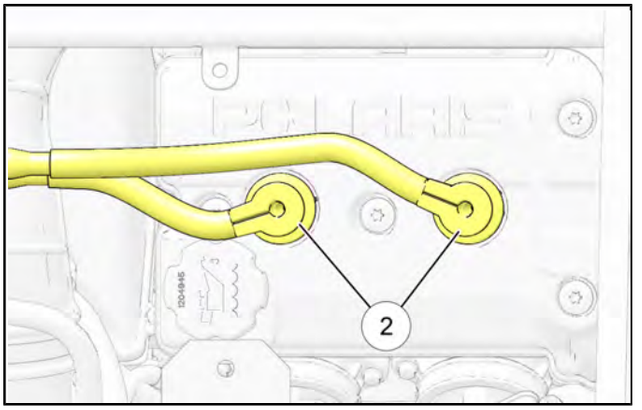
1. Remove the cargo box access panel ①.



⚠ 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.



NOTICE

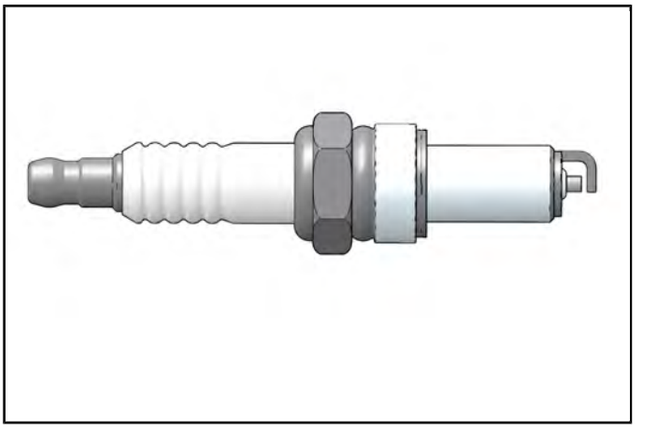
Note MAG and PTO reference decals on spark plug wires for reassembly.

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.

NOTICE

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:
NGK MR9F

10. Install spark plugs and torque to specification.

TORQUE

Spark Plug Torque:
7 ft-lbs (10 N·m)

11. 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.
12. Reinstall the cargo box access panel.

CHAPTER 3
ENGINE / COOLING SYSTEM

3

GENERAL INFORMATION

SPECIAL TOOLS

PART NUMBER	DESCRIPTION
PA–49316	Flywheel Puller
PU-50105	Oil Filter Wrench
PU-50562	Engine Stand Adapter
PU-50563	Cylinder Holding & Camshaft Timing Plate
PU-50564	Water Pump Mechanical Seal Installer
PU-50569	Oil Pressure Gauge Adapter
PU-50624	Engine Stand (2″ Bore)
PU-50625	Engine Stand Sleeve Adapter
PU-51220	Flywheel Holding Tool
PV-1253	Valve Spring Compressor
PV-43513-A	Valve Spring Compressor Adapter
PV-43531	Oil Pressure Gauge
PV-43570-1	Piston Ring Compressor Pliers

ENGINE LUBRICATION SPECIFICATIONS

FLUID CAPACITY
Recommended Engine Oil: **PS-4 (PN 2876244)** *Ambient Temp Range: -35° F to 100° F* **PS-4 Extreme Duty (PN 2878920)** *Ambient Temp Range: 0° F to 120° F* **Capacity:2.75 qt (2.6 L)**

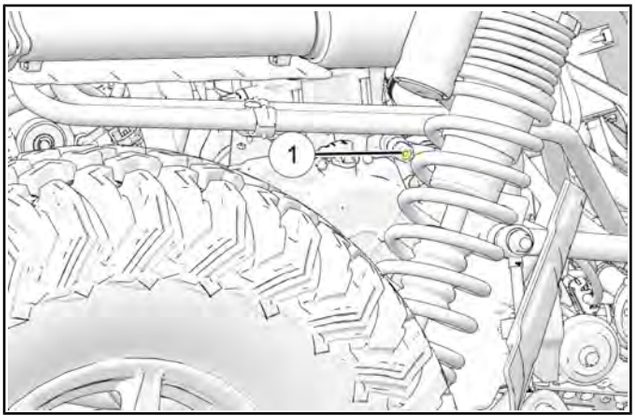
* Additional oil may be required after complete engine disassembly. Check level after filling and add oil as needed.

OIL PRESSURE TEST

1. Attach the Oil Pressure Gauge Adapter (**PU-52492**) to the Oil Pressure Gauge (**PV-43531**).

Oil Pressure Gauge: **PV-43531** Oil Pressure Gauge Adapter: **PU-52492**

2. Clean the area around the oil gallery plug ① located on the MAG side where the turbocharger oil feed fitting connects to the engine.



3. Remove the plug and insert the oil pressure adapter. Torque the adapter to specification.

TORQUE
PU-52492: **12 ft-lbs (16 Nm)**

4. Start the engine and allow it to reach operating temperature, monitoring the gauge.

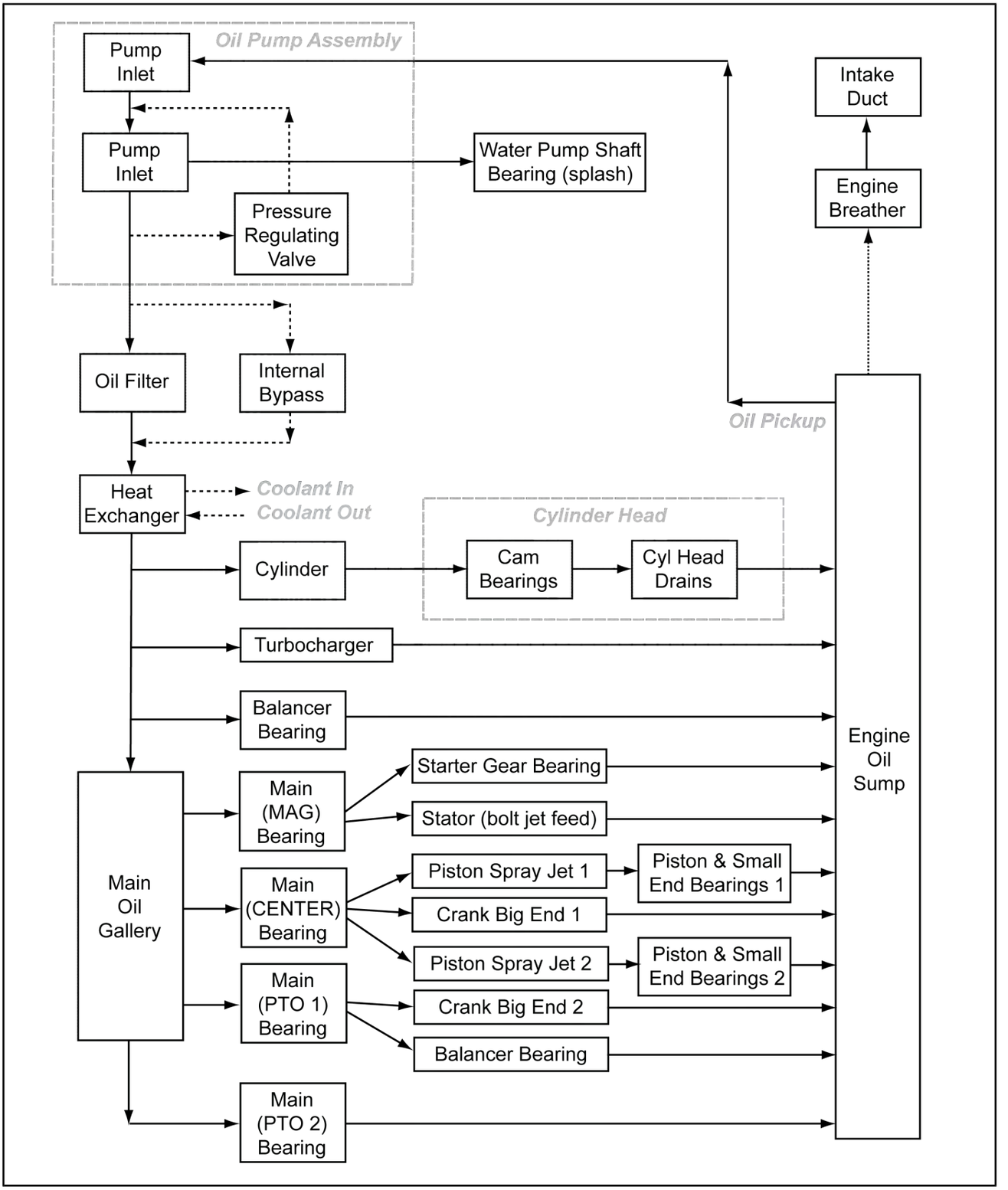
NOTICE
Test results are based on the use of the recommended engine oil (Polaris PS-4 or PS-4 Extreme Duty) while at operating temperature and may vary considerably if any other oil is used or if the engine is not up to operating temperature.

Oil Pressure Specification (engine warm) Minimum @ 1200 RPM: 10 PSI Minimum @ 7000 RPM: 40 PSI Maximum @ All RPM: ≈ 80 PSI (relief valve)

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

TORQUE
Crankcase Oil Gallery Plug: **12 ft-lbs (16 Nm)**

OIL FLOW CHART



ENGINE SERVICE SPECIFICATIONS

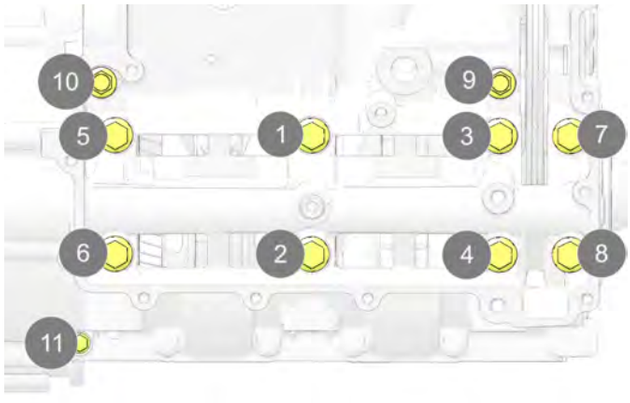
ENGINE SPECIFICATIONS

CAMSHAFT / CYLINDER HEAD / CYLINDER			
ITEM		**STANDARD**	**SERVICE LIMIT**
Camshaft	Cam Lobe Height - Intake	**1.5890 - 1.5921" (40.36 - 40.44 mm)**	**1.5870" (40.31 mm)**
	Cam Lobe Height - Exhaust	**1.5772 - 1.5803" (40.06 - 40.14 mm)**	**1.5752" (40.01 mm)**
	Camshaft Journal O.D. - All	**.9038 - .9046" (22.957 - 22.978 mm)**	**.9033" (22.944 mm)**
	Camshaft Carrier Bore I.D. - All	**.9055 - .9063" (23.000 - 23.021 mm)**	**.9072" (23.044 mm)**
	Camshaft Oil Clearance	**.0009 - .0026" (0.022 - 0.067 mm)**	**.0039" (0.1 mm)**
	Camshaft End Play	**.0040 - .0100" (0.101 - 0.254 mm)**	**.0157" (0.4 mm)**
Cylinder	Cylinder - Surface Warp Limit (cylinder head surface)	-	**.002″ (0.05 mm)**
	Cylinder Bore - Standard	**3.6614 ± .0003" (93 mm ± 0.008 mm)**	-
	Cylinder Out of Round Limit	-	**.001″ (0.025 mm)**
	Cylinder Taper Limit	-	**.001″ (0.025 mm)**
	Cylinder to Piston Clearance	**.0009 - .0019" (0.025 - 0.050 mm)**	-
Cylinder Head	Cylinder Head - Surface Warp Limit	-	**.0039″ (0.1 mm)**
	Cylinder Head - Standard Height	**4.717 ± .0019" (119.82 ± 0.05 mm)**	-
Valve	Valve Lash/Clearance (Cold) - Intake	**.006 ± .002" (0.15 ± 0.05 mm)**	-
	Valve Lash/Clearance (Cold) - Exhaust	**.010 ± .002" (0.25 ± 0.05 mm)**	-
	Valve Stem Diameter - Intake	**.2155 - .2161" (5.475 - 5.490 mm)**	-
	Valve Stem Diameter - Exhaust	**.2147 - .2153" (5.455 - 5.470 mm)**	-
	Valve Stem Oil Clearance - Intake	**.0003 - .0015" (0.010 - 0.040 mm)**	-
	Valve Stem Oil Clearance - Exhaust	**.0011 - .0023" (0.030 - 0.060 mm)**	-
	Valve Stem Overall Length - Intake	**3.7704" (95.77 mm)**	-
	Valve Stem Overall Length - Exhaust	**3.8023" (96.58 mm)**	-
Valve Guide	Valve Guide Inner Diameter	**.2165 - .2171" (5.500 - 5.515 mm)**	-
Valve Seat	Valve Seat - Contacting Width - Intake	**.0393 ± .0039" (1.0 ± 0.10 mm)**	**.0551" (1.4 mm)**
	Valve Seat - Contacting Width - Exhaust	**.0590 ± .0039" (1.5 ± 0.10 mm)**	**.0748" (1.9 mm)**
	Valve Seat Angles	**30.0° ± 1.5° 45.0° ± 0.5° 60.0° ± 1.5°**	-

PISTON / RINGS / CONNECTING ROD / CRANKSHAFT / BALANCE SHAFT				
ITEM			**STANDARD**	**SERVICE LIMIT**
Piston	Standard O.D. - Measured 90° to pin, 0.39" (10 mm) up from piston skirt		**3.6597 ± .0003" (92.959 ± 0.008 mm)**	-
	Piston Pin Bore I.D. (Standard)		**.8665 - .8668" (22.009 - 22.017 mm)**	**.8678" (22.042 mm)**
	Piston Pin O.D.		**.8659 - .8661" (21.995 - 22.000 mm)**	**.8651" (21.975 mm)**
Piston Ring	Installed Gap	Top Ring	**.010 - .016" (0.24 - 0.40 mm)**	**.0196" (0.50 mm)**
		Second Ring	**.015 - .025" (0.37 - 0.63 mm)**	**.028" (0.70 mm)**
		Oil Control Rails	**.010 - .040" (0.25 - 1.02 mm)**	**.045" (1.15 mm)**
	Ring to Groove Clearance	Top Ring	**.0007 - .0023" (0.020 - 0.060 mm)**	**.0047" (0.12 mm)**
		Second Ring		
Connecting Rod	Connecting Rod Small End I.D.		**.8667 - .8673" (22.015 - 22.03 mm)**	**.8677" (22.04 mm)**
	1 - Marking	Conn. Rod Big End Bore I.D.	**1.8892 - 1.8895" (47.987 - 47.994 mm)**	-
	2 - Marking	Conn. Rod Big End Bore I.D.	**1.8896 - 1.8898" (47.995 - 48.001 mm)**	-
	3 - Marking	Conn. Rod Big End Bore I.D.	**1.8898 - 1.8901" (48.002 - 48.008 mm)**	-
Crankshaft	A - Marking	Main Journal O.D.	**1.6140 - 1.6143" (40.996 - 41.004 mm)**	**1.6129" (40.970 mm)**
	B - Marking	Main Journal O.D.	**1.6137 - 1.6140" (40.988 - 40.995 mm)**	**1.6129" (40.970 mm)**
	C - Marking	Main Journal O.D.	**1.6134 - 1.6137" (40.980 - 40.987 mm)**	**1.6129" (40.970 mm)**
	A - Marking	Rod Journal O.D.	**1.7715 - 1.7717" (44.995 - 45.002 mm)**	**1.7704" (44.968 mm)**
	B - Marking	Rod Journal O.D.	**1.7718 - 1.7720" (45.003 - 45.010 mm)**	**1.7707" (44.976 mm)**
	C - Marking	Rod Journal O.D.	**1.7721 - 1.7724" (45.011 - 45.019 mm)**	**1.7710" (44.984 mm)**
	Runout	MAG	-	**Less than .001″ (0.035 mm)**
		PTO	-	**.002″ (0.05 mm)**
Balance Shaft	Bearing Journal O.D. (Standard)		**1.4939 - 1.4946" (37.946 - 37.962 mm)**	**1.4921" (37.900 mm)**

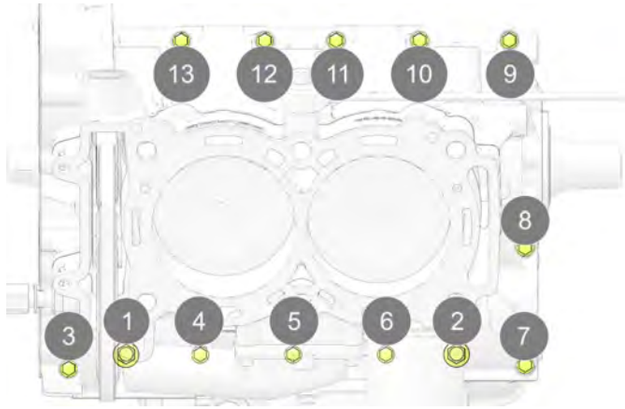
ENGINE TORQUE SPECIFICATIONS

CRANKCASE - LOWER



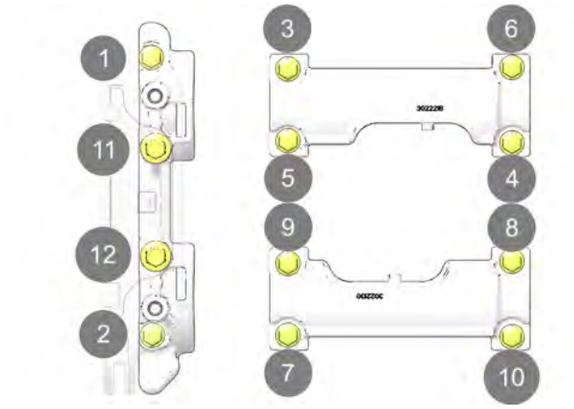
M10 Bolts:	**Step 1: 9 ft-lb (12 Nm)** **Step 2: 21 ft-lb (28 Nm)** **Step 3: Tighten add'n 90°**
M8 Bolts:	**26 ft-lb (35 Nm)**
M6 Bolts:	**9 ft-lb (12 Nm)**

CRANKCASE - UPPER



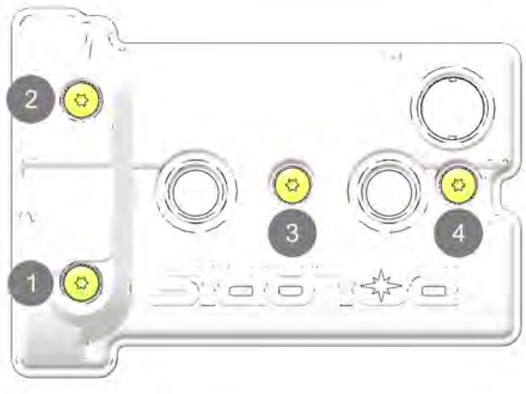
M8 Bolts:	**26 ft-lb (35 Nm)**
M6 Bolts:	**9 ft-lb (12 Nm)**

CAM CARRIER



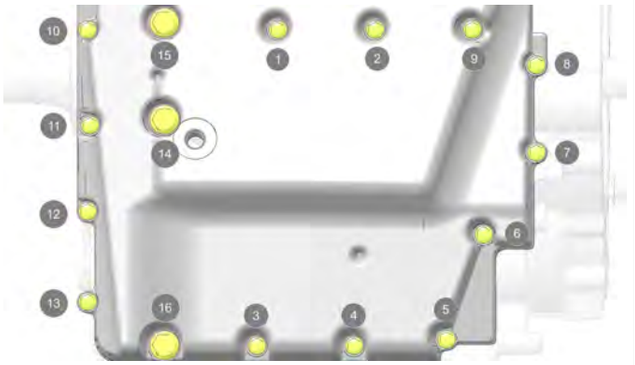
Camshaft Carrier Bolts	**7 ft-lb (10 Nm)**

VALVE COVER



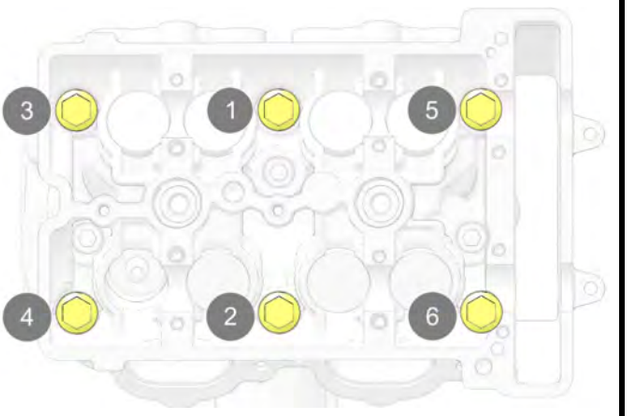
Valve Cover Bolts	**7 ft-lbs (10 Nm)**

SUMP COVER / OIL PAN



M8	**26 ft-lb (35 Nm)**
M6	**9 ft-lb (12 Nm)**

CYLINDER HEAD

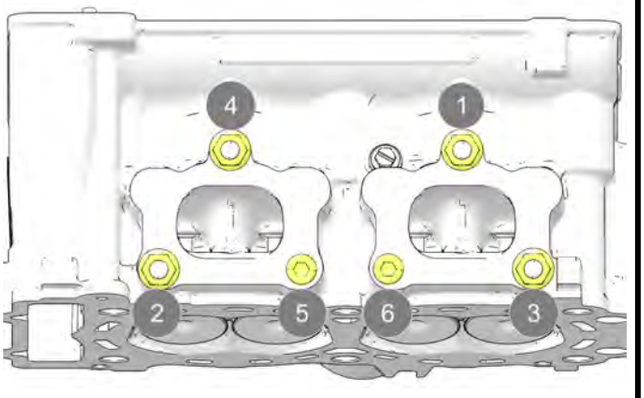


Cylinder Head Bolts	**Torque in sequence** **Step 1: 13 ft-lbs (18 Nm)** **Step 2: 26 ft-lb (35 Nm)** **Step 3: Additional 180°** **Step 4: Additional 180°** **Step 5: M6 bolts: 7 ft-lb (10 Nm)**

STATOR COVER

Stator Cover Bolts	**9 ft-lb (12 Nm)**

HEAD PIPE / TURBO



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

INTAKE / EXHAUST SYSTEM

INTAKE / TURBO SYSTEM OVERVIEW

⚠ CAUTION

The turbocharger / exhaust system generates extreme heat and house rotating parts which can cause severe injury and burns. Never touch any part of the turbocharger / exhaust system while the engine is running or until the engine has been shut off and been allowed to sufficiently cool. Do not allow objects such as clothing, hair or body parts to come into contact with or enter the compressor or turbine housing while the engine is running.

The turbocharger uses the energy of expanding exhaust gases exiting the engine to power a turbine and compressor. Intake air is drawn into the compressor impeller and compressed before entering the engine. The intake compressor is connected by a common shaft with the exhaust turbine. The shaft's bearings are lubricated with engine oil.

Because of the precise manufacturing tolerances and shaft balancing, turbocharger disassembly is never recommended. Never attempt to remove carbon build-up from the turbine blades.

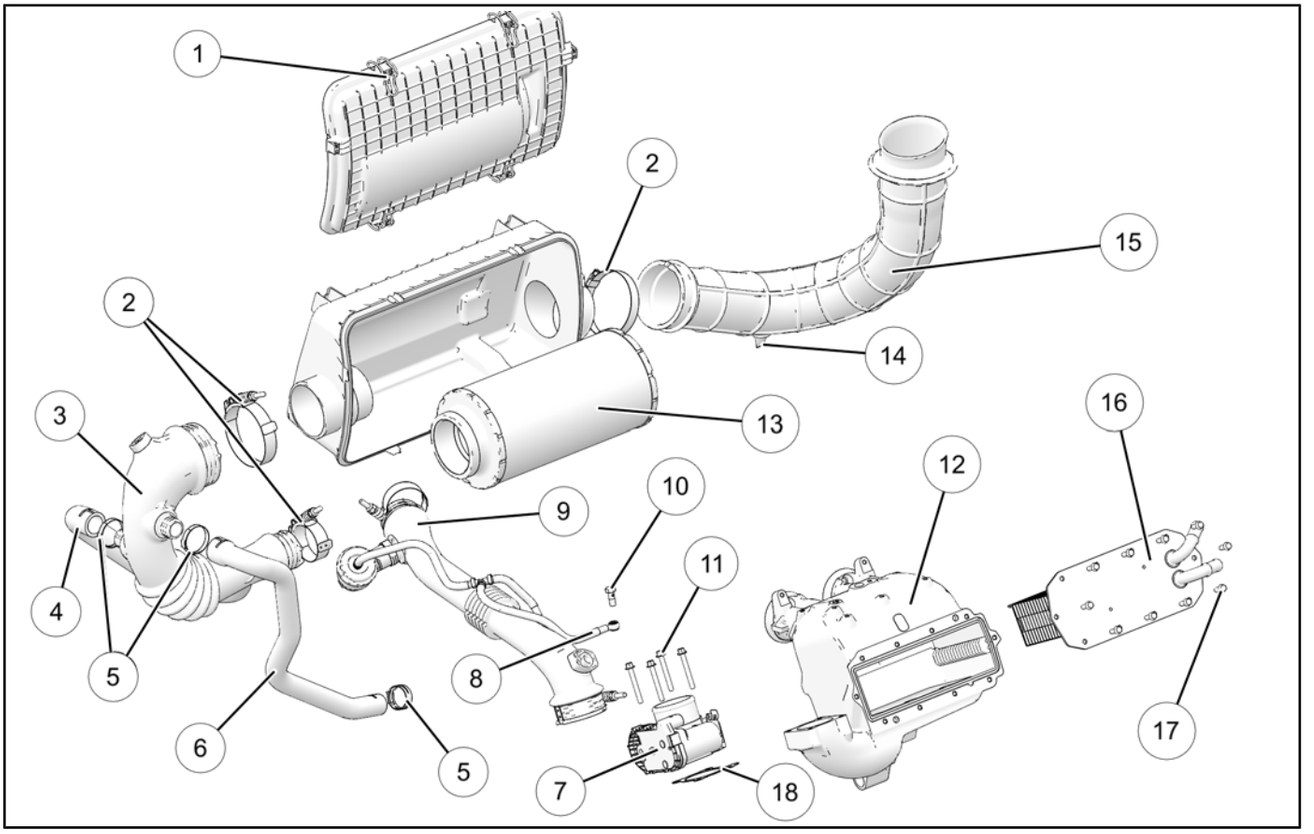
The ambient pressure sensor relays the absolute outside air pressure to the ECU. The ECU uses this information to determine the vehicle's operating altitude.
The boost pressure sensor is located on the boost duct just before the throttle body. The ECU uses this sensor to determine the actual absolute charged air pressure within the intake system and if boost pressure is too high, the ECU will control the boost control solenoid to move the actuator to open the wastegate. No boost pressure is being generated at idle so the boost pressure sensor should read close to barometric pressure.
The manifold pressure sensor senses the air pressure that is going into the engine.

The boost control valve allows the ECU to control the amount of boost pressure within the induction system. Boost control is accomplished by pulsing the valve at different frequencies (pulse width modulate) depending on the amount of boost pressure within the induction system. If the ECU determines that the targeted boost pressure has been obtained, the ECU will trigger the pulse valve so that a certain level of compressor pressure is routed to the wastegate actuator. Doing so activates the wastegate so that a proportion of exhaust gas bypasses the turbine. The boost control valve vents to atmosphere when building boost. If the vent hose to atmosphere is plugged, an underboost code will set.

The wastegate actuator is a mechanical device that houses a bellows, pre-load spring, and actuator arm. The wastegate actuator is responsible for opening and closing the turbocharger's internal wastegate door. When the door is closed, all of the engine's exhaust gases are routed to the turbine. This action increases turbine speed and boost pressure. When the door is opened, some exhaust gas is allowed to immediately exit into the exhaust system, bypassing the turbine. This action decreases turbine speed and boost pressure. If the wastegate actuator arm is removed or disabled, the vehicle will go into limp home mode. if the actuator arm is out of adjustment, codes will set.

The Blow Off/Dump Valve help prevent turbo compressor load surging. When the throttle is suddenly released, intake pressure is released through the dump valve to help the turbo spool back up when throttle is depressed. A change of approximately .25 bar (3.6 PSI) sensed at the dump valve will cause it to open. The dump valve is normally open at idle.

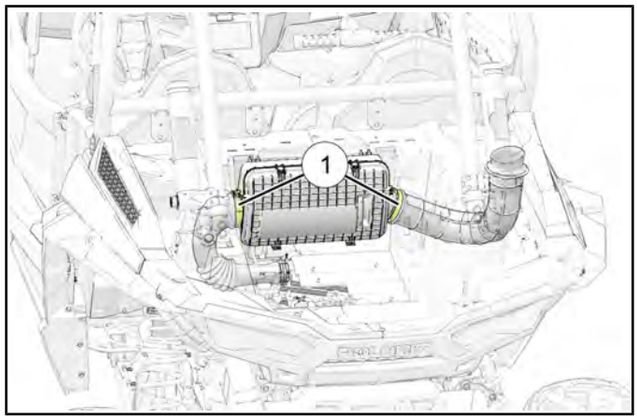
ENGINE AIR INTAKE ASSEMBLY VIEW



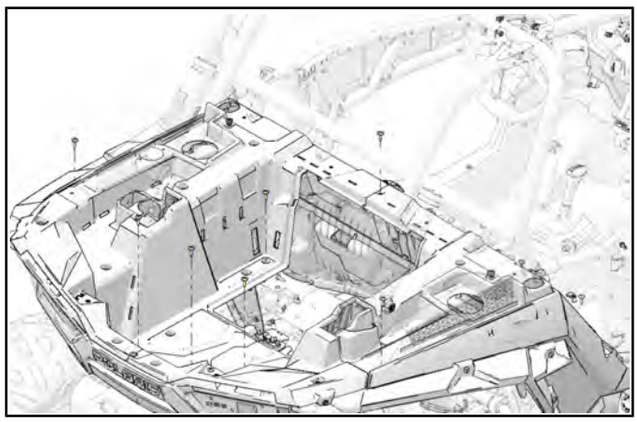
① Air Box Latch	⑦ Throttle Body	⑬ Air Filter
② Intake Clamp **35 in-lb (4 Nm)**	⑧ Manifold Pressure Reference Hose	⑭ Intake Drain
③ Intake Air Duct	⑨ Charge Air Duct	⑮ Air Box Inlet Hose
④ Blow Off Valve Vent Hose	⑩ Banjo Bolt **7 ft-lb (10 Nm)**	⑯ Charge Air Cooler Cover
⑤ Oetiker Clamp	⑪ Throttle Body Bolts **7 ft-lb (10 Nm)**	⑰ Cover Bolts **Torque in sequence to 7 ft-lb (10 Nm)**
⑥ Engine Breather Hose	⑫ Intake Manifold	⑱ Throttle Body Gasket

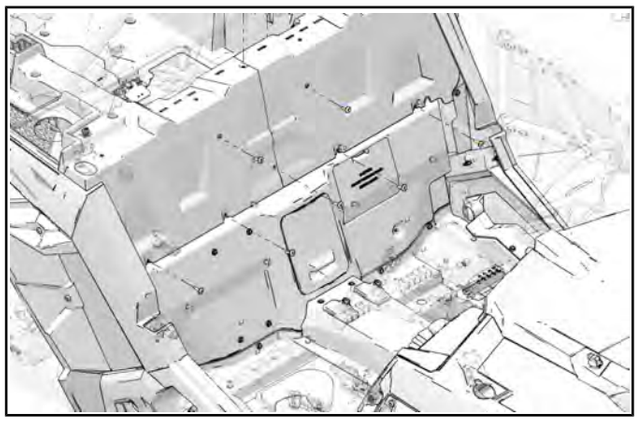
AIR BOX REMOVAL

1. Remove the seats.
2. Remove the engine access panel.
3. Loosen the band clamps ① retaining the intake hoses to the air box.



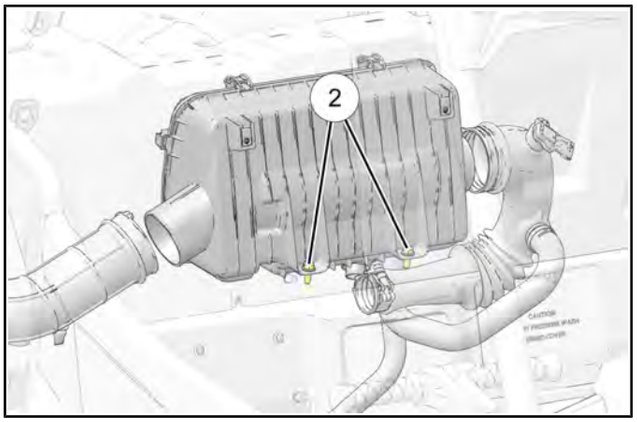
4. Remove the fasteners retaining the cargo box.





NOTICE
The cargo box only needs to be lifted up slightly to gain access to the air box fasteners. The cargo box or cab frame does not need to be removed.

5. Lift the cargo box nearest to the front of the vehicle so you can access the lower air box mounting bolts ② and remove the two bolts.



6. Remove the air box through the cargo box access panel.

AIR BOX INSTALLATION

1. Install the air box through the cargo box access panel.
2. Install the intake hoses onto the air box. Tighten hose clamps to specification.

TORQUE
Intake Hose Clamps: **35 in-lb (4 Nm)**

3. Lift the cargo box enough to access the lower air box mounting points. Install fasteners and torque to specification.

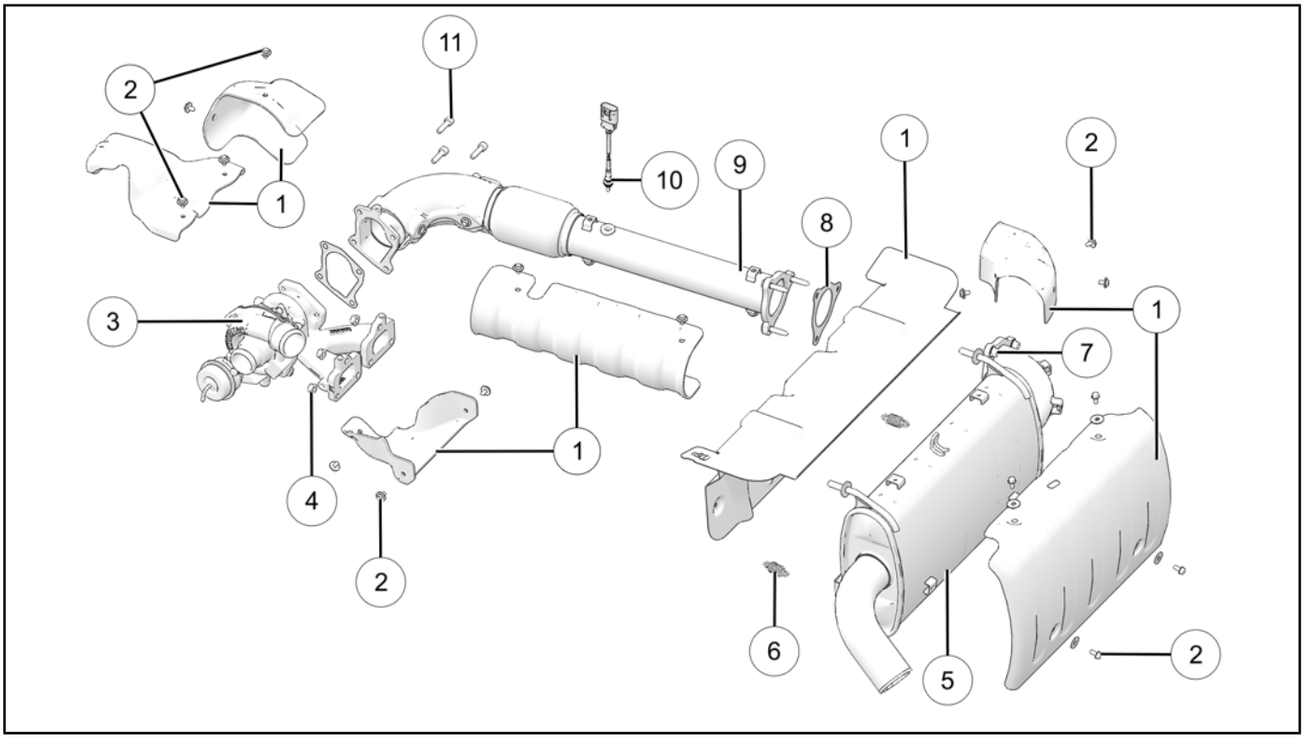
TORQUE
Lower Air Box Mounting Fasteners: **8 ft-lb (11 Nm)**

4. Install the cargo box fasteners previously removed. Torque fasteners to specification.

TORQUE
Cargo Box Fasteners: **8 ft-lb (11 Nm)**

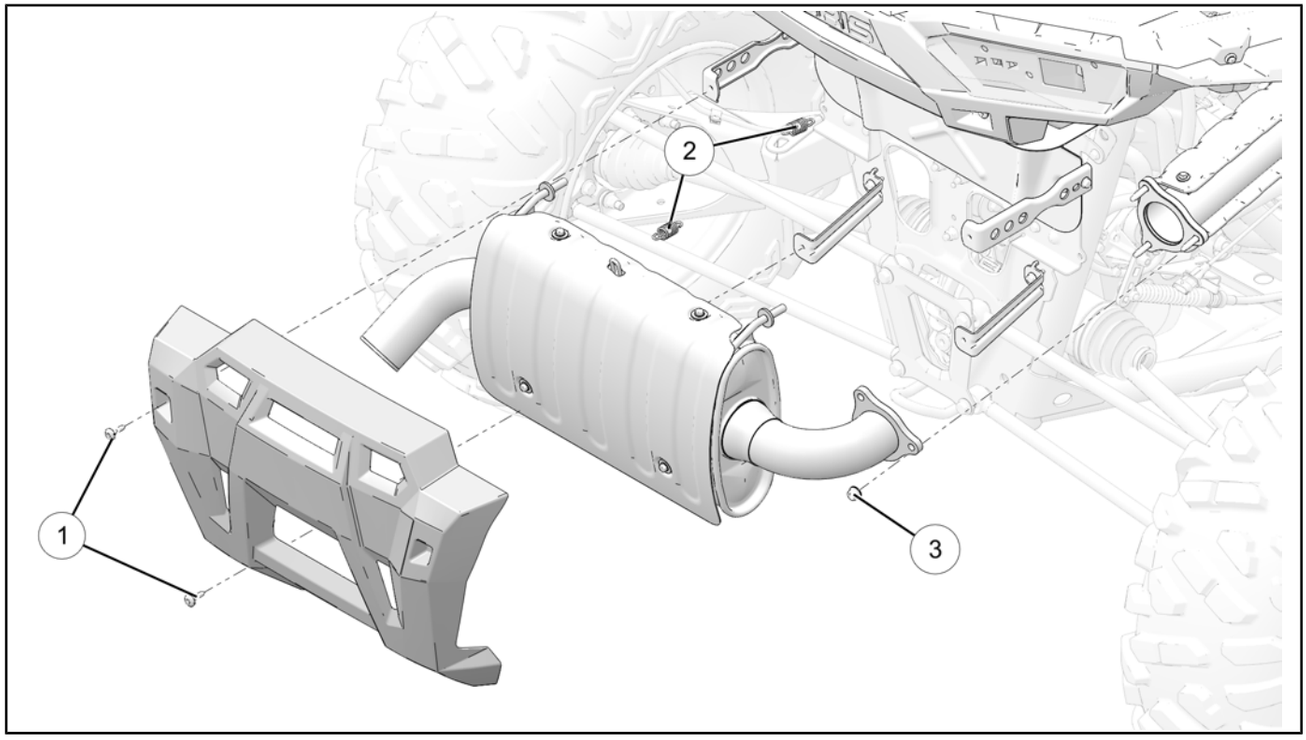
5. Install engine access panel.
6. Install both seats.

EXHAUST ASSEMBLY VIEW



① Heat Shield	⑤ Muffler	⑨ Exhaust Pipe
② Heat Shield Fasteners **8 ft-lb (11 Nm)**	⑥ Muffler Spring	⑩ Oxygen Sensor **13 ft-lb (18 Nm)**
③ Turbo / Head Pipe Assembly	⑦ Exhaust Pipe Nuts **18 ft-lb (24 Nm)**	⑪ Exhaust Pipe Fasteners **18 ft-lb (24 Nm)**
④ Head Pipe Fasteners **18 ft-lb (24 Nm)**	⑧ Exhaust Gasket	

MUFFLER REMOVAL



1. Remove the four fasteners ① retaining the muffler cover / rear fascia .
2. Remove the two muffler springs ②.
3. Remove the three fasteners ③ retaining the muffler to the exhaust pipe.
4. Pull muffler towards the rear of the vehicle to remove it from the mounting grommets.

MUFFLER INSTALLATION

1. Install the muffler studs into the mounting grommets on the chassis.
2. Install a new muffler gasket and install the three fasteners retaining the muffler to the exhaust pipe. Torque fasteners to specification.

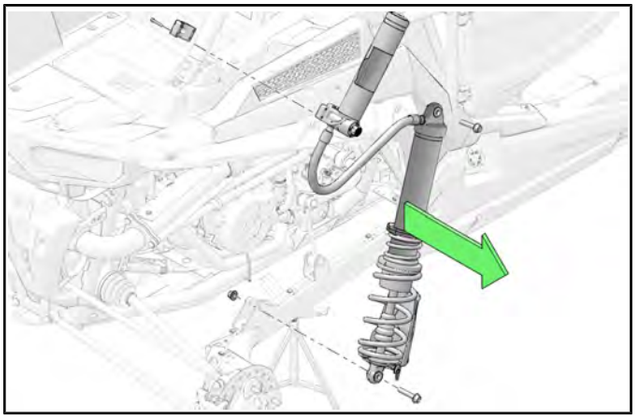
TORQUE
Exhaust Pipe Fasteners: **18 ft-lb (24 Nm)**

3. Install the two muffler springs.
4. Install the rear fascia / muffler cover. Torque fasteners to specification

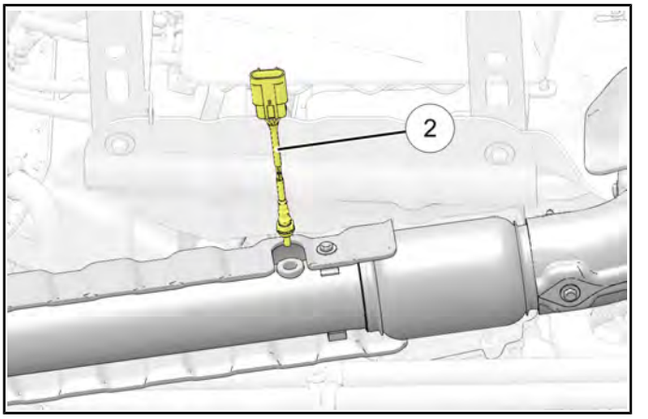
TORQUE
Rear Fascia / Muffler Cover Screws: **8 ft-lb (11 Nm)**

EXHAUST PIPE REMOVAL

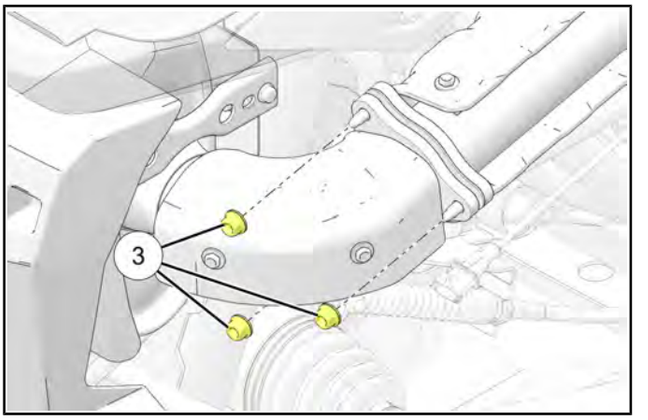
1. Lift and secure the vehicle.
2. Remove the right rear shock assembly.



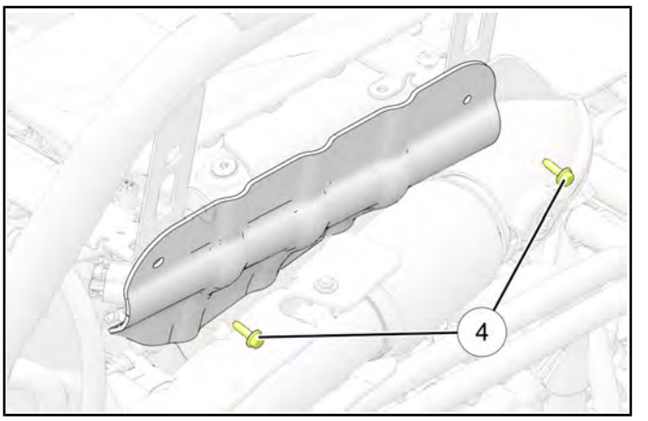
3. Disconnect and remove the oxygen sensor ②.



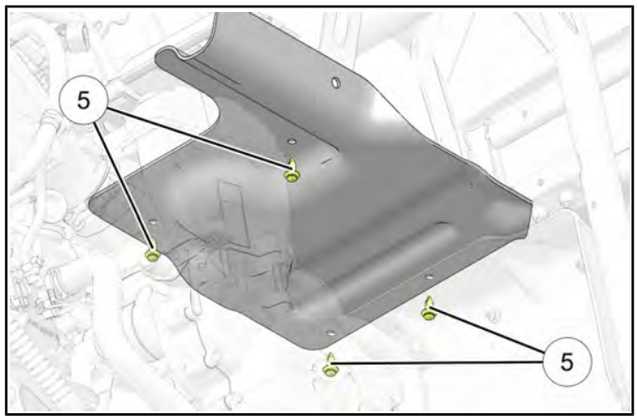
4. Remove the three fasteners ③ retaining the muffler to the exhaust pipe.



5. Remove two fasteners ④ retaining the engine heat shield above O2 sensor.

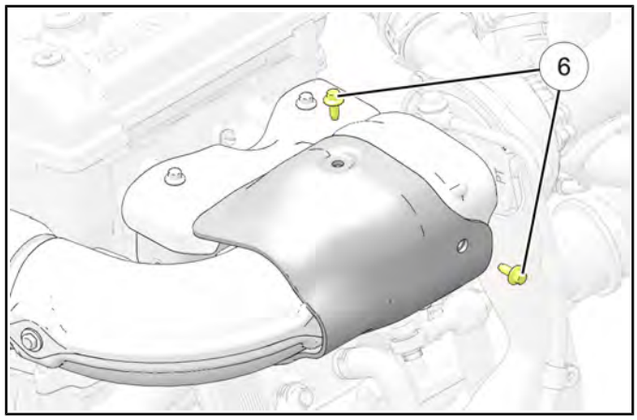


6. Remove the four fasteners ⑤ retaining the heat shield above the valve cover.

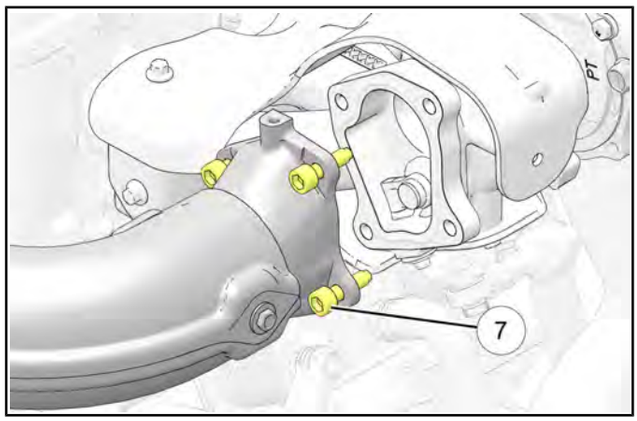


NOTICE
Front fasteners are plastic rivets and rear fasteners are bolt/washer/nut.

7. Remove the two fasteners ⑥ retaining the heat shield to the exhaust pipe / turbo joint.



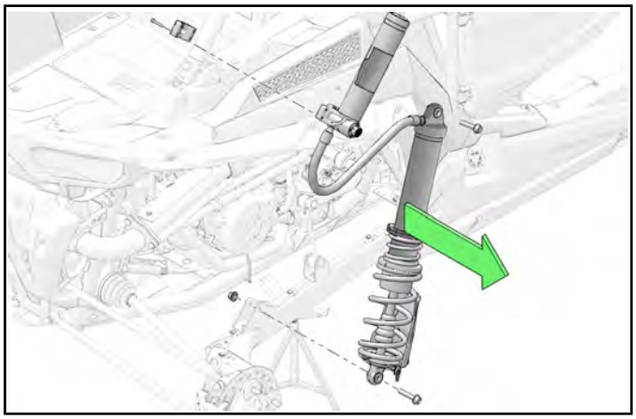
8. Remove the four fasteners ⑦ retaining the exhaust pipe to the turbocharger.



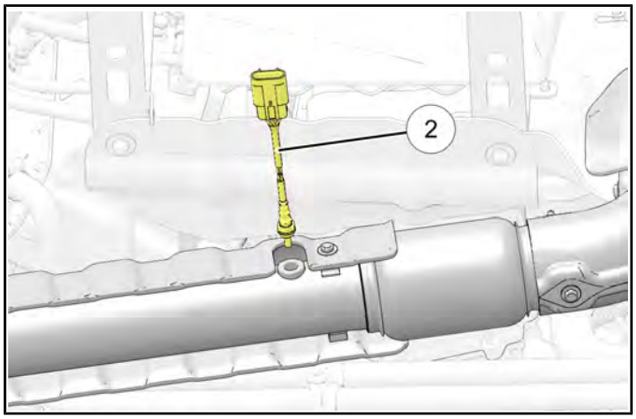
9. Remove the exhaust pipe from the chassis.
10. If replacing the exhaust pipe, remove the heat shielding from the pipe.

HEAD PIPE / TURBO REMOVAL

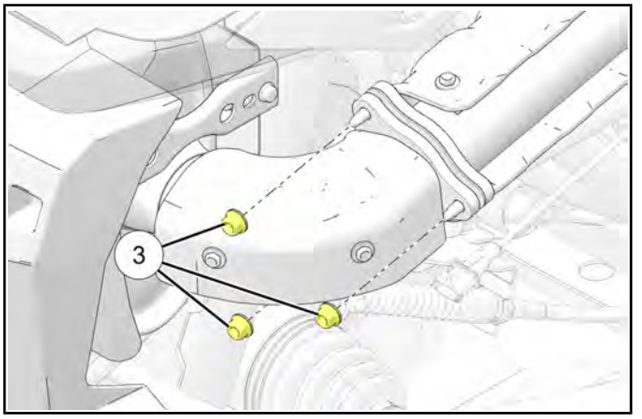
1. Lift and secure the vehicle.
2. Remove the right rear shock assembly.



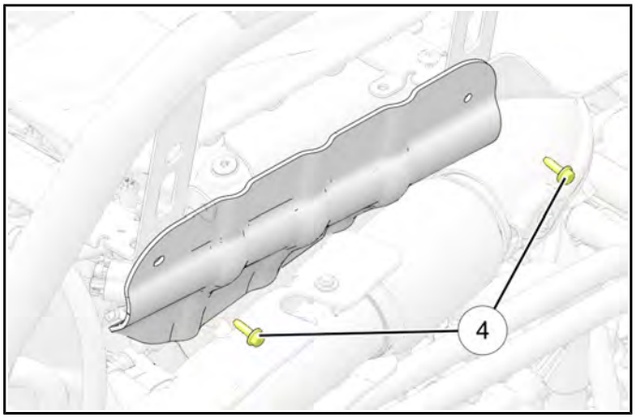
3. Disconnect and remove the oxygen sensor ②.



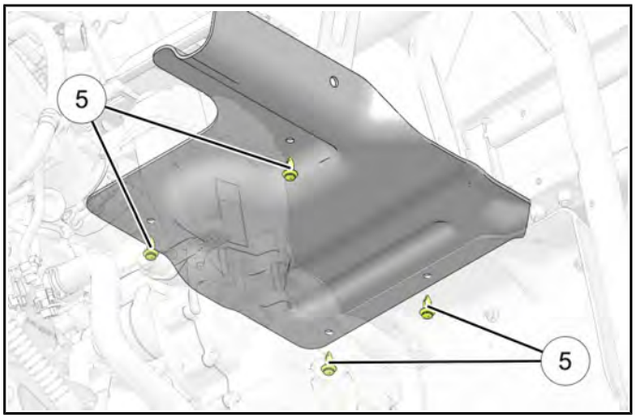
4. Remove the three fasteners ③ retaining the muffler to the exhaust pipe.



5. Remove two fasteners ④ retaining the engine heat shield above O2 sensor.

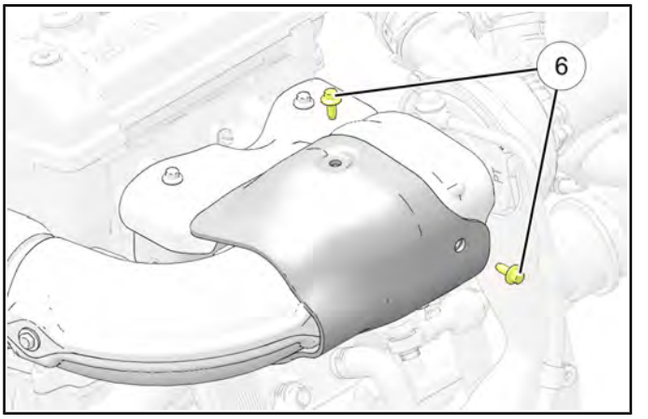


6. Remove the four fasteners ⑤ retaining the heat shield above the valve cover.

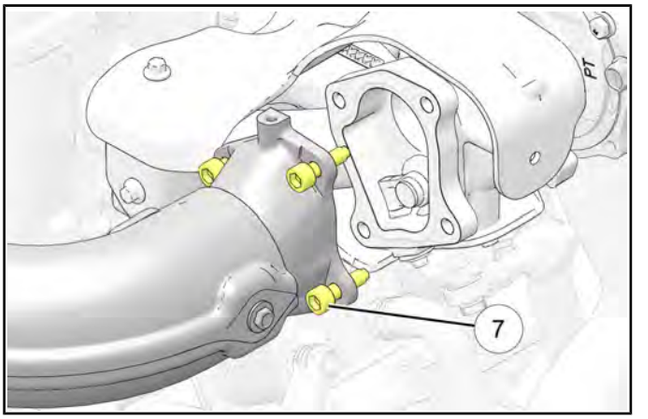


NOTICE
Front fasteners are plastic rivets and rear fasteners are bolt/washer/nut.

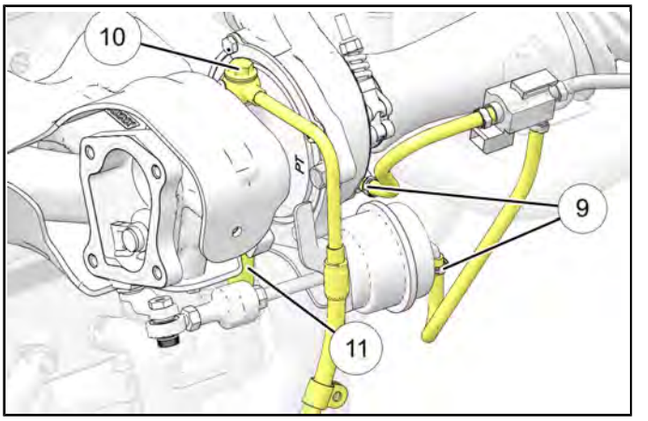
7. Remove the two fasteners ⑥ retaining the heat shield to the exhaust pipe / turbo joint.



8. Remove the four fasteners ⑦ retaining the exhaust pipe to the turbocharger.



9. Remove the exhaust pipe from the chassis.
10. Remove the two hoses ⑨ from the turbo going to the boost control valve.

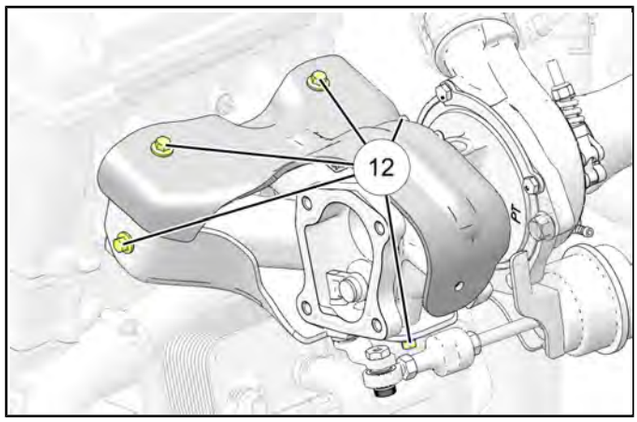


11. Remove the banjo bolt ⑩ retaining the oil inlet hose and remove the oil drain hose ⑪.

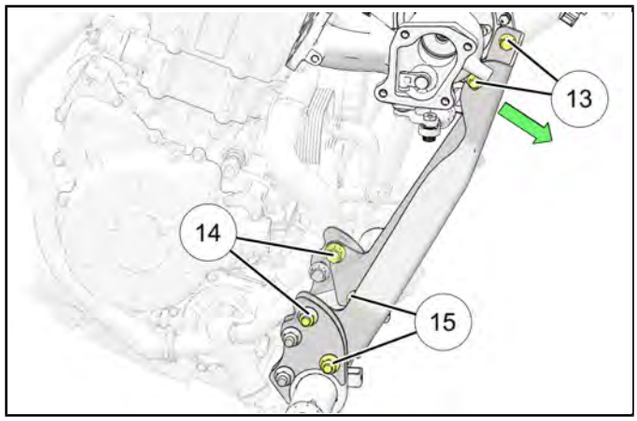
IMPORTANT

The oil line sealing washers MUST be replace any time the oil line/fitting is removed. Use only the recommended washers shown in the Polaris Electronic Parts Catalog.

12. Remove the fasteners ⑫ retaining the heat shields to the head pipe / turbo assembly and remove the shields.



13. Remove the fasteners ⑬ retaining the turbo to the mounting bracket.

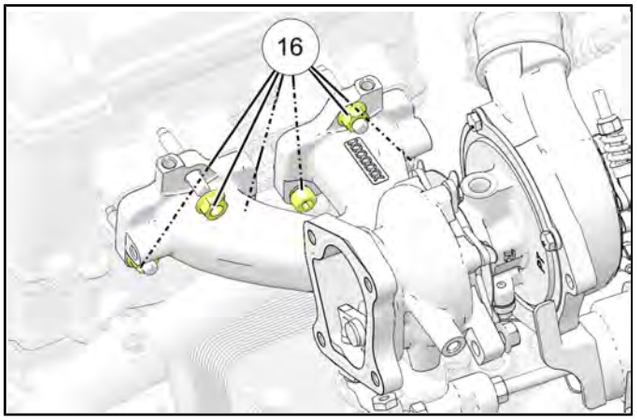


14. Remove the lower rear turbo bracket fasteners ⑭ and loosen the front fasteners ⑮. Pivot the top of the bracket towards the front of the vehicle.

NOTICE

The front fasteners only need to be loosened to allow the bracket to pivot towards the front of the vehicle for turbo removal.

15. Remove the six fasteners ⑯ retaining the head pipe to the cylinder head.



16. Slide the head pipe off the studs and remove the head pipe/turbo from the vehicle.

CAUTION

Do not handle the turbo/head pipe assembly by the actuator rod. The rod will become damaged and the turbo will not function properly.

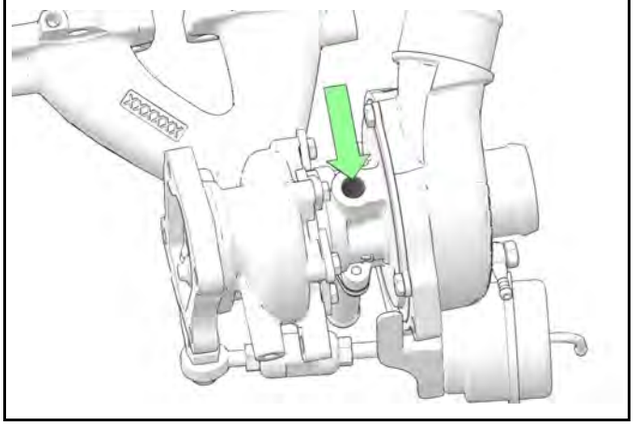
HEAD PIPE / TURBO INSTALLATION

CAUTION

Do not handle the turbo/head pipe assembly by the actuator rod. The rod will become damaged and the turbo will not function properly.

IMPORTANT

If replacing the turbo assembly, pour a few drops of new engine oil down the oil supply hole and rotate the turbo by hand. Never used compressed air on the turbo assembly to rotate the vanes.



1. Install a new head pipe gasket and install the head pipe/turbo assembly on the cylinder head studs.
2. Install the six fasteners retaining the head pipe to the cylinder head. Torque fasteners to specification.

TORQUE

Head Pipe Screws:
17 ft-lb (23 Nm)

Head Pipe Nuts:
26 ft-lb (35 Nm)

3. Install the lower rear turbo bracket fasteners and tighten the front fasteners. Torque fasteners to specification.

TORQUE

Turbocharger Bracket Lower Fasteners:
42 ft-lb (57 Nm)

4. Install the fasteners retaining the turbo to the mounting bracket. Torque fasteners to specification.

TORQUE

Turbocharger Mounting Fasteners:
18 ft-lb (24 Nm)

5. Install the fasteners retaining the heat shields to the head pipe / turbo assembly. Torque fasteners to specification.

TORQUE

Heat Shield Fasteners:
8 ft-lb (11 Nm)

6. Install the turbocharger oil drain hose and install the banjo bolt retaining the oil inlet hose. Torque banjo bolt to specification.

IMPORTANT

The oil line sealing washers MUST be replace any time the oil line/fitting is removed. Use only the recommended washers shown in the Polaris Electronic Parts Catalog.

TORQUE

Turbo Oil Line Banjo Bolt:
33 ft-lb (45 Nm)

7. Install the two hoses from the turbo going to the wastegate solenoid. Install new Oetiker clamps.
8. Install the four fasteners retaining the exhaust pipe to the turbocharger. Torque fasteners to specification.

IMPORTANT

Apply anti-seize on exhaust pipe to turbo joint and fasteners.

TORQUE

Exhaust Pipe to Turbo Fasteners:
18 ft-lb (24 Nm)

9. Install the two fasteners retaining the heat shield to the exhaust pipe / turbo joint.
10. Install two plastic rivets and two screws retaining the heat shield above the valve cover.
11. Install two fasteners retaining the engine heat shield above O2 sensor. Torque heat shield fasteners to specification.

TORQUE

Heat Shield Fasteners:
8 ft-lb (11 Nm)

12. Install the three fasteners retaining the muffler to the exhaust pipe. Torque fasteners to specification.

TORQUE
Exhaust Pipe to Muffler Fasteners: **18 ft-lb (24 Nm)**

13. Connect O2 sensor harness.
14. Install the right rear shock assembly. Torque fasteners to specification.

TORQUE
Shock Mounting Fasteners: **70 ft-lbs (95 Nm)** Shock Reservoir Mounting Fasteners: **35 in-lb (4 Nm)**

15. Install the shock access panel. Torque fastener to specification.

TORQUE
Shock Access Panel: **35 in-lb (4 Nm)**

EXHAUST PIPE INSTALLATION

1. Install the head shielding and O2 sensor on the exhaust pipe. Torque to specification.
2. Install the exhaust pipe into the chassis and first install the exhaust pipe studs through the muffler flange and then install the exhaust pipe fasteners retaining the pipe to the turbocharger. Torque fasteners to specification.
3. Install the two fasteners retaining the heat shield to the exhaust pipe / turbo joint. Torque fasteners to specification.
4. Install the two plastic rivets and two screws retaining the heat shield above the valve cover. Torque fasteners to specification.
5. Install the two fasteners retaining the heat shield above the O2 sensor. Torque fasteners to specification.
6. Connect the O2 sensor harness and secure the wiring.
7. Install the right rear shock assembly. Torque fasteners to specification.

TORQUE
Oxygen Sensor: **13 ft-lb (18 Nm)** Exhaust Heat Shield Fasteners: **8 ft-lb (11 Nm)** Exhaust Pipe to Turbo Fasteners: **18 ft-lb (24 Nm)** Exhaust Pipe to Muffler Fasteners: **18 ft-lb (24 Nm)** Rear Shock Fasteners: **70 ft-lbs (95 Nm)**

TURBOCHARGER SERVICE

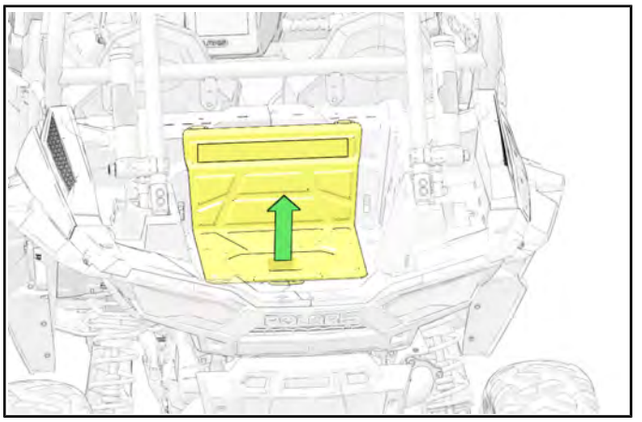
TURBOCHARGER INSPECTION

Conditions that warrant turbocharger inspection:

- Decreased horsepower and performance
- Slower response and power delivery (sluggish or “laggy” feel)
- Audible noise from turbocharger
- Blue smoke emitted from exhaust

IMPORTANT
It is recommended that the air intake filter and pre-filter be inspected daily.

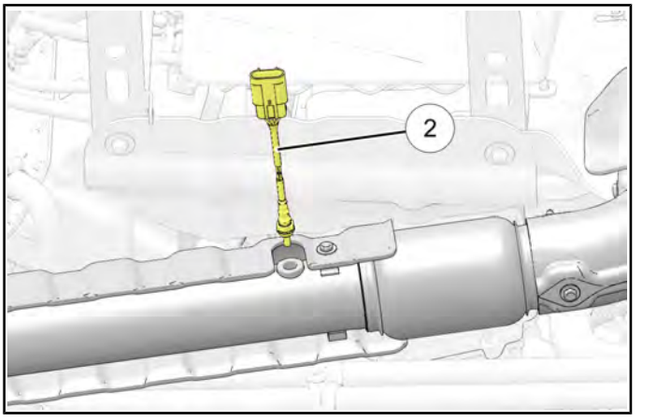
1. Remove cargo box access panel.



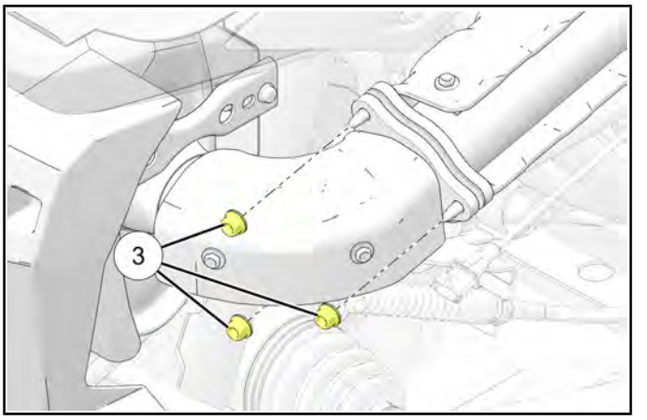
2. Disengage the for air box cover latches and remove the air filter.
3. Inspect air filter and the inside of the air box for dirt or foreign debris. If filter is found to be clogged, replace the filter.

CAUTION
A clogged or restrictive air filter or intake tract can cause excessive turbocharger speeds and premature wear.

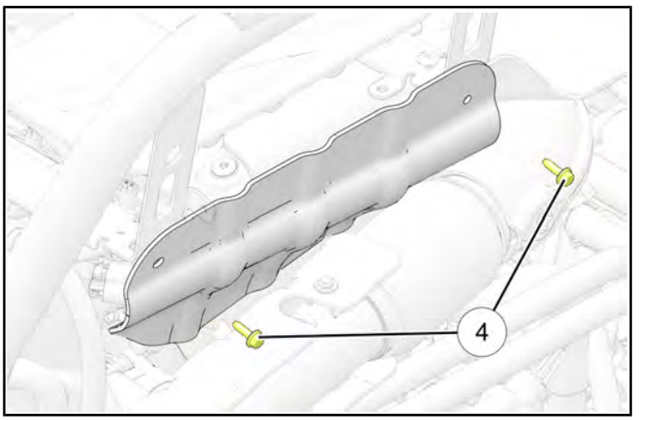
4. Disconnect and remove the oxygen sensor ②.



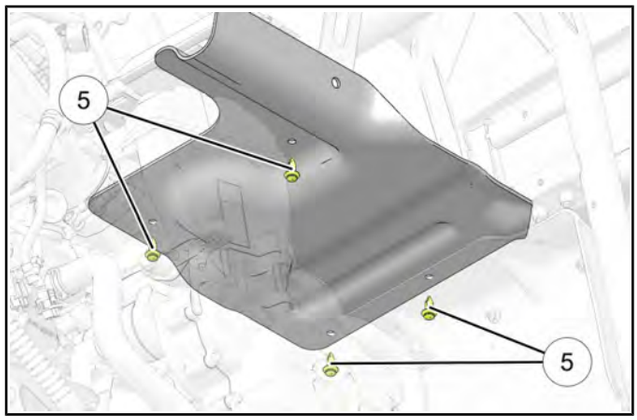
5. Remove the three fasteners ③ retaining the muffler to the exhaust pipe.



6. Remove two fasteners ④ retaining the engine heat shield above O2 sensor.



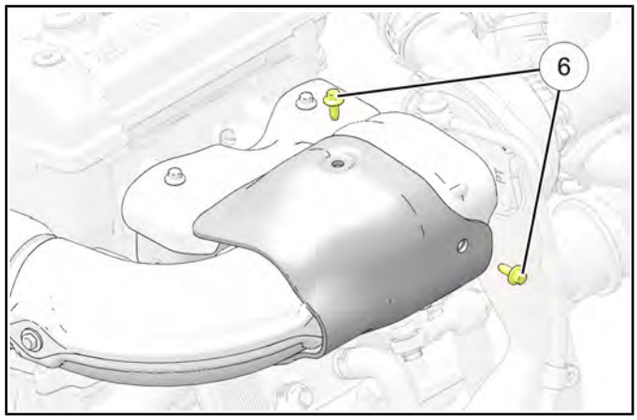
7. Remove the four fasteners ⑤ retaining the heat shield above the valve cover.



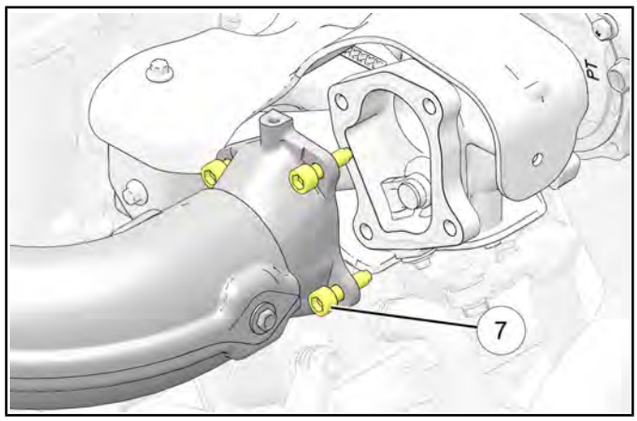
NOTICE

Front fasteners are plastic rivets and rear fasteners are bolt/washer/nut.

8. Remove the two fasteners ⑥ retaining the heat shield to the exhaust pipe / turbo joint.



9. Remove the four fasteners ⑦ retaining the exhaust pipe to the turbocharger.

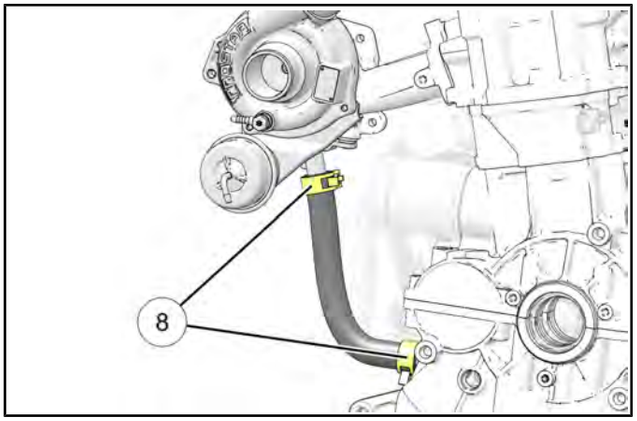


10. Remove the exhaust pipe from the chassis.
11. Remove turbocharger oil drain hose and inspect. If the inner diameter has been deformed or obstructed, or if any kinking or cracking is present, place the hose.

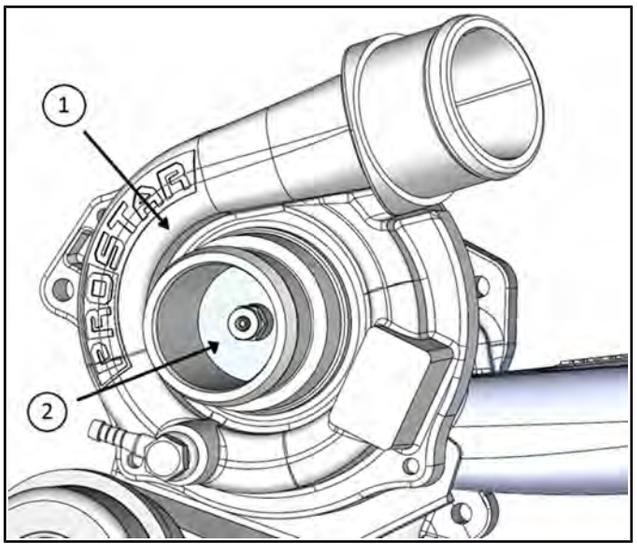
NOTICE

Ensure the oil drain hose located between the turbocharger and oil pan is not kinked or obstructed in any way.

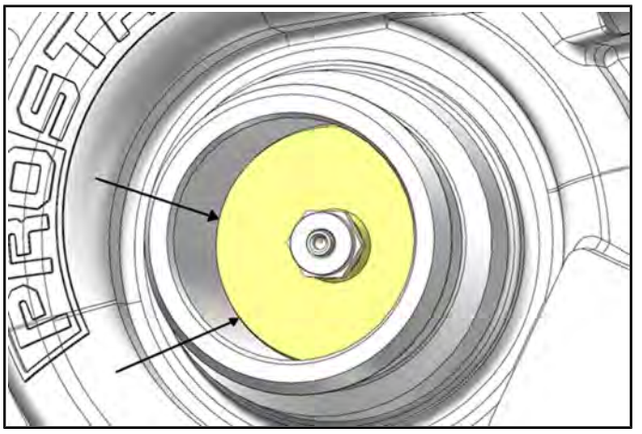
12. Inspect for any oil seepage or leaking from either end of the oil drain hose. Check tightness and condition of both hose spring clamps ⑧. Replace if necessary.



13. With the use of a flashlight, inspect the compressor housing inlet ① and compressor wheel ②.



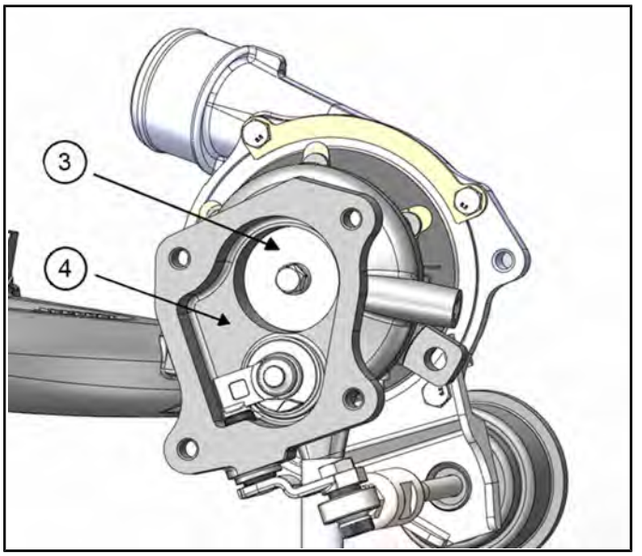
14. Look for any signs of foreign object damage or bending on the compressor wheel inducer blades, and check the compressor housing profile for signs of contact between the housing and wheel.



NOTICE

If compressor wheel damage is observed, inspect intake pipe and associated components for potential debris. Inspect for places where unfiltered air may be let into the intake tract. Make note of any possible sources of damaging material.

15. With the use of a flashlight, inspect the turbine wheel ③ and inner turbine housing ④ on the opposite side of the turbocharger.



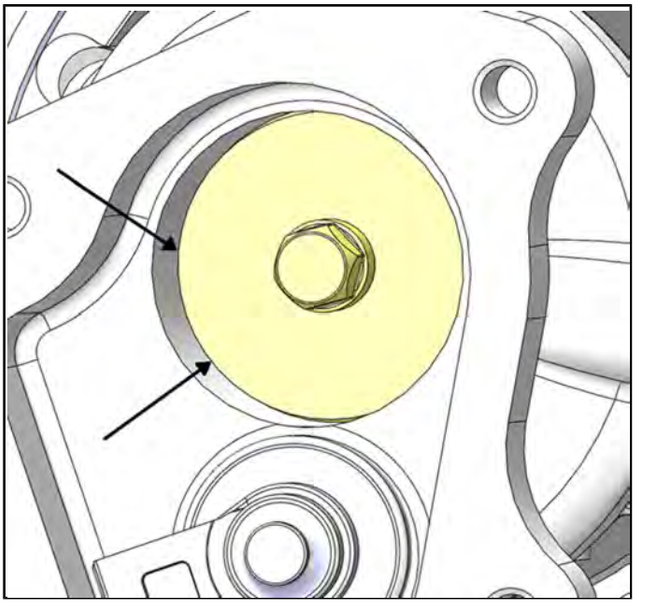
16. Look for any signs of contact between the turbine wheel and the turbine housing profile. Check for any damage or deformation of the turbine exducer blades.

17. Use an angled feeler gauge to inspect the clearance between the bolt head and drain tube flange. Loosen and move the drain tube as needed to ensure there is a minimum clearance of 0.010″ (.254 mm).

NOTICE

If you are not able to achieve the minimum clearance, the turbocharger assembly would need to be replaced.

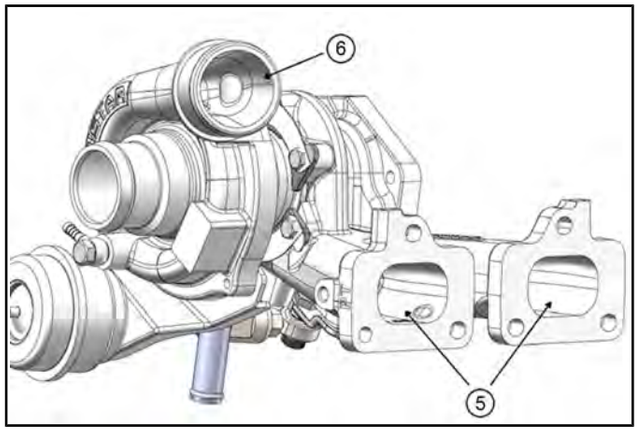
18. Inspect turbine housing profile and turbine housing discharge cavity / pipe for signs of any oil residue.



NOTICE

If any oil or oily residue is seen in the turbine housing discharge or exhaust components, remove turbocharger and inspect more closely.

19. Inspect turbine inlet runners ⑤ for the presence of oily residue. Inspect compressor discharge outlet ⑥ for any oil.



NOTICE

If any oil is present in the turbine manifold inlet runners or cylinder head exhaust ports, the source of oil is likely engine related.

If any oil is present in the compressor inlet, the source of oil is likely related to the crankcase ventilation system.

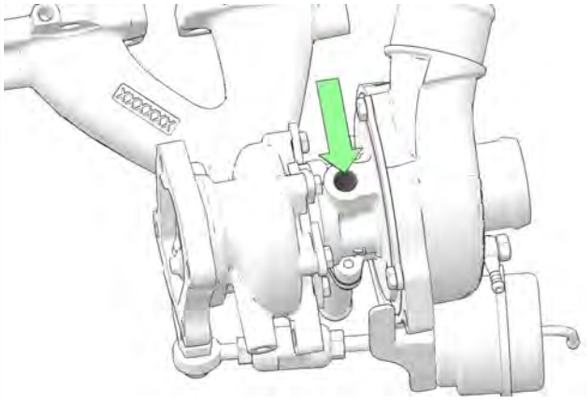
20. A compressor side oil leakage issue is likely if oil is present in the compressor discharge, but not in the compressor inlet. Similarly, it can be assumed a turbine side oil leakage is likely if oil is present in the turbine discharge outlet, but not in the turbine inlet runners / exhaust ports.

NOTICE

Inspect the exhaust port flange surface for any signs of pre-turbine exhaust leakage.

IMPORTANT

If you are replacing the turbo, put some new engine oil down the supply hole and rotate turbo by hand. Do NOT use compressed air.

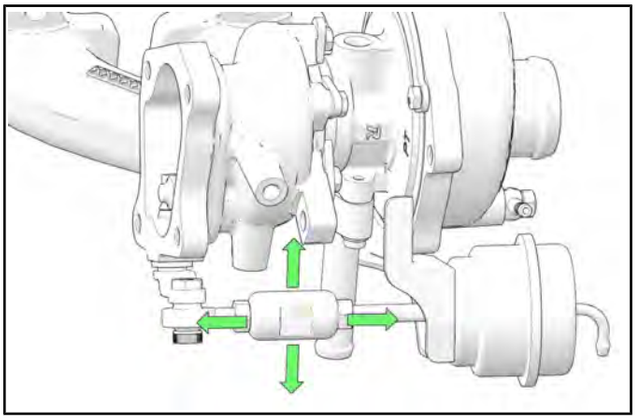


ACTUATOR / WASTEGATE INSPECTION

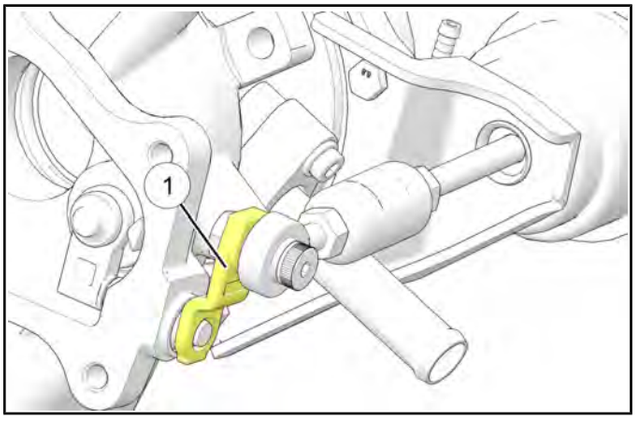
The actuator pod, actuator rod/linkage and internal wastegate flapper components, along with the boost control solenoid, are responsible for releasing pre-turbine exhaust pressure and limiting boost pressure. The actuator is located outside of the turbocharger, positioned below the unit with the actuator pod fastened to the compressor housing by M6 fasteners.

1. If a condition where little-to-no boost pressure is seen under wide open throttle, ensure that the actuator rod is still properly fastened, the flapper arm is still under tension from the actuator pod, and that no mechanical component failures have occurred.

2. Feel for any free-play on either end of the actuator rod. Ensure that the actuator crank arm is holding the internal wastegate disc firmly closed.



3. Using the turbine discharge flange as a mounting point, fasten a magnetic base dial indicator to the turbine housing, touching the dial indicator plunger to the outer wastegate crank arm ① in the axial direction so that the opening distance of the wastegate flapper valve is measured by the dial indicator.

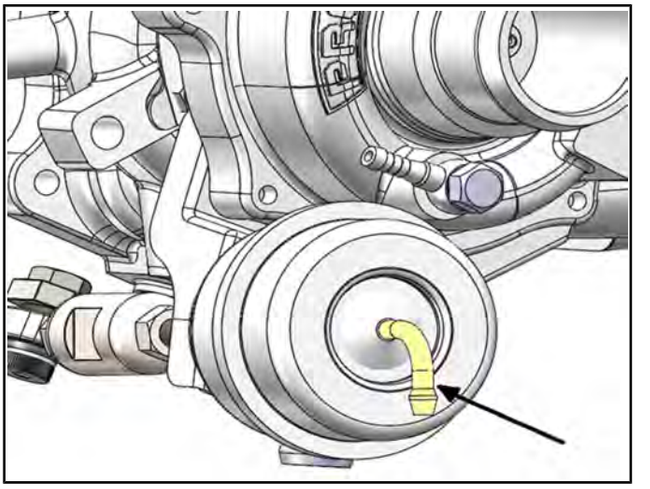


IMPORTANT

The location of the dial indicator plunger should be just below the crank arm upper taper, as close to the axis of the heim joint as possible.

4. Zero the indicator dial with the flapper in its natural resting position with no air pressure applied to the actuator pod.

5. With the use of an air regulator and pressure gauge, attach an air supply line to the actuator pod pressure reference port, located on the top of the canister.



6. Slowly apply pressure to the actuator, and watch the indicator dial. Once the indicator dial has indicated a displacement of .070″ (1.75 mm), observe the line pressure reading after the air pressure regulator.

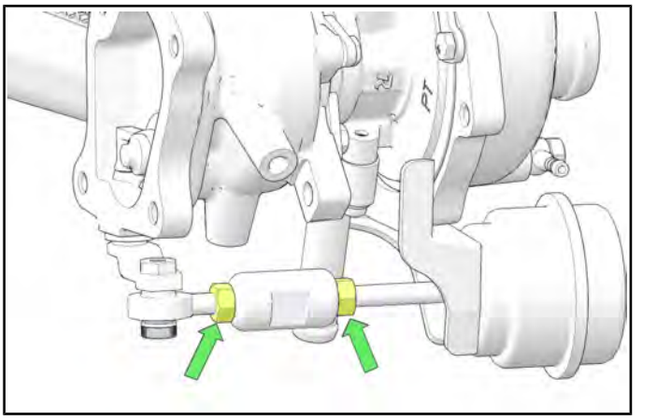
NOTICE

The intended actuator preload should result in a displacement of .070″ (1.75 mm) at 7 PSI supplied air pressure. Having a correctly preloaded actuator will help ensure correct turbocharger response and boost pressure.

MEASUREMENT

Actuator Preload
0.070” (1.75 mm) at 7 PSI (48.3 kPa)

7. To adjust actuator preload, start by loosening the two (13mm) lock nuts on the actuator rod, keeping in mind the actuator rod itself is a left hand thread.

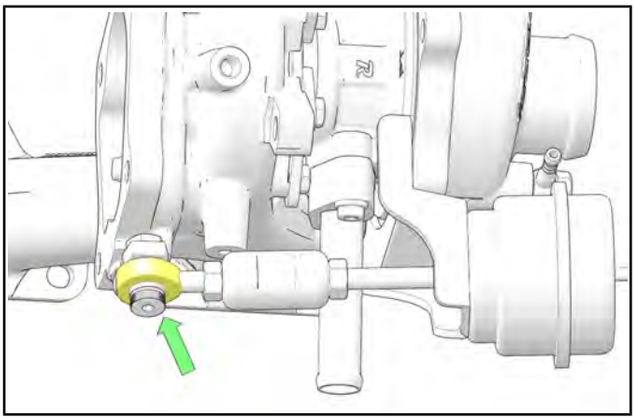


8. Using the same method of applying air pressure to the canister as previously mentioned, the large turnbuckle can be turned to adjust actuator preload, until the desired preload is met. This correct preload will result in .070″ (1.75 mm) of displacement on the wastegate flapper at a supplied pod pressure of 7 PSI. The nuts may be locked in place once again using the (17mm) flats found on the actuator rod turnbuckle.

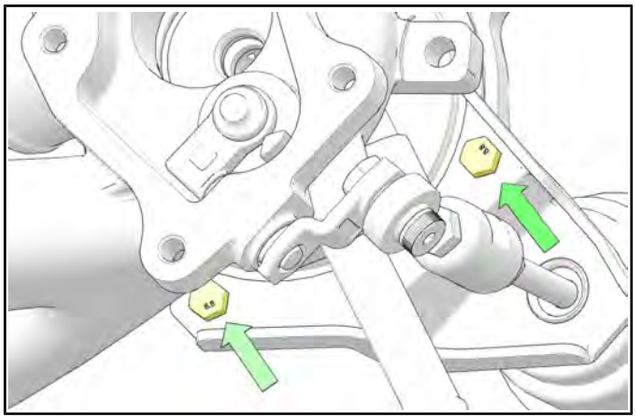
NOTICE
The preload may change when the lock nuts are torqued. Ensure the correct preload is still measured after locking the actuator rod turnbuckle in place.

ACTUATOR POD REMOVAL

1. Locate the actuator rod heim joint, located opposite to the actuator pod.
2. Holding the opposite 13mm hex nut, loosen the bolt securing the heim joint with a 4mm Allen key.



3. Remove both pieces to free the Heim joint from the assembly.
4. On the opposite end of the turbocharger, locate M6 10mm hex bolts that fasten the actuator pod bracket to the compressor housing, as well as the boost pressure reference hose on the top of the canister.



5. Remove the boost reference hose from the canister pod.
6. Remove the two mounting bolts, and the actuator pod assembly will be free from the turbocharger.

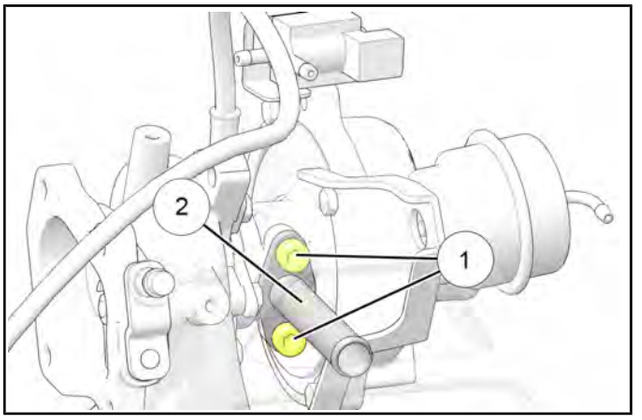
CAUTION
Do NOT hold turbocharger by the actuator rod. This may result in serious damage to the turbocharger and its components.

7. For assembly, reverse procedure. Torque fasteners to specification.

TORQUE
Actuator Rod Heim Joint Fasteners: **7 ft-lb (10 Nm)**

OIL DRAIN TUBE SERVICE

1. Remove the two fasteners ① retaining the oil drain tube ② to the turbocharger. Discard the fasteners.

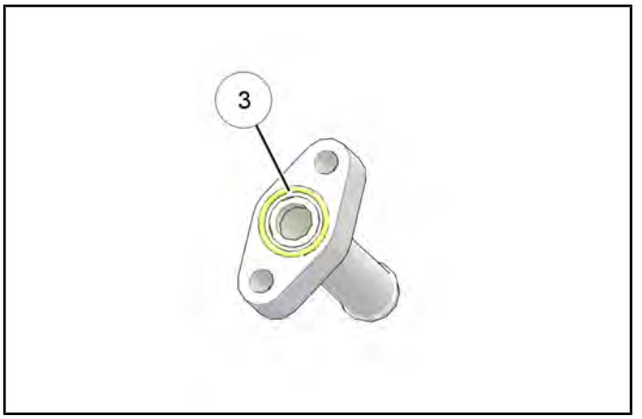


2. Inspect the drain tube to turbocharger mating surfaces. Ensure there is no damage to either surface (nicks/scratches). Any residue/oil should be removed with a gasket removing solvent applied to a clean shop rag.

⚠ CAUTION

It is critical that the surfaces are smooth and free of nicks and scratches. Damage on the mating surfaces may lead to an oil leak.

3. Inspect the oil drain tube and sealing o-ring ③. If the o-ring is damaged, it must be replaced.



IMPORTANT

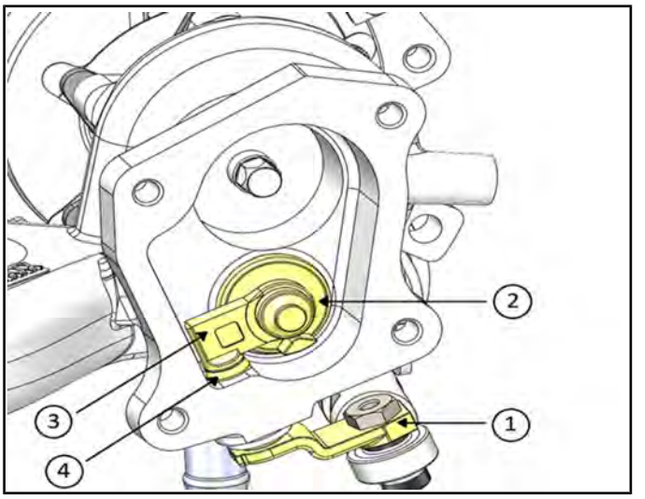
The O-ring must be properly in place before installing the drain tube on the turbocharger to prevent an oil leak.

4. Install new oil drain tube fasteners. Torque fasteners to specification.

TORQUE
Drain Tube Fasteners: **11 ft-lb (15 Nm)**

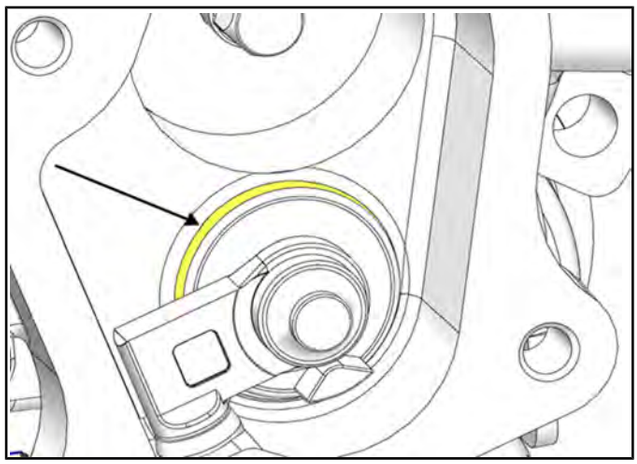
WASTEGATE FLAPPER INSPECTION

Due to the high pressures and temperatures seen in the turbine, the wastegate flapper and associated components are susceptible to wear after extended use.



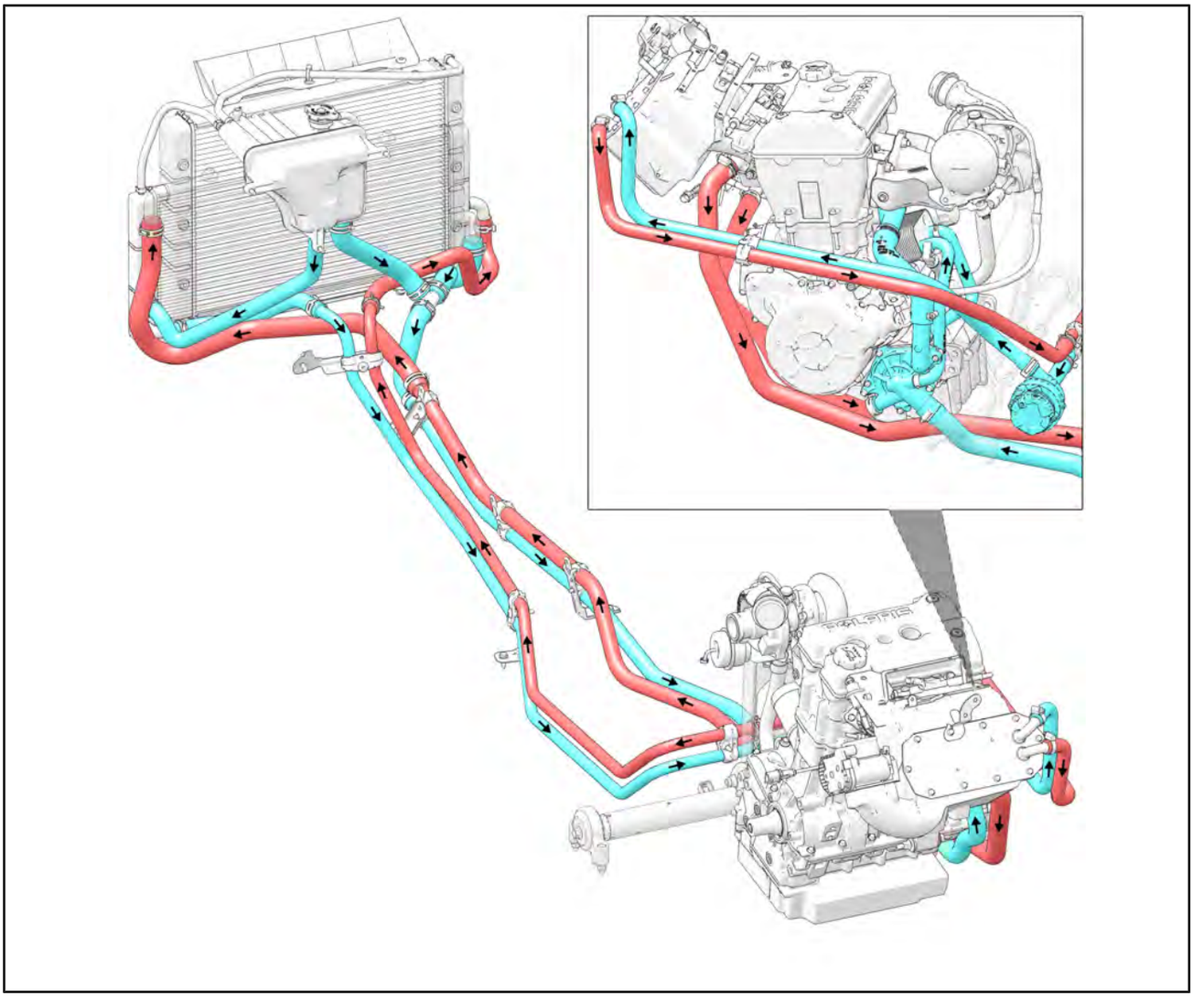
① Outer Crank Arm	③ Wastegate Flapper Arm
② Wastegate Flapper Disc	④ Wastegate Flapper Bushing

Looking inside the turbine outlet, ensure the wastegate flapper is closed flat against the turbine seat. Ensure the flapper disc is properly sealed over the wastegate port, and that no gap is visible that can let exhaust gas past the wastegate when fully closed.



COOLING SYSTEM

COOLING SYSTEM FLOW



COOLING SYSTEM SPECIFICATIONS

COOLING SYSTEM CAPACITY

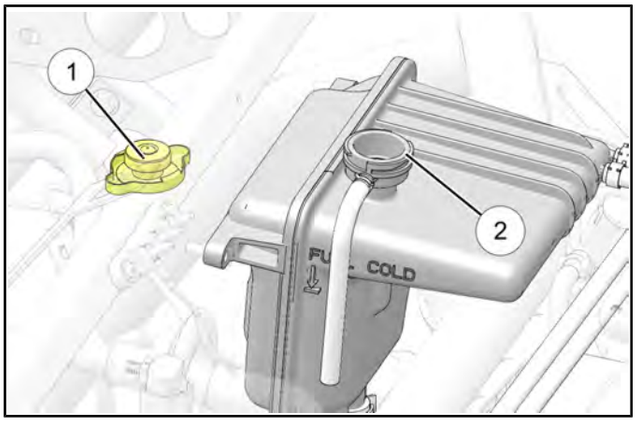
RZR XP Turbo	10.8 qts (10.22 L)
RZR XP4 Turbo	11.7 qts (11.07 L)

TEMPERATURE SPECIFICATIONS

CONDITION	COOLANT TEMP ° F (° C)
Room Temperature	68° F (20° C)
Thermostat Begins Opening	180° F (82° C)
Fan Off *(when temp decreases to)*	190° F (88° C)
Fan On (fan speed 50%) *(engine running) (when temp increases to)*	190° F (88° C)
Fan On (fan speed 100%) *(engine running) (when temp increases to)*	207° F (97° C)
Thermostat Full Open	203° F (95° C)
Fan On *(engine OFF)* ** fan will run up to 30 seconds without engine running*	230° F (110° C)
Engine Temperature **Overheat Indicator ON**	232° F (111° C)
Engine Protection **Power Reduction**	232° F (111° C)
Engine Protection **Forced Idle**	239° F (115° C)
Engine Protection **Shutdown & Overheat Indicator Flashes**	246° F (119° C)

COOLING SYSTEM PRESSURE TEST

1. Remove the hood.
2. Remove pressure cap ① and pressure test the cap using a commercially available pressure tester. The pressure cap relief pressure is 13 psi. Replace the cap if it does not meet this specification.



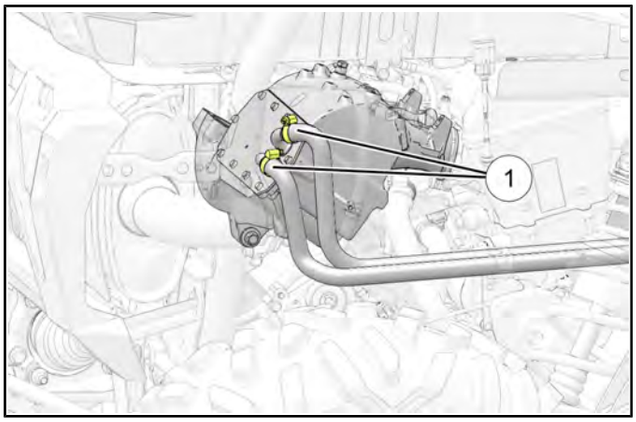
WARNING

Never remove pressure cap when engine is warm or hot. The cooling system is under pressure and serious burns may result. Allow the engine to cool before servicing.

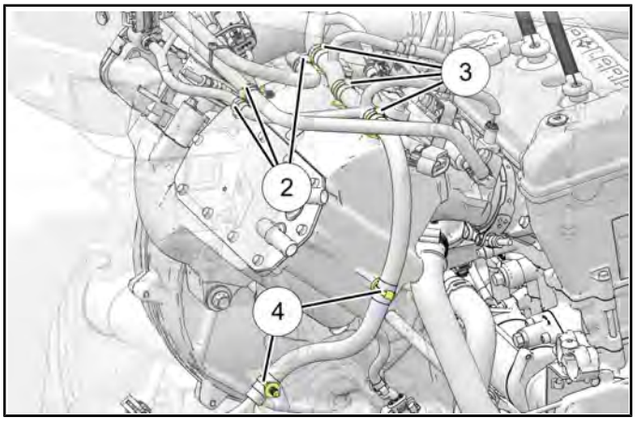
3. To test the cooling system, connect the pressure tester to the cooling neck ② with the correct adapter.
4. The system must maintain 10 psi for five minutes or longer. If pressure loss is evident within five minutes, check the filler neck, radiator, hoses, clamps and water pump weep hole for leakage.

CHARGE AIR COOLER REMOVAL

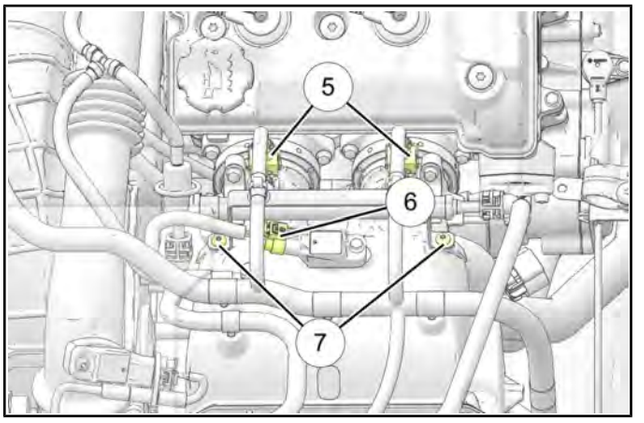
1. Remove the exhaust pipe. See Exhaust Pipe Removal page 3.16.
2. Place a drain pan under the rear of the vehicle and remove both hoses ① going to the charge air cooler and allow coolant to drain.



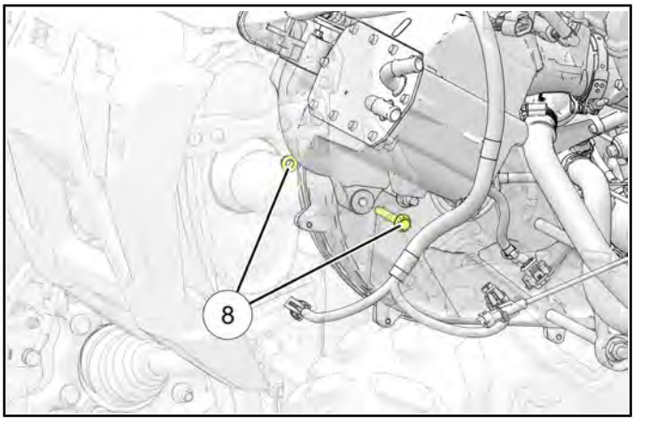
3. Cut the three zip ties retaining the fuel lines ② , the three zip ties ③ retaining the harness on the top of the intake manifold and the two zip ties ④retaining the harness on the passenger side of the intake manifold.



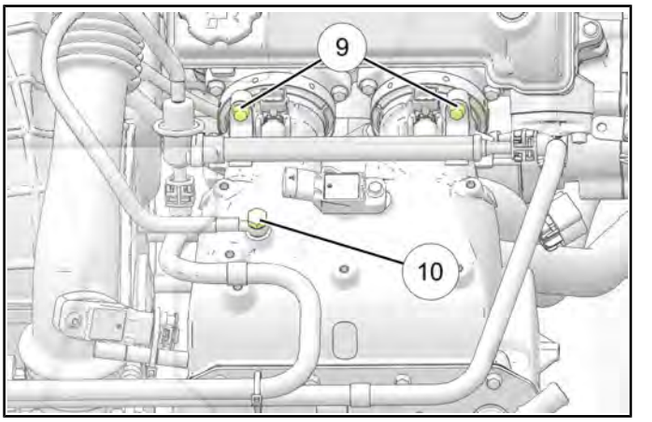
4. Remove the cargo box access panel.
5. Disconnect the fuel injectors ⑤ , TMAP sensor ⑥ and remove the two fasteners ⑦ retaining the fuel injector wiring bracket to the intake manifold. Move the assembly off to the side.



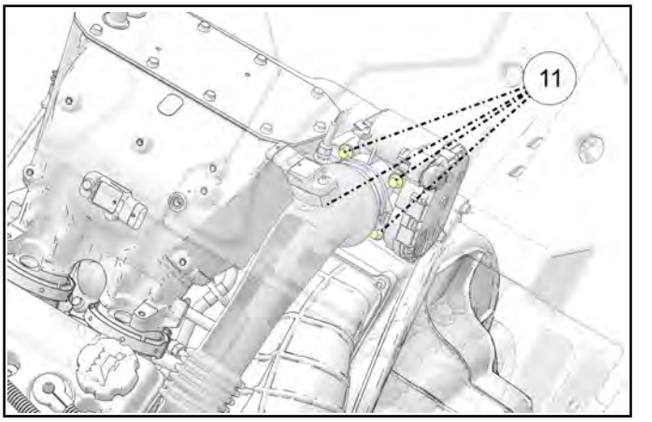
6. Disconnect the transmission switch, speed sensor and CPS.
7. Remove the fasteners ⑧ retaining the intake manifold to the transmission.



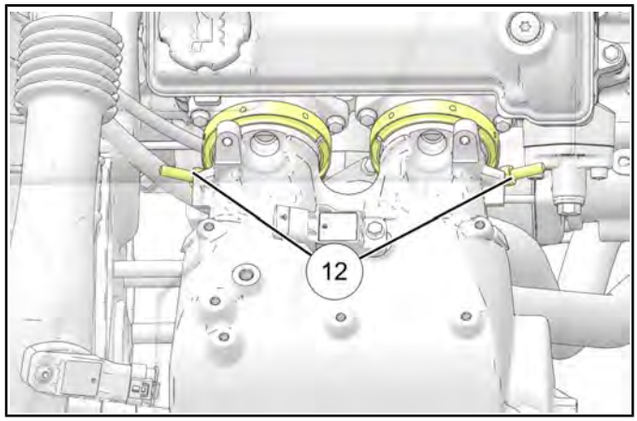
8. Remove the two fasteners ⑨ retaining the fuel rail to the intake manifold.



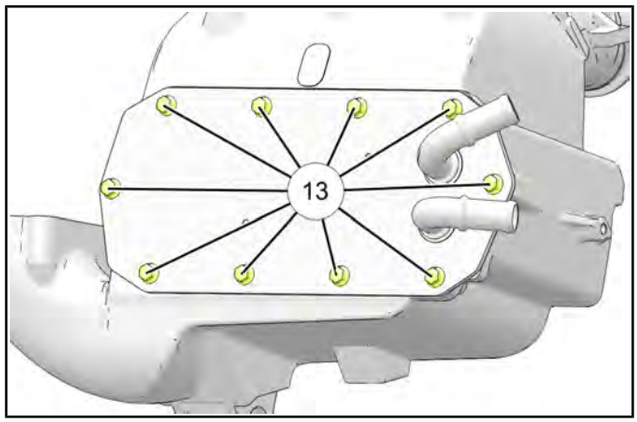
9. Remove the fastener ⑩ retaining the manifold air pressure reference hose banjo fitting.
10. Remove the four fasteners ⑪ retaining the throttle body/ETC to the intake manifold.



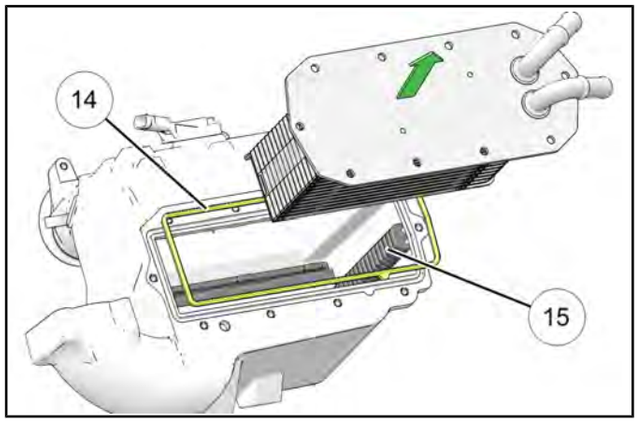
11. Loosen the clamps ⑫ retaining the intake manifold to the engine.



12. Carefully remove the intake manifold out the passenger side of the vehicle.
13. Remove the fasteners ⑬ retaining the charge air cooler to the intake manifold.



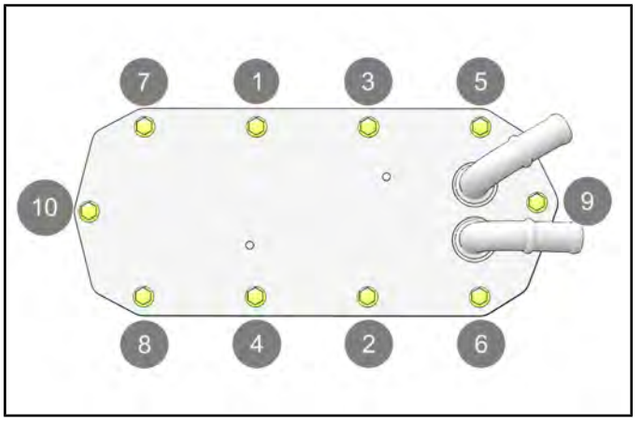
14. Replace the seal ⑭ any time the charge air cooler is removed. Also inspect the side/bottom air dam ⑮ for any damage.



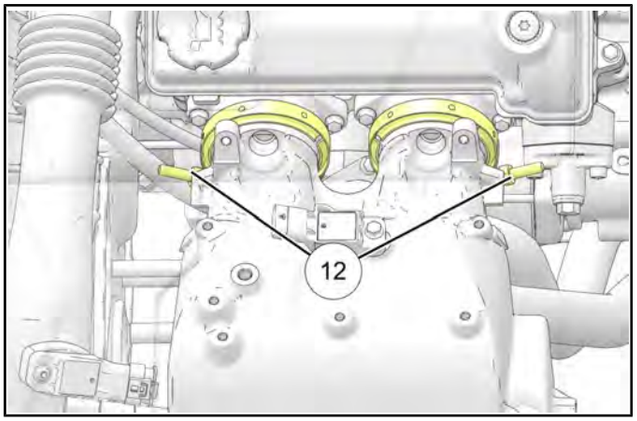
CHARGE AIR COOLER INSTALLATION

1. Install new charge air cooler seal and install charge air cooler into the intake manifold. Torque fasteners to specification.

TORQUE
Charge Air Cooler Fasteners: **Torque in sequence to 7 ft-lb (10 Nm)**



2. Carefully install the intake manifold through the passenger side of the vehicle.
3. Install the clamps ⑫ retaining the intake manifold into the engine. Tighten the clamps to specification.



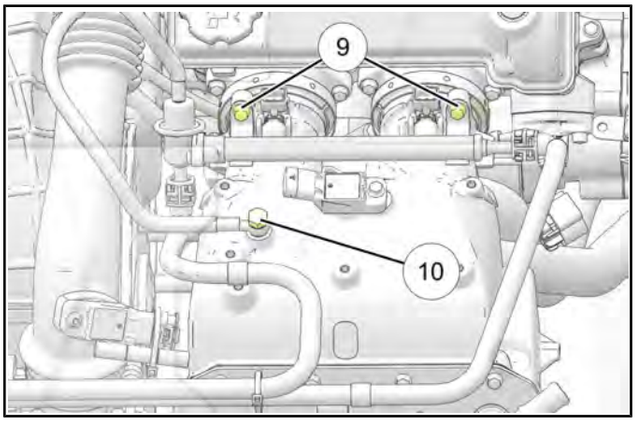
TORQUE
Intake Manifold Clamps: **6 ft-lb (8 Nm)**

4. Install the four fasteners retaining the throttle body to the intake manifold. Torque fasteners to specification.

TORQUE
Throttle Body Fasteners: **7 ft-lb (10 Nm)**

IMPORTANT
Ensure the gasket between the throttle body and intake manifold is properly in place and not damaged. An intake leak will result in poor performance.

5. Replace the crush washers on both sides of the banjo fitting. Install the fastener ⑩ retaining the manifold air pressure reference hose banjo fitting. Torque fastener to specification.



TORQUE
Manifold Pressure Fitting Bolt: **7 ft-lb (10 Nm)**

6. Install the two fasteners ⑨ retaining the fuel rail to the intake manifold. Torque fasteners to specification.

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

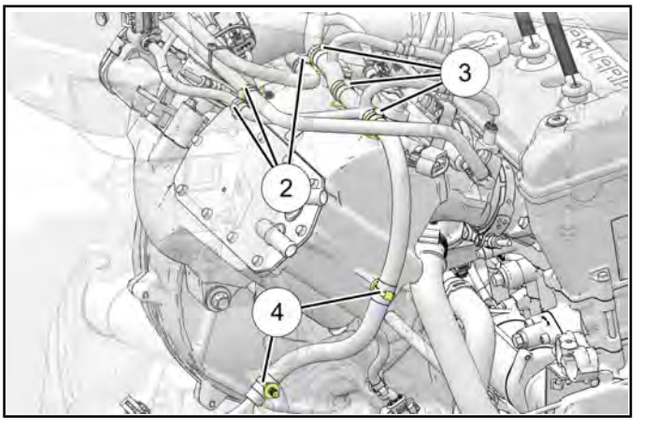
7. Install the fasteners retaining the intake manifold to the transmission. Torque fasteners to specification.

TORQUE
Intake Manifold Mounting Fasteners (lower): **20 ft-lb (27 Nm)**

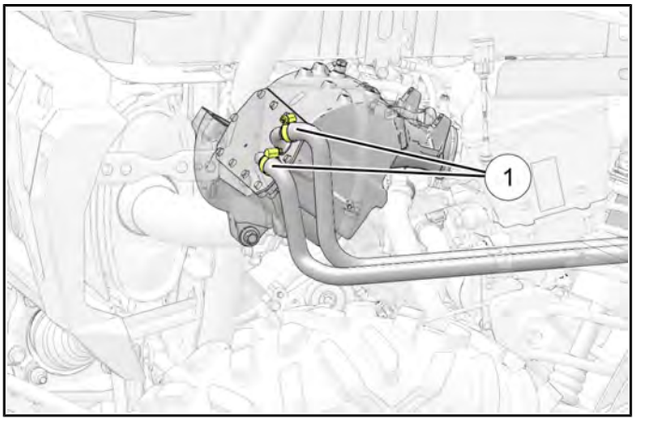
8. Install the two fasteners retaining the fuel injector wiring bracket to the intake manifold. Torque fasteners to specification.

TORQUE
Fuel Injector Wiring Bracket Fasteners: **7 ft-lb (10 Nm)**

9. Connect the sensors, switches and injectors.
10. Install the cargo box panel.
11. Install zip ties retaining the wiring harness and fuel lines around the intake manifold ②③④.



12. Install both hoses ① going to the charge air cooler.

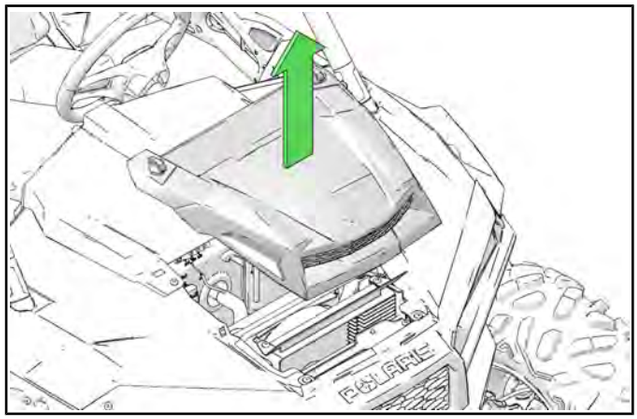


13. Install the exhaust pipe. See Exhaust Pipe Installation page .
14. Elevate the front of the vehicle and fill the coolant bottle.
15. Run the vehicle for several minutes and check the coolant level. Refill as required.

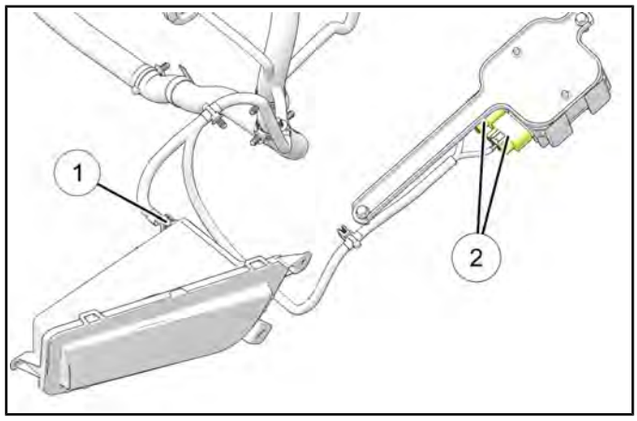
RADIATOR REMOVAL

This procedure is used for both the charge air system radiator as well as the engine radiator.

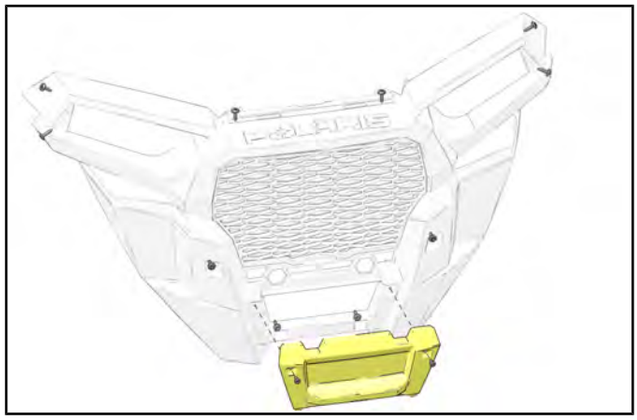
1. Drain the cooling system.
2. Remove the hood panel.



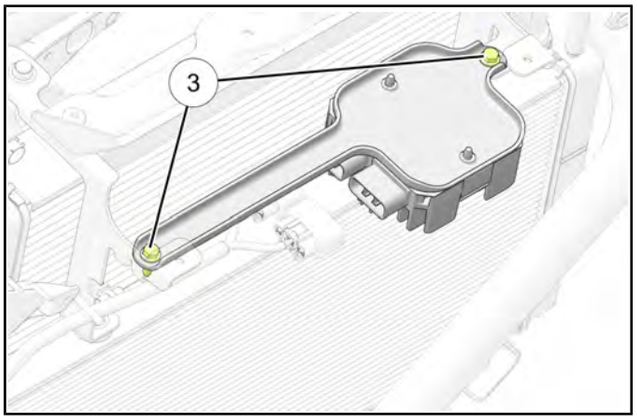
3. Disconnect the front headlight harnesses ① on both sides and the two voltage regulator harness connections ②.



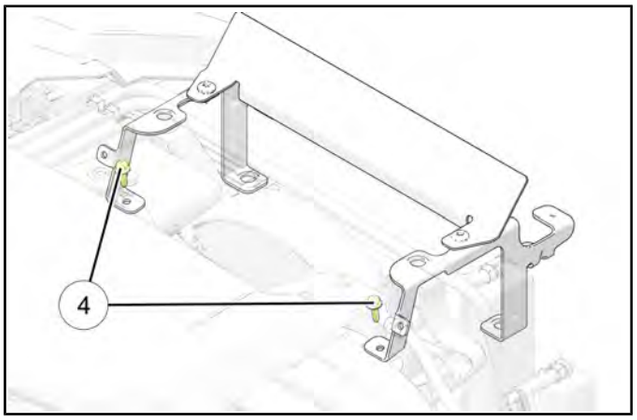
4. Remove the two Torx fasteners retaining the winch cover and the ten Torx fasteners retaining the front fascia.



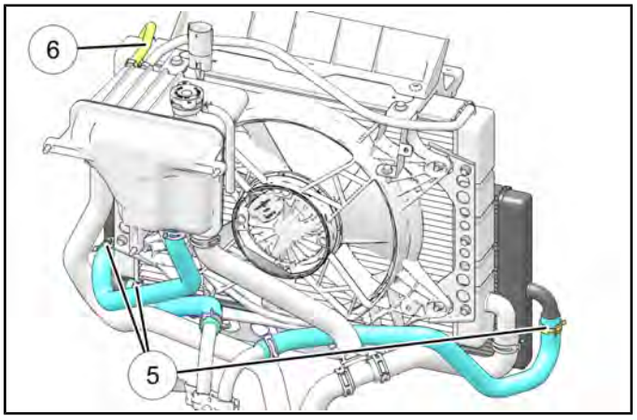
5. Remove the zip ties on both sides retaining the headlight harnesses.
6. Remove the two fasteners ③ retaining the voltage regulator bracket and remove the bracket.



7. Remove the two fasteners ④ retaining the upper radiator bracket.

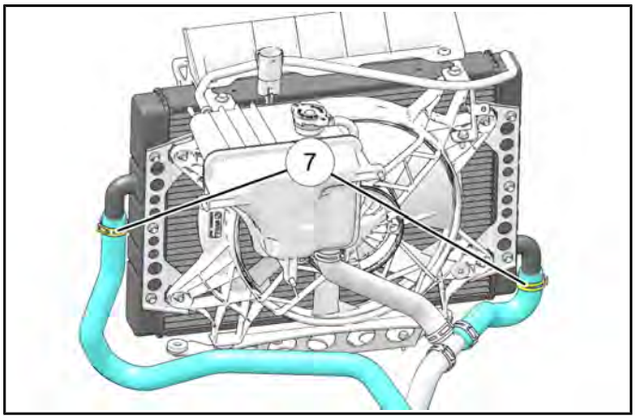


8. Remove the three large hoses ⑤ going to the charge air radiator and the small vent hose ⑥.

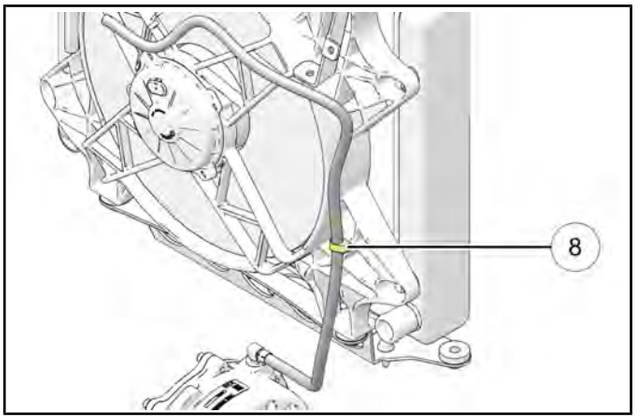


9. Lift the charge air radiator and turn it 90° to remove it from the chassis.

10. **FOR ENGINE RADIATOR REMOVAL:** Disconnect the fan harness.
11. Remove the two hoses ⑦ going to the radiator.



12. Disconnect the front gearcase breather hose ⑧ from the fan shroud.



13. The fan and radiator can be removed as an assembly.

RADIATOR INSTALLATION

1. Install the fan and radiator as an assembly.
2. Connect the front gearcase breather hose to the fan shroud.
3. Connect the two coolant hoses going to the radiator.
4. Connect the fan harness.
5. Install the charge air radiator into the chassis.
6. Install the three large hoses going to the charge air radiator and the small vent hose .
7. Install the two fasteners retaining the upper radiator bracket. Torque fasteners to specification.

TORQUE
Radiator Bracket Fasteners: **8 ft-lb (11 Nm)**

8. Install the two fasteners retaining the voltage regulator bracket to the chassis. Torque fasteners to specification.

TORQUE
Voltage Regulator Bracket Fasteners: **8 ft-lb (11 Nm)**

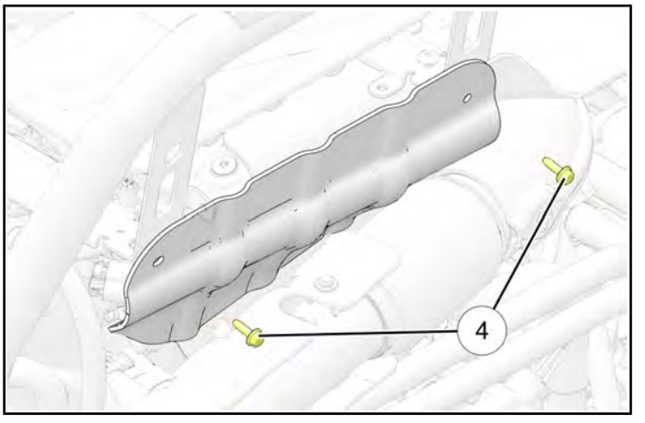
9. Install zip ties on both sides retaining the headlight harnesses.
10. Install the ten Torx fasteners retaining the front fascia. Torque fasteners to specification.

TORQUE
Front Fascia Fasteners: **8 ft-lb (11 Nm)**

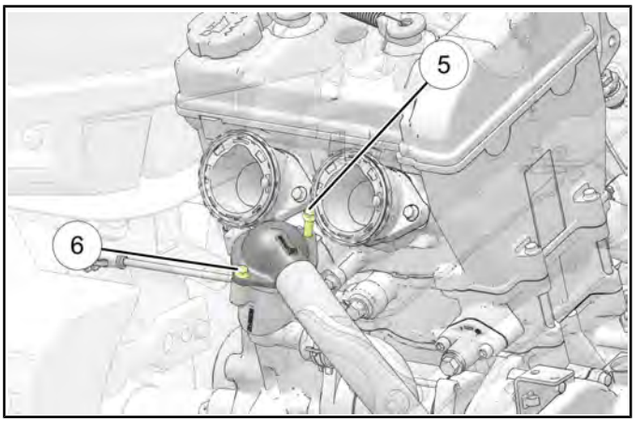
11. Connect the front headlight harnesses on both sides and connect the two voltage regulator harness connections.
12. Fill the cooling system. Properly bleed both the engine cooling system as well as the charge air cooling system. See Cooling System Bleeding page 2.40
13. Install the hood panel.

THERMOSTAT REPLACEMENT

1. Remove two fasteners ④ retaining the engine heat shield above O2 sensor.

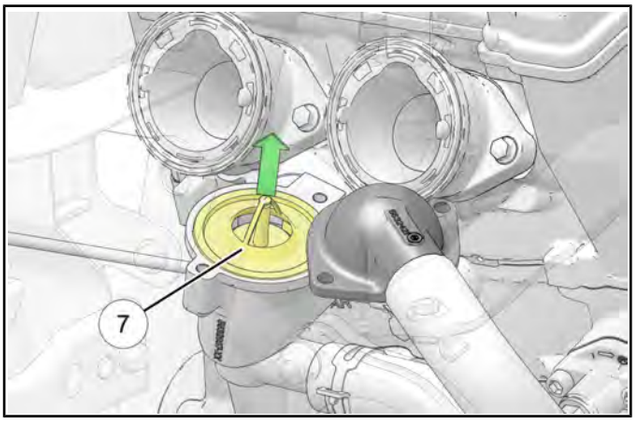


2. Place a drain pan under the engine below the thermostat housing.
3. Remove the cargo box engine access panel.
4. Remove the two fasteners retaining the thermostat cover.



NOTICE
The front fastener ⑤ is accessible through the cargo box access panel. The rear fastener ⑥ is accessible through the passenger side with a wrench.

5. Remove the thermostat cover and hose to access the thermostat ⑦. Pull the thermostat up to remove it from the housing.



6. Install new thermostat into the housing.

IMPORTANT
Installing the thermostat upside down will damage the thermostat and lead to engine overheating.

7. Install thermostat cover. Torque fasteners to specification.

TORQUE
Thermostat Cover Fasteners: **7 ft-lb (10 Nm)**

8. Install the exhaust heat shield. Torque fasteners to specification.

TORQUE
Heat Shield Fasteners: **8 ft-lb (11 Nm)**

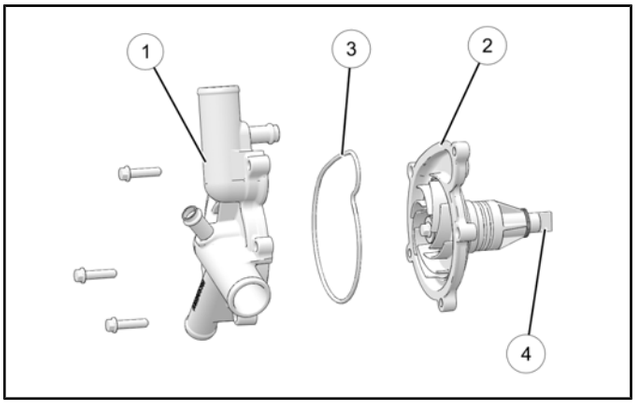
9. Fill the cooling system and properly bleed the engine cooling system. See Cooling System Bleeding page 2.40.

WATER PUMP SERVICE

NOTICE

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

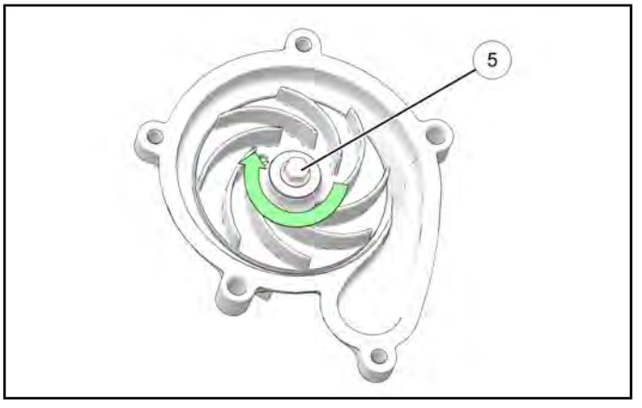
1. Remove water pump assembly as outlined in this chapter (Engine Disassembly/Inspection - Bottom End — Water Pump Housing Removal).
2. Remove the three bolts retaining water pump cover ① to water pump housing ②. Discard cover gasket ③.



3. Place the water pump drive tab ④ vertically into a soft jaw vice.
4. Remove the bolt and washer retaining the water pump impeller to the shaft. Inspect the impeller veins and water pump housing for damage. Replace if needed.

NOTICE

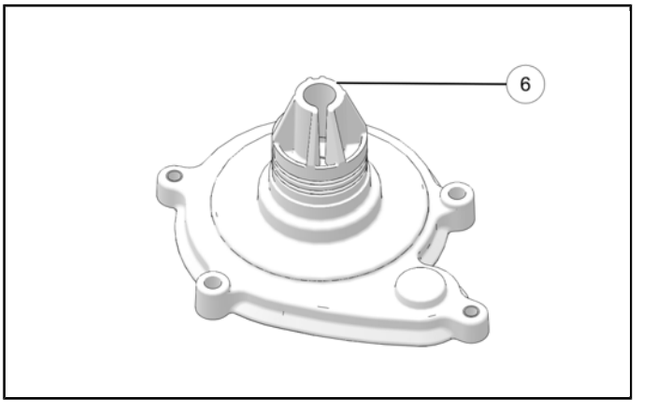
The water pump impeller bolt ⑤ is left hand thread (reverse thread).



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

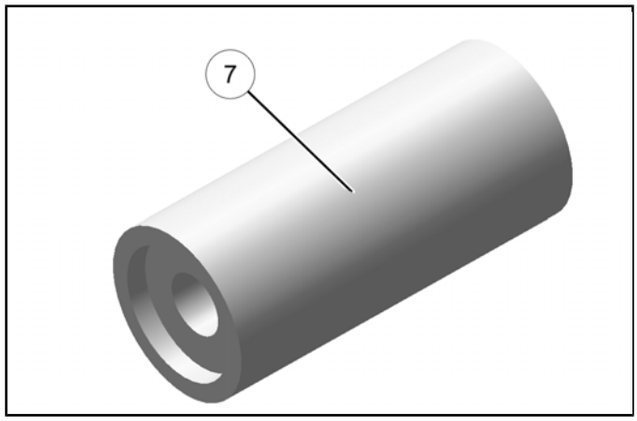
NOTICE

A 5/32" (4 mm) diameter punch ⑥ will fit in the lubrication slot to aid in the removal of the oil seal. Be sure not to damage the water pump shaft bearing surface.



8. Inspect the water pump shaft bore for excessive wear or damage. Replace water pump housing assembly if necessary.
9. Clean and inspect water pump shaft for excessive wear or damage. Replace water pump housing assembly if necessary, as shaft can not 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 soft jaw vice as previously shown in this procedure.

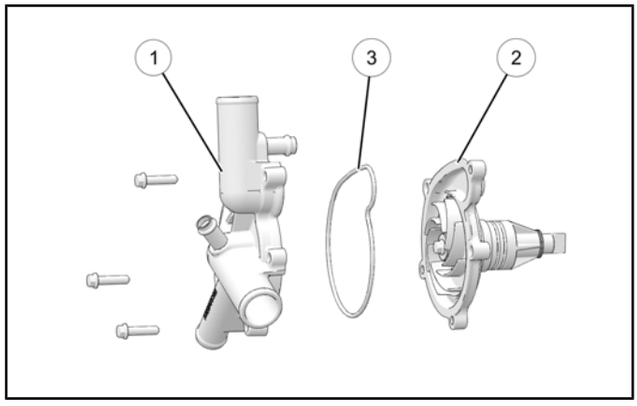
14. Install a NEW mechanical seal into the water pump housing using special tool (**PU-50564**) ⑦. Press the new mechanical seal in until it is flush with the water pump housing.



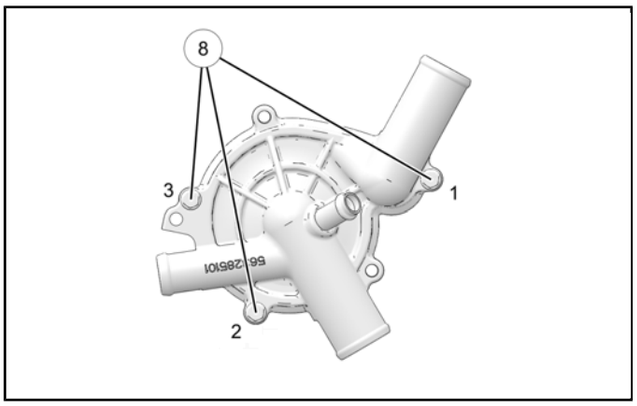
15. Rotate water pump shaft after seal installation to verify free movement.
16. Place impeller onto the water pump shaft.
17. Apply Loctite® 204™ to the threads of the impeller bolt. Install washer and impeller bolt and torque to specification.

TORQUE
Water Pump Impeller Bolt: **7 ft-lbs (10 N·m)(Apply Loctite® 204™ to bolt threads)**

18. Clean cover ① and housing gasket surfaces ②.
19. Install a new water pump cover gasket ③.



20. Install the water pump cover and three retaining bolts ⑧. Torque bolts in sequence to specification.

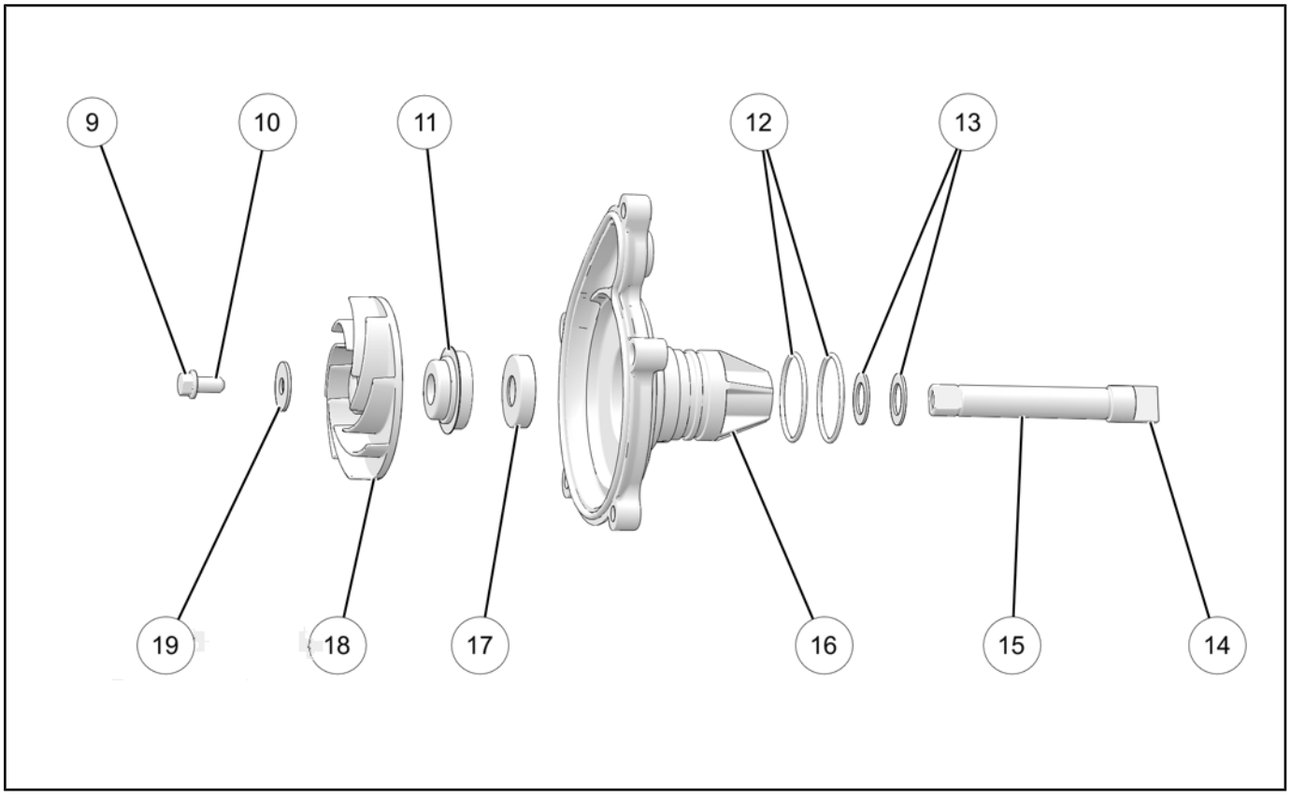


TORQUE
Water Pump Cover Bolts: **7 ft-lbs (10 N·m)(Apply Loctite® 204™ to bolt threads)**

21. Install two new water pump (O-rings) and lubricate them with fresh engine oil.

22. Install water pump assembly into engine.

WATER PUMP ASSEMBLY VIEW

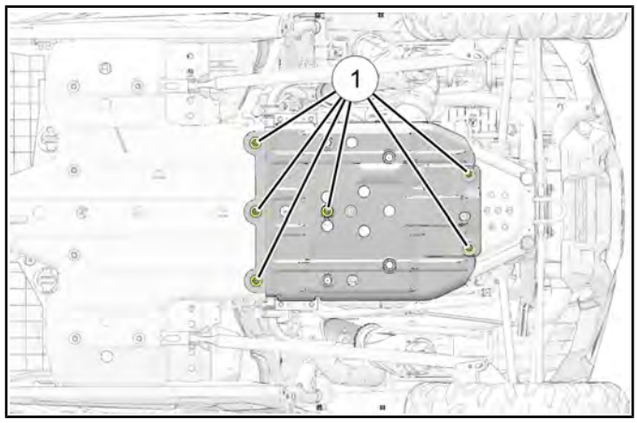


⑨ Bolt	⑬ Washers	⑰ Oil Seal
⑩ Loctite 204	⑭ Drive Tab	⑱ Impeller
⑪ Mechanical Seal	⑮ Water Pump Shaft	⑲ Washer
⑫ O-Rings	⑯ Water Pump Housing	

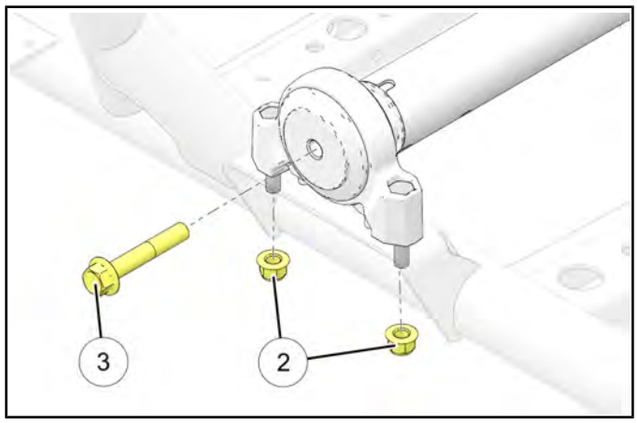
ENGINE SERVICE

FRONT ENGINE MOUNT ISOLATOR REPLACEMENT

1. Remove the rear skid plate fasteners ① and remove the skid plate from the vehicle.



2. Using a commercially available transmission lift or pump jack, lift the front engine mount to take the weight off the isolators.
3. Remove the fasteners ① retaining the isolator mounts to the frame.

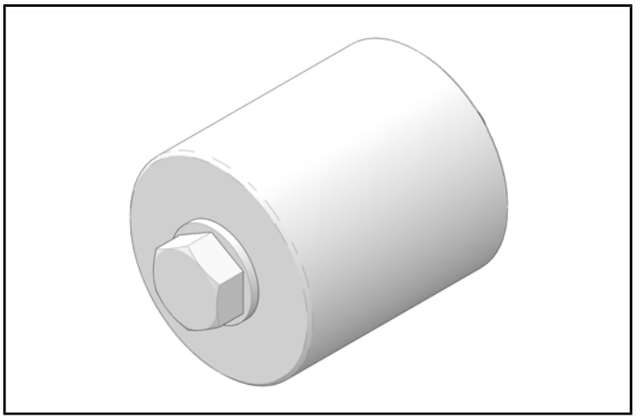


4. Remove the isolator bolt ② and remove the isolator.
5. Install new isolator and bolt. Torque fastener to specification.
6. Lower the lift or jack and align the isolator tang with the holes in the frame. Install isolator to frame fasteners. Torque fasteners to specification.
7. Install rear skid pan. Torque fasteners to specification.

TORQUE
Engine Mount Isolator Bolts: **40 ft-lbs (54 Nm)**
Engine Mount Nuts: **22 ft-lb (30 Nm)**
Skid Pan Fasteners: **8 ft-lbs (11 Nm)**

CRANKSHAFT PTO SEAL REPLACEMENT

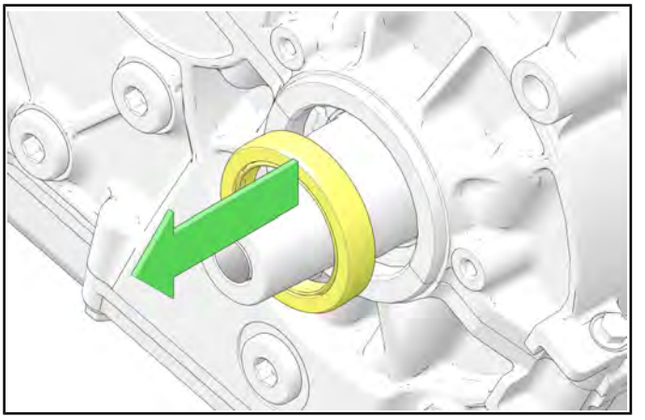
Special Tool **PU-52493** allows the replacement of the engine crankshaft PTO seal without splitting the engine case.



IMPORTANT
PU-52493 does NOT work with 2017 and older models.

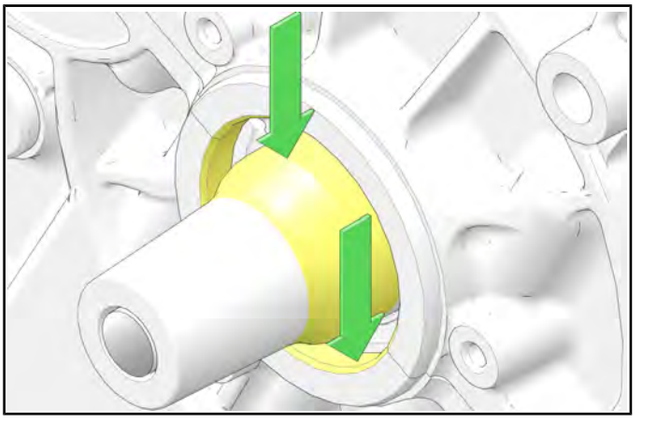
REMOVAL

1. Remove the Inner PVT Cover. Refer to PVT Inner Cover Disassembly page .
2. Using a commercially available seal puller tool, remove crankcase seal from crankcase.



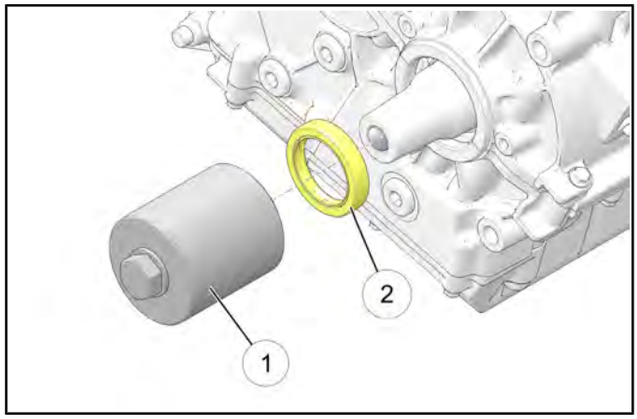
IMPORTANT
Use care not to scratch the crankcase while removing seal.

3. Inspect the crankcase and crankshaft surfaces for any burrs or scratches that could damage the new seal or prevent it from sealing properly.

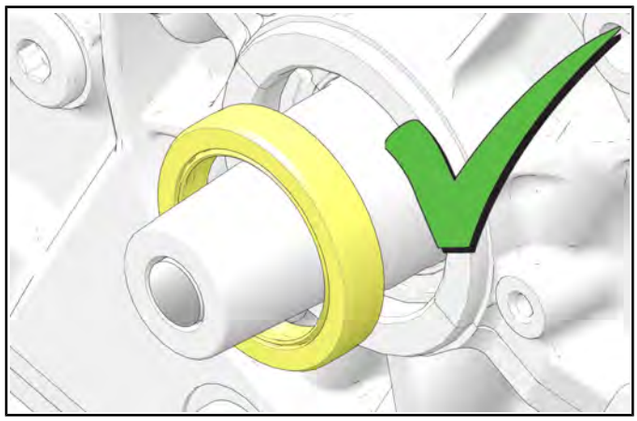


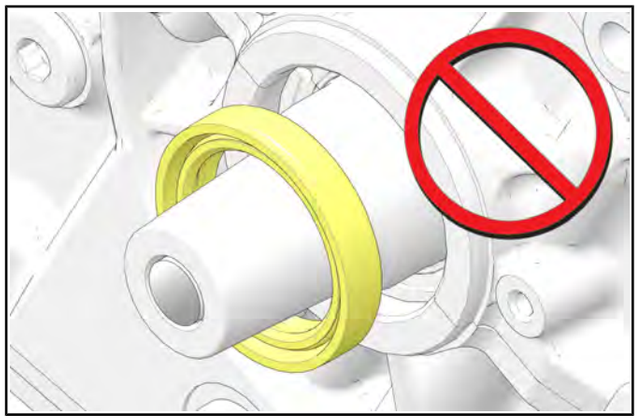
INSTALLATION

1. Install new seal ② into crankcase. Thread the drive bolt of special tool **PU-52493** ① into the crankshaft.

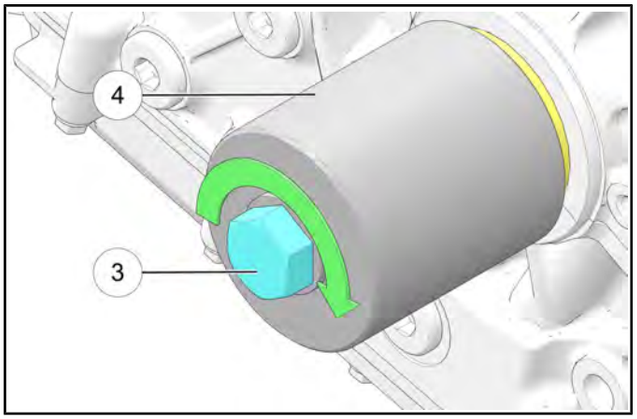


IMPORTANT
The orientation of the seal is critical. Install the seal with the flat side of the seal facing out as shown.





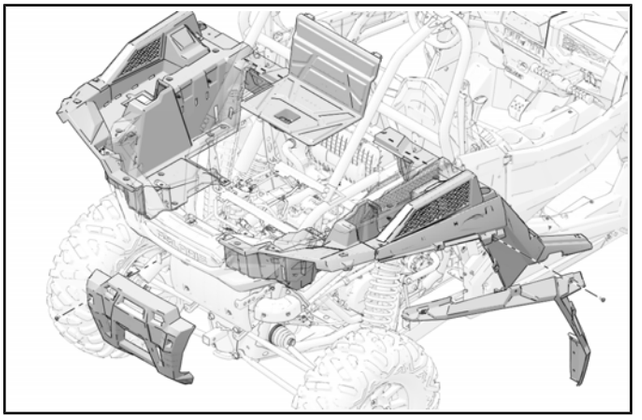
2. Tighten the drive bolt ③ until the cylinder ④ bottoms out against the crankcase.



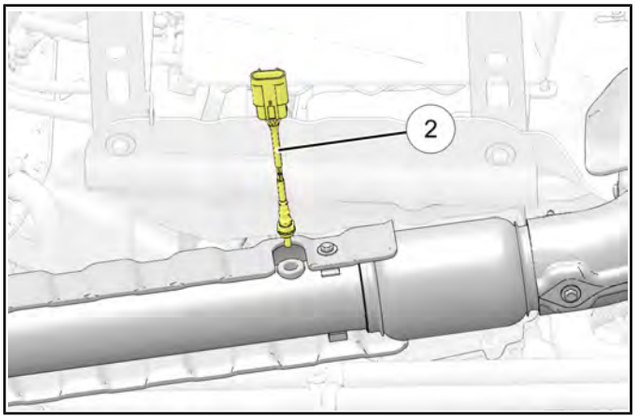
3. Once the seal is properly installed, loosen the drive bolt ③ and remove special tool **PU-52493** from the crankshaft.
4. Refer to PVT Inner Cover Assembly page .
5. Test drive the vehicle and recheck for leaks before putting back into service.

ENGINE REMOVAL

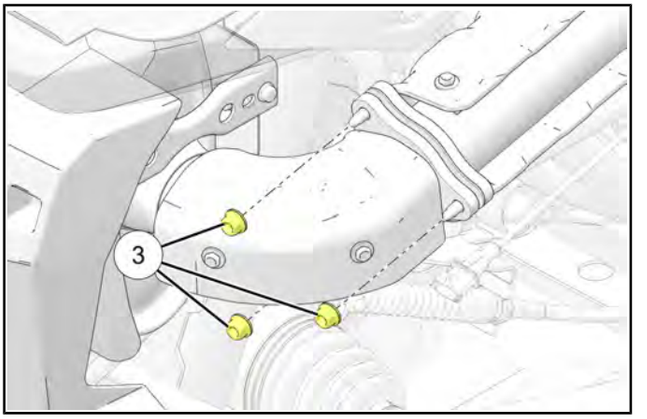
1. Disconnect the battery.
2. Drain coolant and engine oil. SeeEngine Oil and Filter Change page 2.30 and Coolant Flush page 2.39.
3. Remove rear fender flairs and fenders.



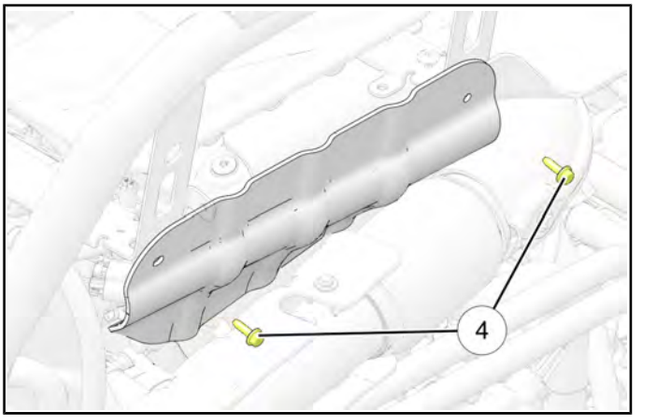
4. Remove rear fascia.
5. Remove rear cab frame.
6. Remove cargo box.
7. Remove cargo box brackets. exhaust shields on passenger side, wire/hose clamps ① on driver's side.
8. Disconnect ignition coil.
9. Disconnect and remove the oxygen sensor ②.



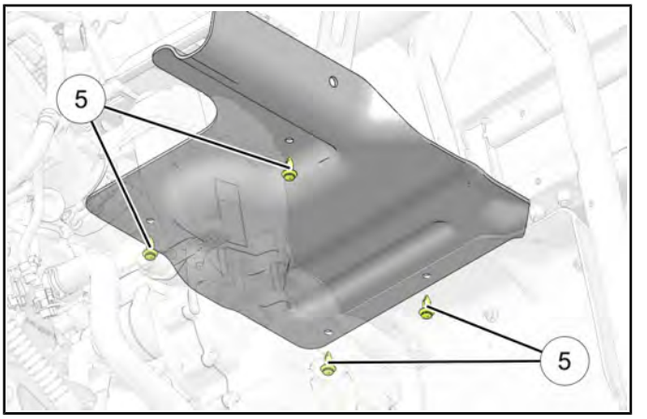
10. Remove the three fasteners ③ retaining the muffler to the exhaust pipe.



11. Remove two fasteners ④ retaining the engine heat shield above O2 sensor.

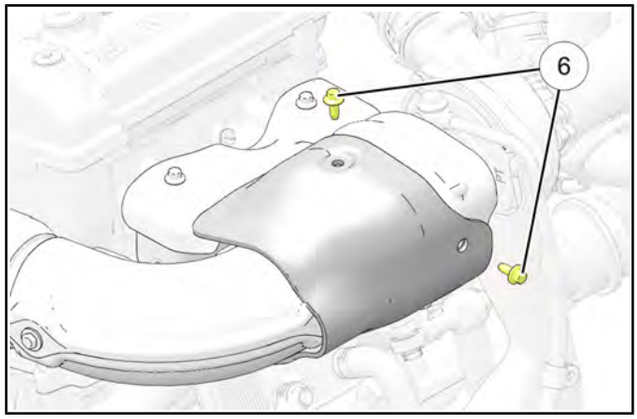


12. Remove the four fasteners ⑤ retaining the heat shield above the valve cover.

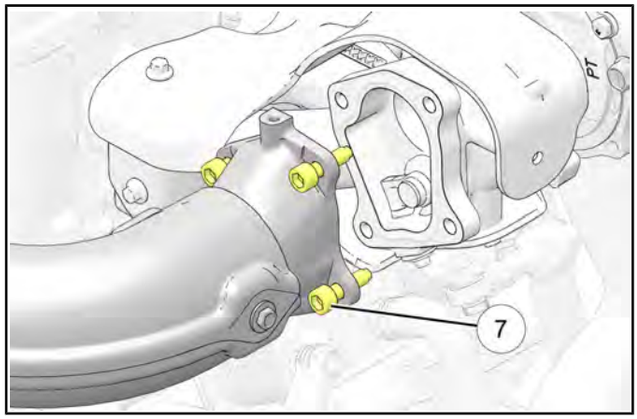


NOTICE
Front fasteners are plastic rivets and rear fasteners are bolt/washer/nut.

13. Remove the two fasteners ⑥ retaining the heat shield to the exhaust pipe / turbo joint.

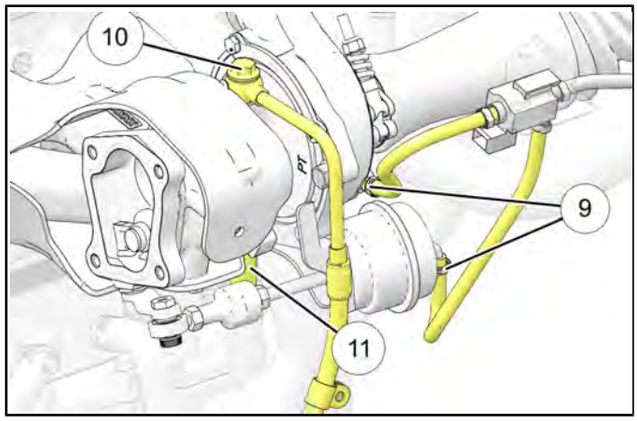


14. Remove the four fasteners ⑦ retaining the exhaust pipe to the turbocharger.



15. Remove the exhaust pipe from the chassis.

16. Remove the two hoses ⑨ from the turbo going to the boost control valve.

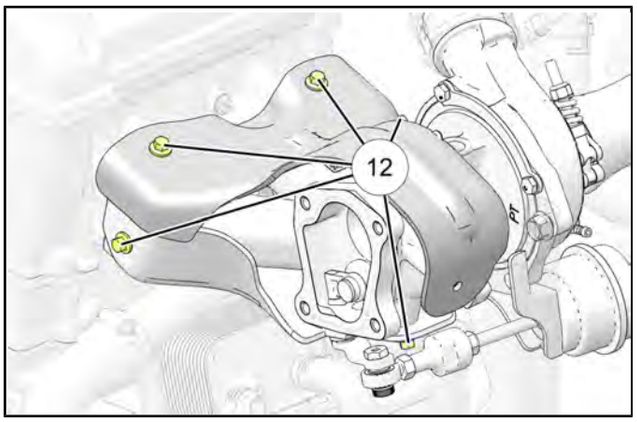


17. Remove the banjo bolt ⑩ retaining the oil inlet hose and remove the oil drain hose ⑪.

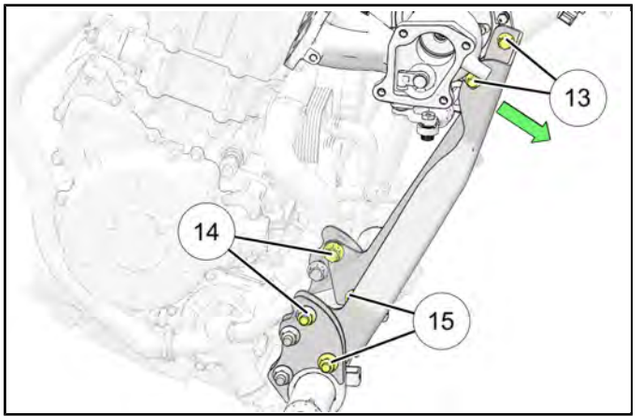
IMPORTANT

The oil line sealing washers MUST be replace any time the oil line/fitting is removed. Use only the recommended washers shown in the Polaris Electronic Parts Catalog.

18. Remove the fasteners ⑫ retaining the heat shields to the head pipe / turbo assembly and remove the shields.

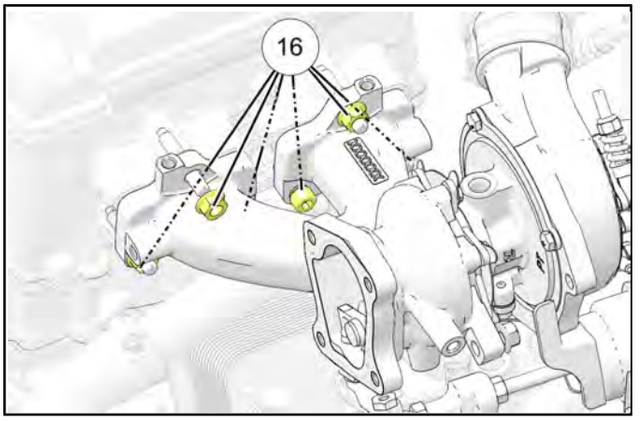


19. Remove the fasteners ⑬ retaining the turbo to the mounting bracket.



20. Remove the lower turbo bracket fasteners ⑭ and remove the bracket from the vehicle.

21. Remove the six fasteners ⑯ retaining the head pipe to the cylinder head.

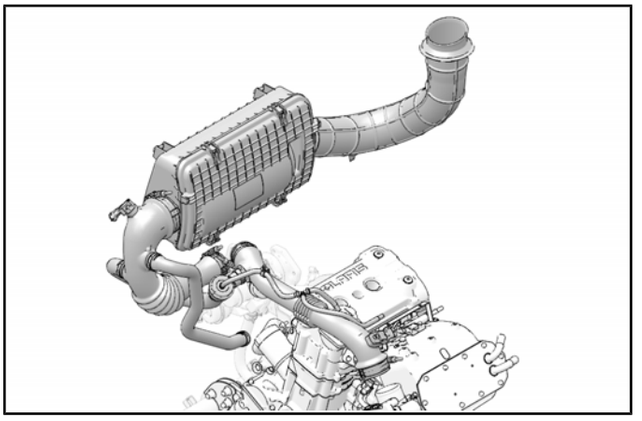


22. Slide the head pipe off the studs and remove the head pipe/turbo from the vehicle.

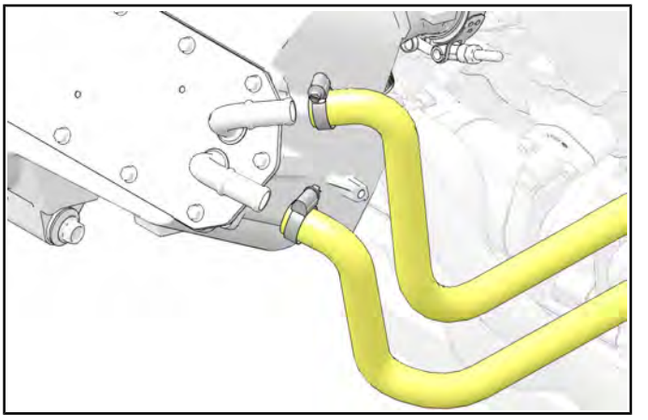
CAUTION

Do not handle the turbo/head pipe assembly by the actuator rod. The rod will become damaged and the turbo will not function properly.

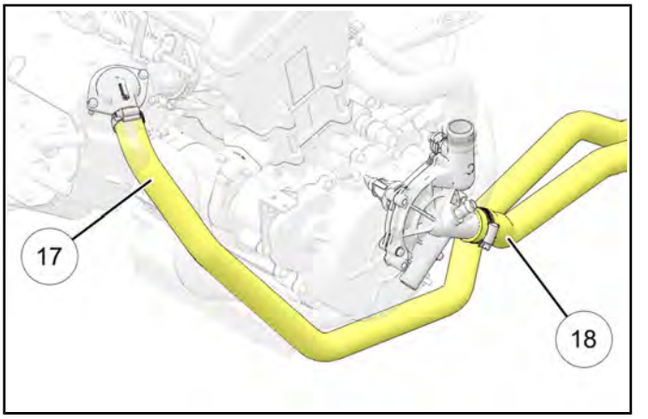
23. Remove air box and engine air intake.



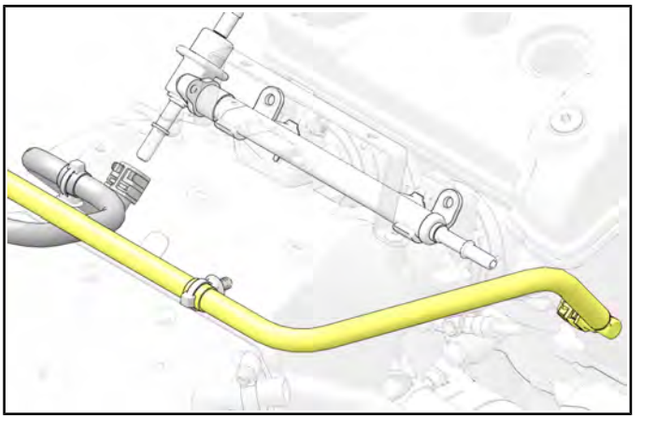
24. Remove two hoses going to the charge air cooler and move the hoses towards the front of the vehicle.



25. Remove the thermostat housing hose ⑰ and the water pump hose ⑱.

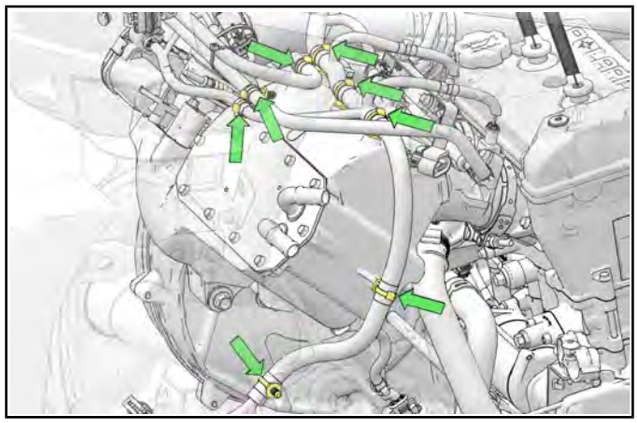


26. Disconnect stator harness and disconnect the harness retainer from the engine mount.
27. Disconnect the fuel supply and return hoses at the fuel rail.

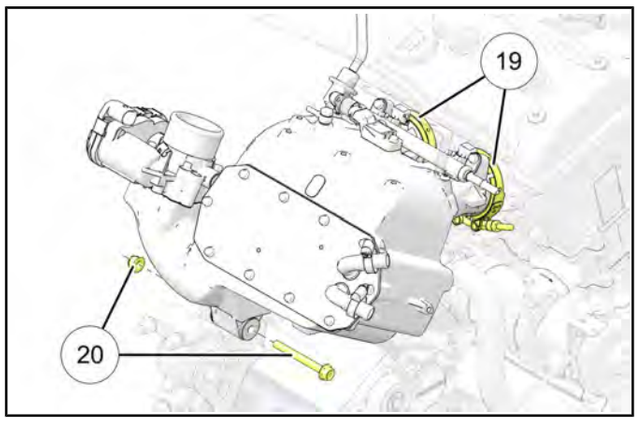


28. Disconnect TBAP, both TMAP sensors, CPS, coolant temp sensor, Trans switch, speed sensor, injectors, ETC.

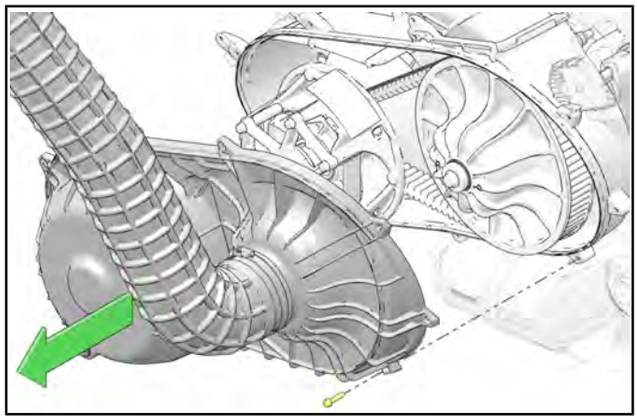
29. Remove zip ties retaining fuel lines and harnesses to intake manifold.



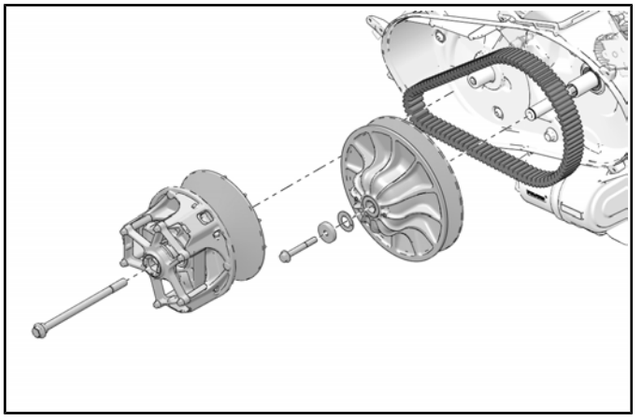
30. Loosen and remove clamps ⑲ retaining intake manifold to engine. Remove lower manifold mounting bolt ⑳ (to trans mount bracket).



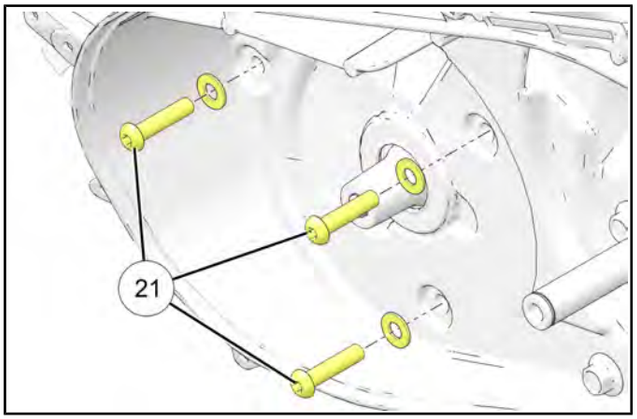
31. Remove intake manifold and throttle body as assembly.
32. Disconnect the starter wiring.
33. Remove PVT hoses and outer cover.



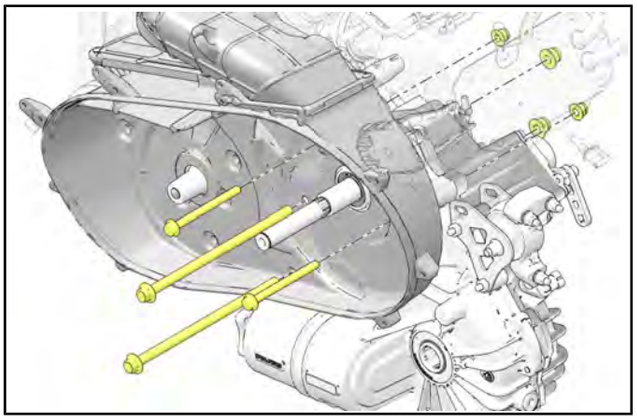
34. Remove secondary clutch, belt and primary clutch.



35. Support the bottom side of the engine with wood blocks or from the top side with an engine lift.
36. Remove the three allen screws ㉑ retaining inner cover to engine.

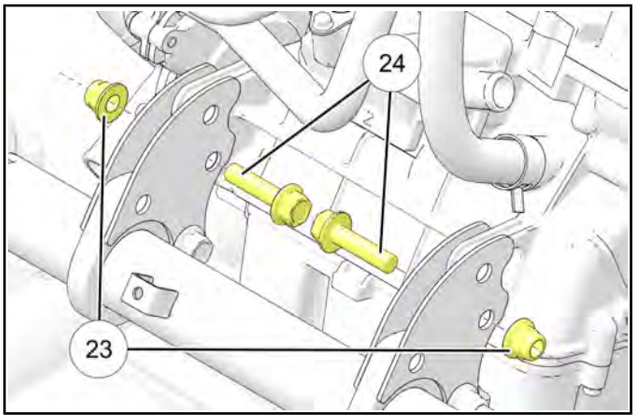


37. Remove fasteners retaining inner cover to transmission.



38. Remove fasteners retaining inner cover to engine/ trans joint. Discard PVT inner cover o-ring around the crankshaft snout.

39. Remove fasteners㉓㉔ retaining engine to the engine mount bracket.



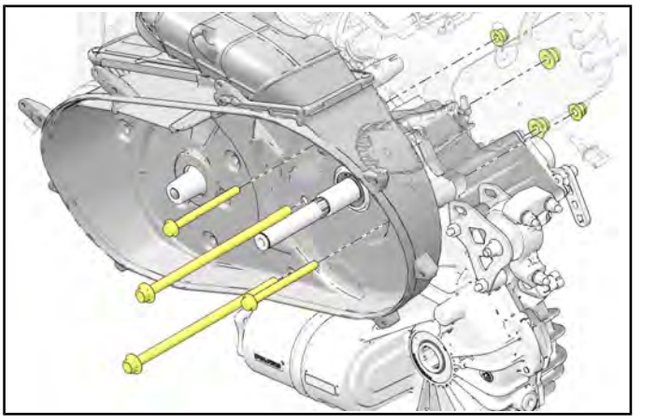
40. Lift engine out of the chassis, be careful not to snag any hoses or wiring.
41. **If replacing engine:** remove applicable coolant hoses, stator/flywheel, starter and engine sensors.

ENGINE INSTALLATION

1. **If removed from engine:** install applicable coolant hoses, stator/flywheel, starter and engine sensors.
2. Install engine in the chassis, be careful not to snag any hoses or wiring.
3. Install fasteners retaining engine to the engine mount bracket. Torque fasteners to specification.

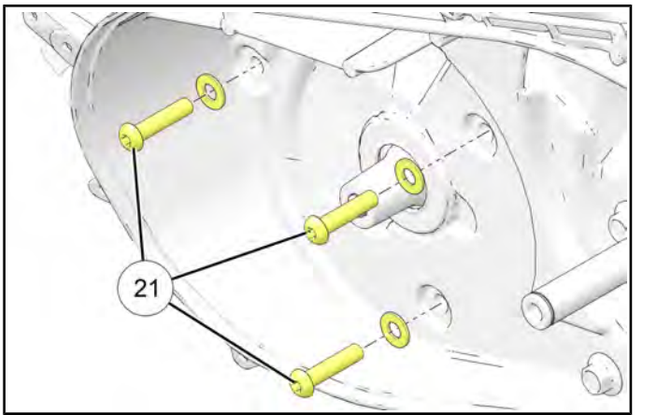
TORQUE
Engine Mounting Bracket Fasteners: **42 ft-lb (57 Nm)**

4. Install new foam seal (PN 5813708) around crankshaft snout prior to installing PVT inner cover. Loosely install fasteners retaining inner cover to the transmission and engine/trans joint.

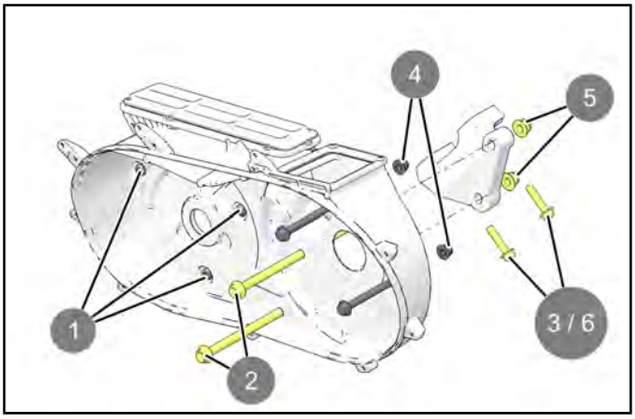


NOTICE
The acrylic adhesive/sticky side of the foam seal should adhere to the inner cover.

5. Loosely install the three allen screws ㉑ retaining inner cover to engine.



6. Torque PVT inner cover fasteners in sequence to specification.



TORQUE
PVT Inner Cover Fasteners: **STEP 1: Torque to 37 ft-lb (50 Nm)** **STEP 2: Torque to 10 ft-lb (14 Nm)** **STEP 3: Loosely install bolts by hand** **STEP 4: Torque to 37 ft-lb (50 Nm)** **STEP 5: Torque to 50 ft-lb (68 Nm)** **STEP 6: Torque to 37 ft-lb (50 Nm)**

7. Install the primary clutch, belt and secondary clutch. Install snap ring on transmission input shaft before installing secondary clutch mounting bolt. Torque fasteners to specification.

TORQUE
Primary Clutch Bolt: **96 ft-lb (130 Nm)** Secondary Clutch Bolt: **70 ft-lbs (95 Nm)**

8. Install PVT hoses and outer PVT cover. Torque fasteners to specification.

TORQUE
Hose Clamps: **35 in-lb (4 Nm)** Outer PVT Cover Fasteners: **35 in-lb (3 Nm)**

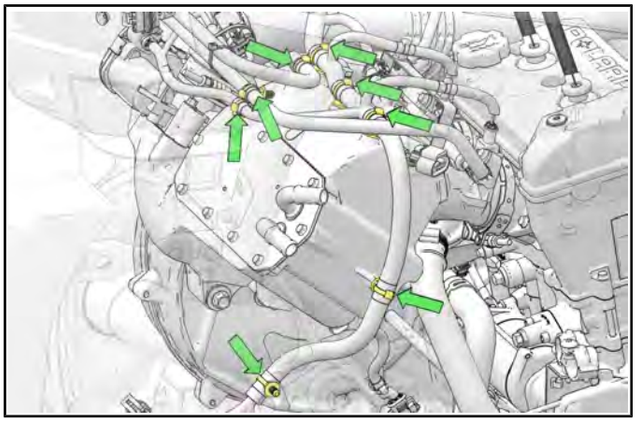
9. Connect the starter wiring. Torque fasteners to specification.

TORQUE
Starter Cable Nuts: **30 in-lb (3 Nm)**

10. Install throttle body / intake manifold assembly. Tighten clamps retaining intake manifold to engine. Install lower manifold mounting bolt (to trans mount bracket). Torque fasteners to specification.

TORQUE
Intake Manifold Clamps: **6 ft-lb (8 Nm)** Lower Intake Manifold Mounting Fasteners: **20 ft-lb (27 Nm)**

11. Install zip ties retaining fuel lines and harnesses to intake manifold.



12. Connect harness going to TBAP, both TMAP sensors, CPS, coolant temp sensor, Trans switch, speed sensor, injectors, ETC.
13. Connect the fuel supply and return hoses at the fuel rail.
14. Connect stator harness.
15. Install the coolant hose to the thermostat housing and the water pump hose.
16. Install the two hoses going to charge air cooler.

17. Install air box and engine air intake. Torque fasteners to specification.

TORQUE
Air Box Mounting Fasteners: **8 ft-lb (11 Nm)** Intake Clamps: **49 in-lb (6 Nm)**

18. Install a new head pipe gasket and install the head pipe/turbo assembly on the cylinder head studs.
19. Install the six fasteners retaining the head pipe to the cylinder head. Torque fasteners to specification.

TORQUE
Head Pipe Screws: **17 ft-lb (23 Nm)** Head Pipe Nuts: **26 ft-lb (35 Nm)**

20. Install the lower rear turbo bracket fasteners and tighten the front fasteners. Torque fasteners to specification.

TORQUE
Turbocharger Bracket Lower Fasteners: **42 ft-lb (57 Nm)**

21. Install the fasteners retaining the turbo to the mounting bracket. Torque fasteners to specification.

TORQUE
Turbocharger Mounting Fasteners: **18 ft-lb (24 Nm)**

22. Install the fasteners retaining the heat shields to the head pipe / turbo assembly. Torque fasteners to specification.

TORQUE
Heat Shield Fasteners: **8 ft-lb (11 Nm)**

23. Install the turbocharger oil drain hose and install the banjo bolt retaining the oil inlet hose. Torque banjo bolt to specification.

IMPORTANT
The oil line sealing washers MUST be replace any time the oil line/fitting is removed. Use only the recommended washers shown in the Polaris Electronic Parts Catalog.

TORQUE
Turbo Oil Line Banjo Bolt: **33 ft-lb (45 Nm)**

24. Install the two hoses from the turbo going to the wastegate solenoid. Install new Oetiker clamps.
25. Install the four fasteners retaining the exhaust pipe to the turbocharger. Torque fasteners to specification.

NOTICE
User may apply anti-seize on exhaust pipe to turbo joint if desired.

TORQUE
Exhaust Pipe to Turbo Fasteners: **18 ft-lb (24 Nm)**

26. Install the two fasteners retaining the heat shield to the exhaust pipe / turbo joint.
27. Install two plastic rivets and two screws retaining the heat shield above the valve cover.
28. Install two fasteners retaining the engine heat shield above O2 sensor. Torque heat shield fasteners to specification.

TORQUE
Heat Shield Fasteners: **8 ft-lb (11 Nm)**

29. Install the three fasteners retaining the muffler to the exhaust pipe. Torque fasteners to specification.

TORQUE
Exhaust Pipe to Muffler Fasteners: **26 ft-lb (35 Nm)**

30. Connect O2 sensor harness.

31. Install the right rear shock assembly. Torque fasteners to specification.

TORQUE
Shock Mounting Fasteners: **70 ft-lbs (95 Nm)** Shock Reservoir Mounting Fasteners: **35 in-lb (4 Nm)**

32. Install the shock access panel. Torque fastener to specification.

TORQUE
Shock Access Panel: **35 in-lb (4 Nm)**

33. Connect the ignition coil.
34. Install cargo box brackets, exhaust shields on passenger side and wire/hose clamps on driver's side. Torque fasteners to specification.

TORQUE
Cargo Box Bracket Fasteners: **8 ft-lb (11 Nm)**

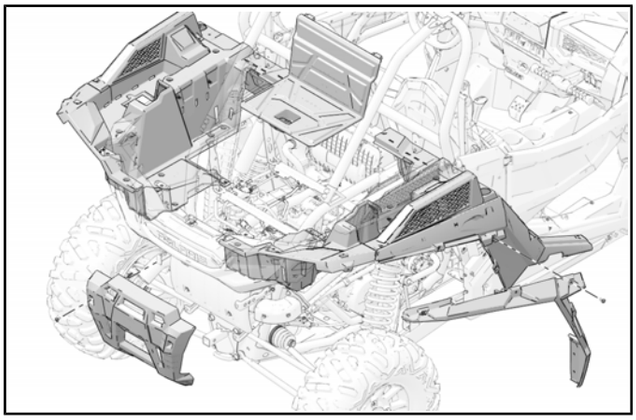
35. Install cargo box. Torque fasteners to specification.

TORQUE
Cargo Box Fasteners: **8 ft-lb (11 Nm)**

36. Install rear cab frame. Torque fasteners to specification.

TORQUE
Cab Frame Fasteners: **40 ft-lb (54 Nm)**

37. Install rear fascia. Torque fasteners to specification.



TORQUE
Rear Fascia Fasteners: **8 ft-lb (11 Nm)**

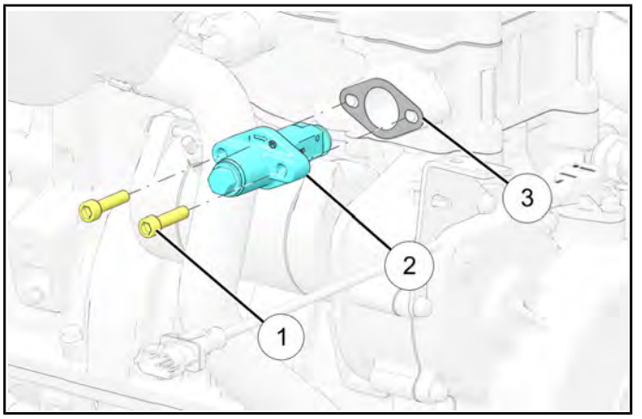
38. Install rear fenders and fender flairs.
39. Fill coolant reservoir. Bleed system as required. See and Cooling System Bleeding page 2.40.
40. Check and fill engine oil as required. See Engine Oil Level page 2.29.
41. Connect the battery. Torque fasteners to specification.

TORQUE
Battery Fasteners: **60 in-lbs (7 Nm)**

CAM CHAIN TENSIONER SERVICE

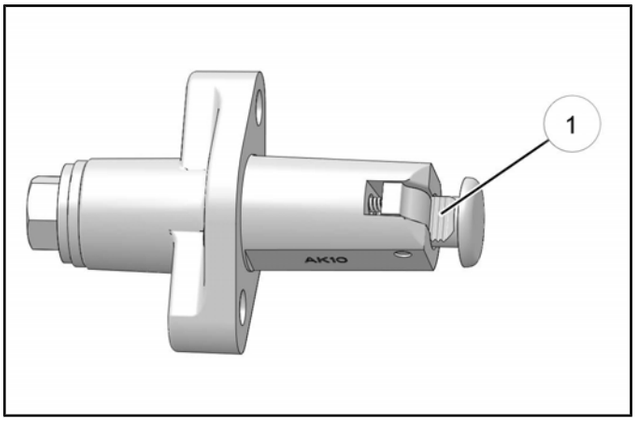
REMOVAL

1. Remove the two fasteners ① securing the cam chain tensioner ② and the tensioner gasket ③.

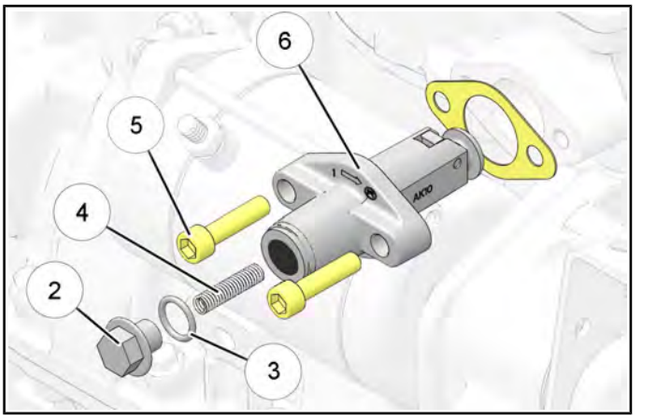


INSTALLATION

1. Lubricate the rack ① on the tensioner with white lithium grease.



2. Remove the spring retainer bolt ② and push the adjuster all the way in.
3. Using a *new* gasket, install the cam chain tensioner ⑥ into the cylinder and torque mounting bolts ⑤ to specification.



TORQUE
Cam Chain Tensioner: **7 ft-lb (10 Nm)**

4. Install the tensioner spring ⑭, washer ③, and retainer bolt ②. Torque retainer bolt to specification.

TORQUE
Tensioner Spring Retainer: **12 ft-lb (16 Nm)**

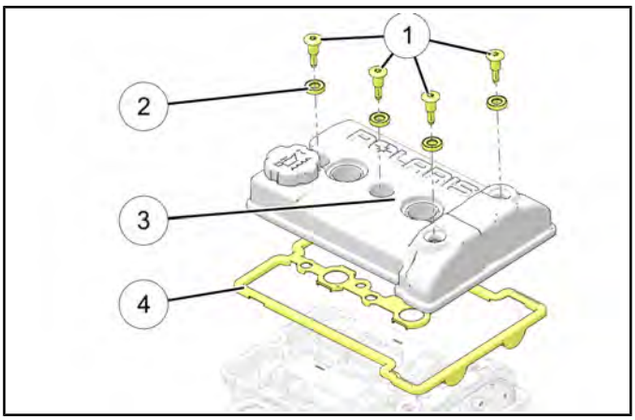
NOTICE
The tensioner will automatically adjust to the proper tension once the spring and retainer are installed. No further adjustment is required.

ENGINE DISASSEMBLY / INSPECTION - TOP END

VALVE COVER REMOVAL

NOTICE
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.



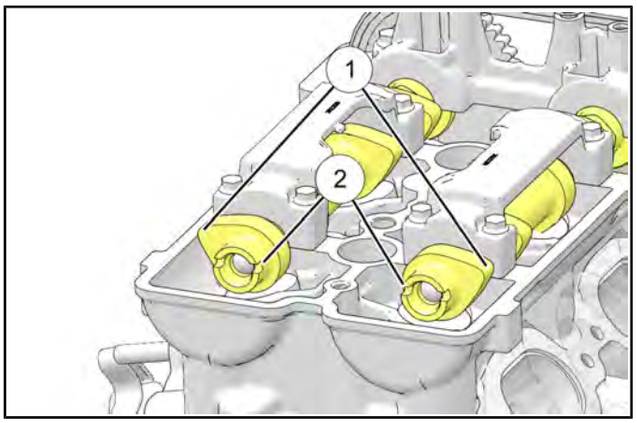
IMPORTANT
Replace rubber isolators upon assembly.

2. Remove valve cover ③ and valve cover seal ④. Replace isolators and valve cover seal if oil leaks are evident.
3. If tearing down the top end of the engine, remove the spark plugs. Stuff spark plug holes with clean shop towels to prevent any debris from falling into the combustion chamber.

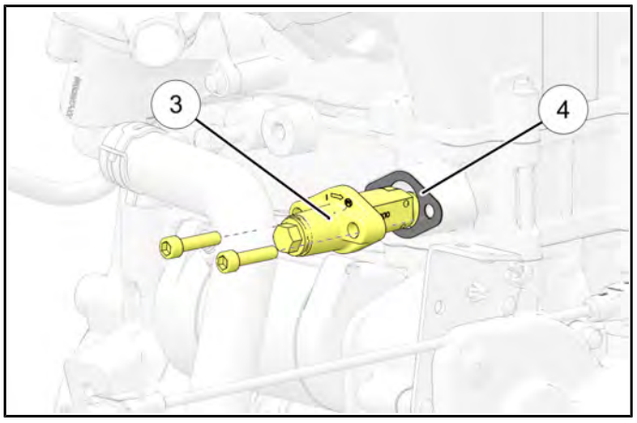
CAMSHAFT REMOVAL

NOTICE
The camshafts can be removed with the engine installed in the chassis.

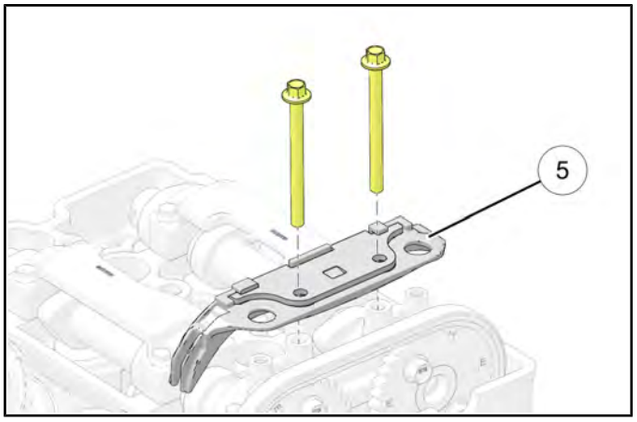
1. Rotate the engine so the PTO cylinder is at Top Dead Center (TDC) to relieve most of the valve spring pressure. The camshaft lobes ① should face out and the slots on the end of the camshafts ② should line up .



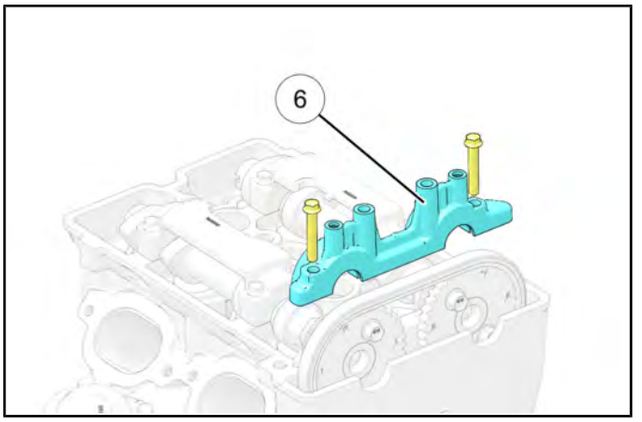
2. Remove the fasteners retaining the cam chain tensioner ③ to the cylinder. Use a *new* tensioner gasket ④ upon assembly.



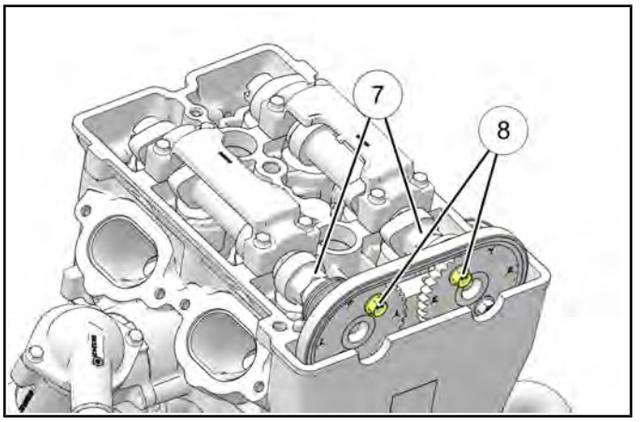
3. Remove the two bolts retaining the fixed cam chain guide ⑤ and remove the assembly from the engine.



4. Remove the remaining two bolts that retain the front camshaft carrier ⑥ and carefully lift the carrier off the camshafts.



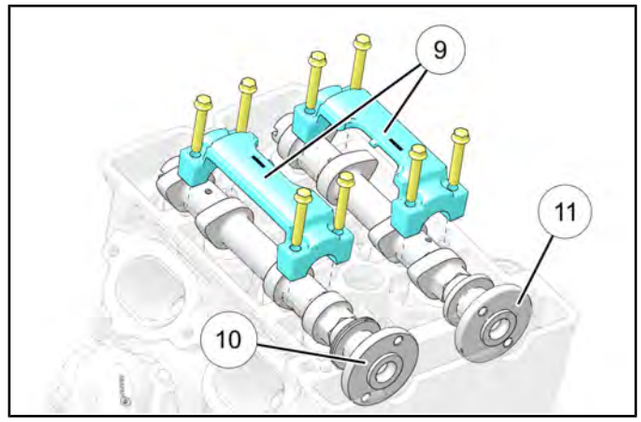
5. Hold camshafts ⑦ with an open-end wrench , and remove the top bolt ⑧ from each camshaft sprocket.



6. Rotate the engine to allow access to the remaining bolt on each camshaft sprocket.
7. Remove the remaining bolt from each camshaft sprocket.
8. Lift the chain and sprockets off the camshafts to allow each sprocket to be removed.
9. Using a paperclip or other tool, hold cam chain up.

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

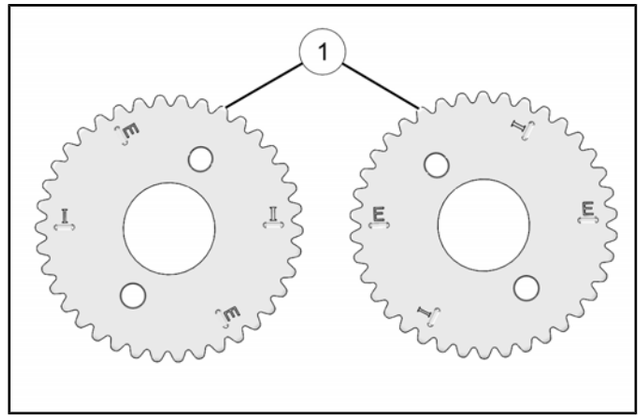
10. Evenly loosen the four bolts retaining each rear camshaft carrier ⑨ and carefully lift the carriers off the camshafts.



11. Mark the intake ⑩ and exhaust ⑪ camshafts to ensure proper assembly.
12. 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.



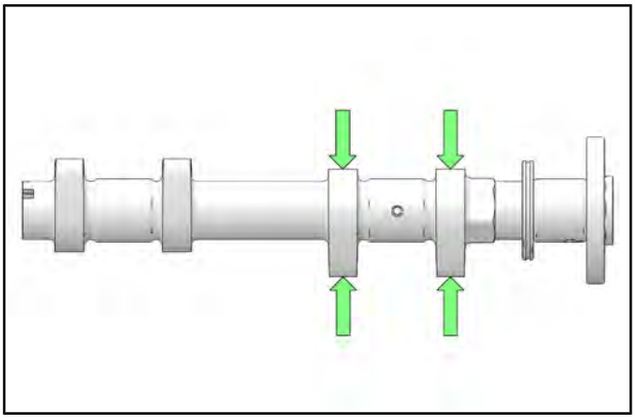
CAMSHAFT / CAMSHAFT BORE INSPECTION

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.

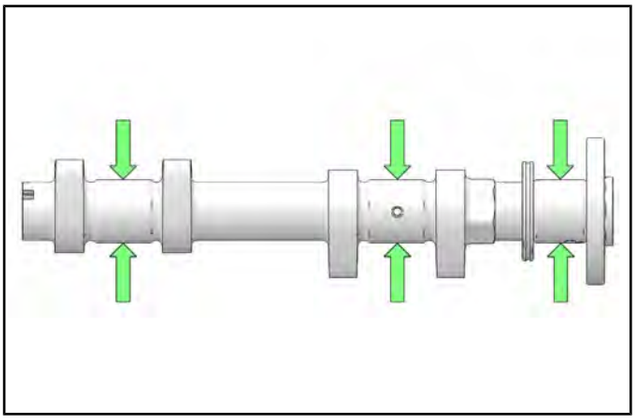
NOTICE
Replace camshafts if damaged or if any part is worn past the service limit.

2. Measure the height of each cam lobe from the base circle to highest point on the lobe using a micrometer. Compare to specification.



MEASUREMENT
Camshaft Lobe Height: Intake: **1.5890 - 1.5921" (40.36 - 40.44 mm)** **1.5870" (40.31 mm)** Exhaust: **1.5772 - 1.5803" (40.06 - 40.14 mm)** **1.5752" (40.01 mm)**

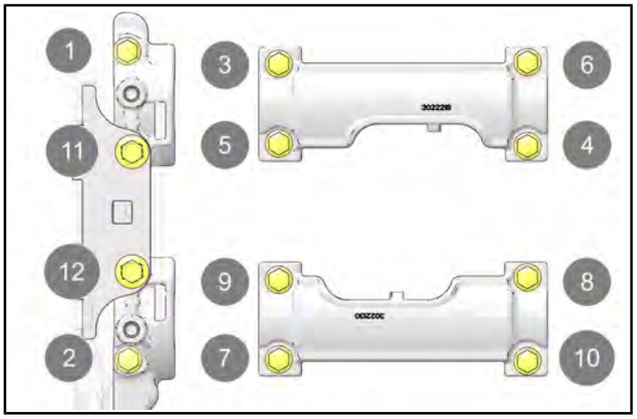
3. Visually inspect each camshaft journal for scoring, wear or damage.
4. Measure the diameter of the camshaft journals using a micrometer. Compare to specification.

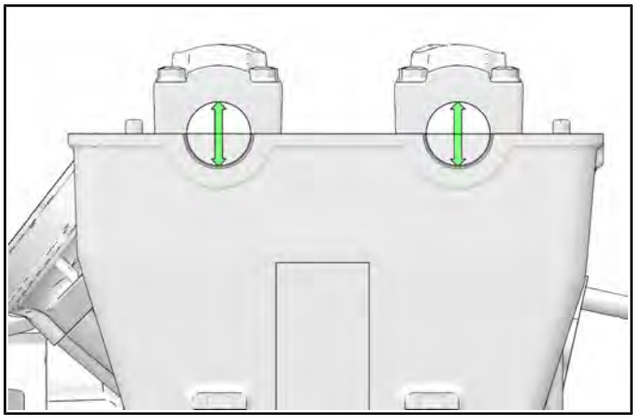


MEASUREMENT
Camshaft Journal O.D.: **.9038 - .9046" (22.957 - 22.978 mm)** **Service Limit: .9033" (22.944 mm)**

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

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





TORQUE
Camshaft Carrier Bolts: **7 ft-lb (10 Nm)**

MEASUREMENT
Camshaft Carrier Bore I.D.: **.9055 - .9063" (23.000 - 23.021 mm)** **Service Limit: .9072" (23.044 mm)**

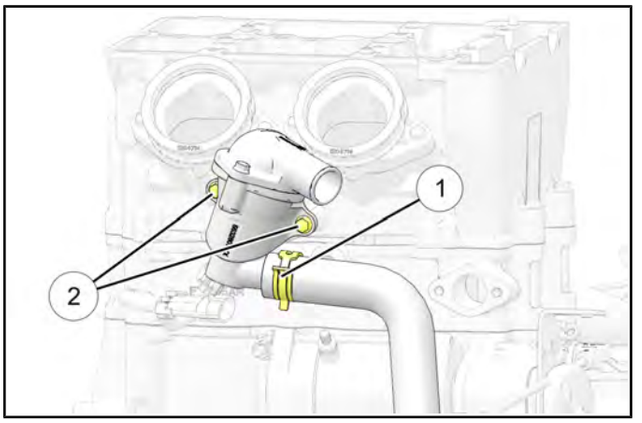
6. Calculate oil clearance by subtracting camshaft journal O.D.s from camshaft carrier bore I.D.s. Compare to specification.

MEASUREMENT
Calculated Camshaft Oil Clearance: **.0009 - .0026" (0.022 - 0.067 mm)Service Limit:** **.0039" (0.1 mm)**

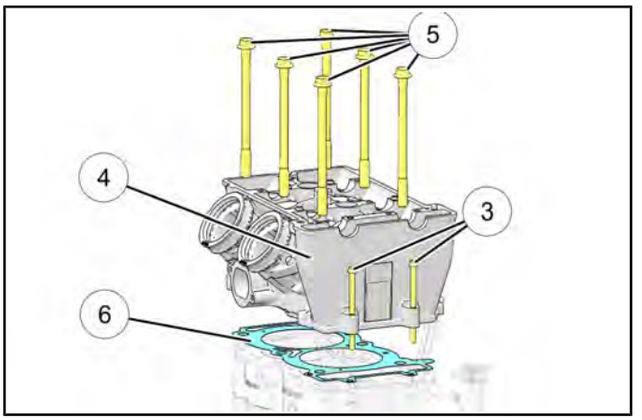
CYLINDER HEAD REMOVAL

NOTICE
The cylinder head can be serviced with the engine installed in the chassis.

1. Disconnect coolant hose ① from thermostat housing if connected.



2. Remove the two fasteners ② retaining the thermostat housing to the cylinder head.
3. Remove the two outer M6 bolts ③ that retain the cylinder head ④ to the cylinder.



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

CAUTION
Tap only in reinforced areas or on thick parts of the cylinder head casting.

7. Remove the cylinder head and head gasket ⑥.

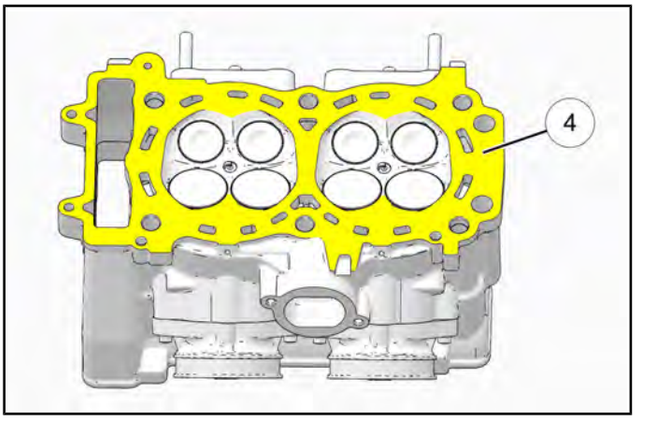
NOTICE
Once the cylinder head is removed, nothing retains the cylinder to the engine. DO NOT rotate the engine without using the Cylinder Holding & Camshaft Timing Plate (PU-50563). Refer to Cylinder / Piston Removal page 3.70.

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.

Lay a straight edge across the surface of the cylinder head ④ 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.



MEASUREMENT
Cylinder Head Warp Limit: **.002″ (0.05 mm)**

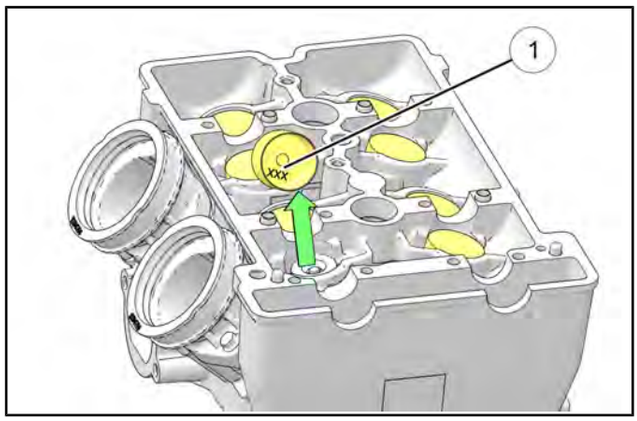
CYLINDER HEAD DISASSEMBLY

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

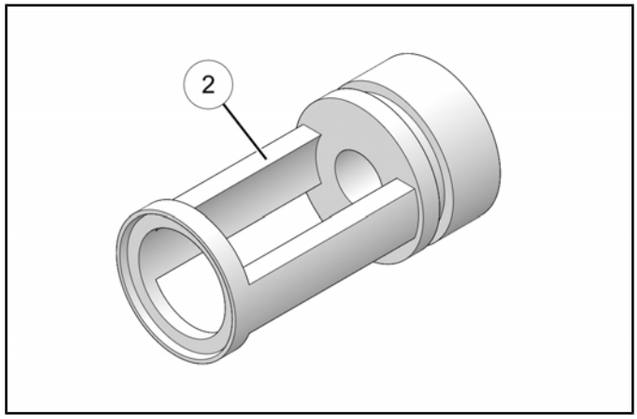
NOTICE

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.

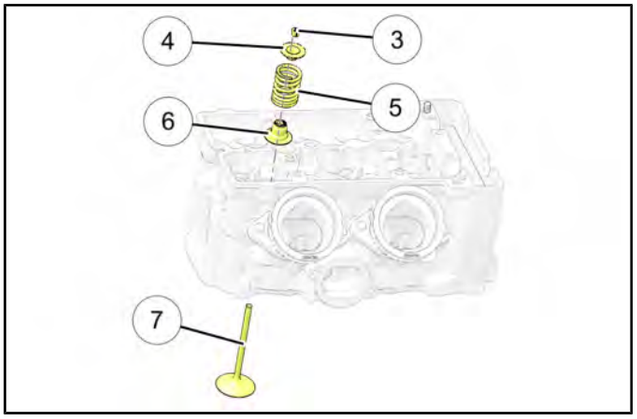
1. Remove the valve tappet and note the number on the bottom side of the tappet ①.



2. Compress the valve spring by hand using valve spring compressor adapter PV-43513-A ②.



3. Push down on spring and remove split keepers ③.



4. Slowly release valve spring pressure and remove the compressor adapter.
5. Remove the valve retainer ④, valve spring ⑤ and the valve stem seal / seat ⑥. Discard the valve seal.
6. Lift up the cylinder head and push the valve ⑦ out, keeping it in order for reassembly in the same valve guide.
7. Repeat the previous steps to remove the remaining valves.
8. Clean the combustion chamber and head gasket surface.

VALVE INSPECTION

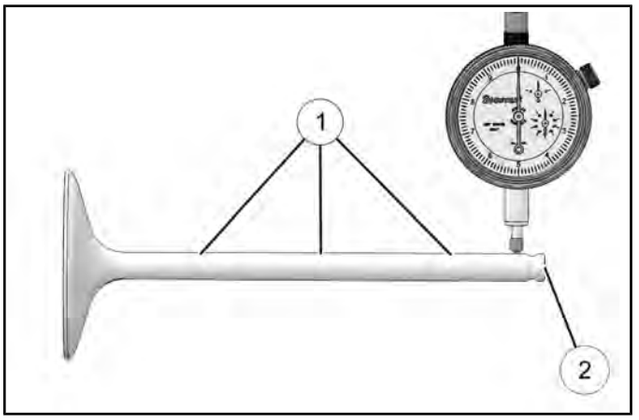
⚠ CAUTION

The EXHAUST valves are sodium filled and should be handled with care. Use proper protection when handling a broken exhaust valve.

NOTICE

Valves with 100 hours or more will have noticeable markings on the valve face. This is normal and should not cause valve leakage. Both valves shown are acceptable and would not require replacement.

1. Remove all carbon from valves with a soft wire wheel or brush.
2. Check valve face for pitting or burnt spots.
3. Inspect the valve stem ① in various spots for wear or pitting. To check for bent valve stems, mount valve in a drill or use “V” blocks and a dial indicator.

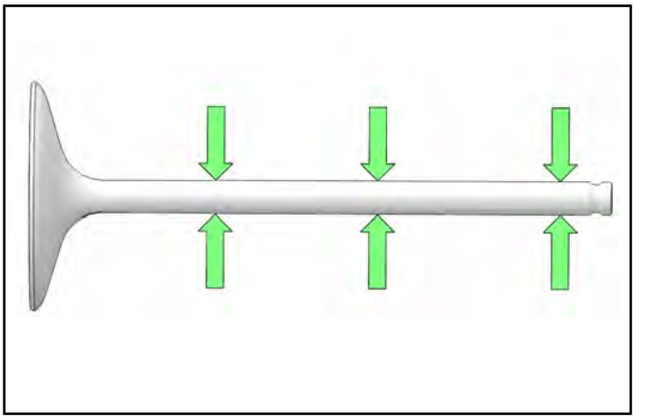


4. Check the end of the valve stem ② for flaring, pitting, wear or damage.
5. Inspect split keeper groove for wear or flaring in the keeper seat area.

NOTICE

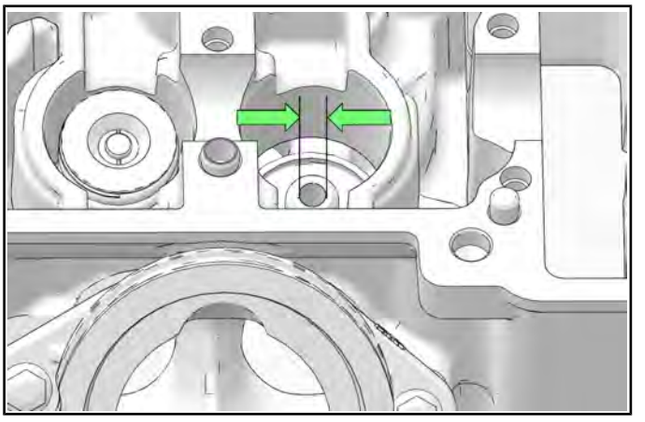
The valves can be re-faced or end ground, if necessary. They must be replaced if extensively worn, burnt, bent or damaged.

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



MEASUREMENT
Valve Stem Diameter: Intake: **.2155 - .2161" (5.475 - 5.490 mm)** Exhaust: **.2147 - .2153" (5.455 - 5.470 mm)**

7. 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.



MEASUREMENT
Valve Guide I.D.: **.2165 - .2171" (5.500 - 5.515 mm)**

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

NOTICE

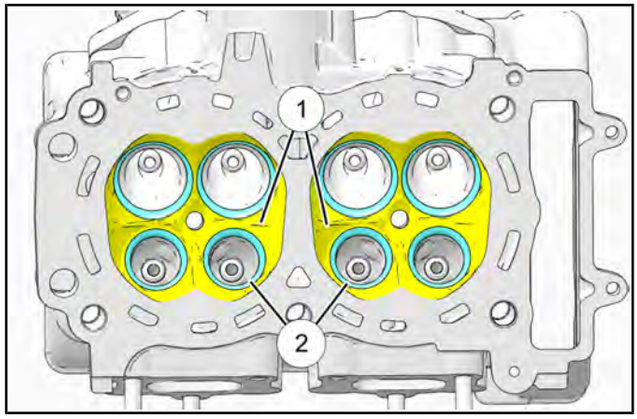
The valve guides cannot be replaced.

COMBUSTION CHAMBER CLEANING

⚠ WARNING

Wear eye protection during combustion chamber cleaning.

1. Clean all accumulated carbon deposits from combustion chambers ① and valve seat area ②.



NOTICE

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

⚠ CAUTION

The EXHAUST valves are sodium filled and should be handled with care.

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.

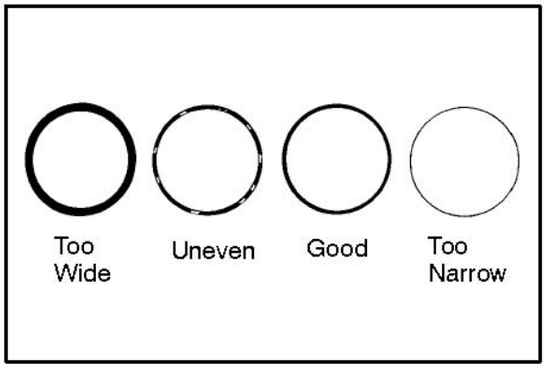
⚠ WARNING

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.



Renewing Valve Seats

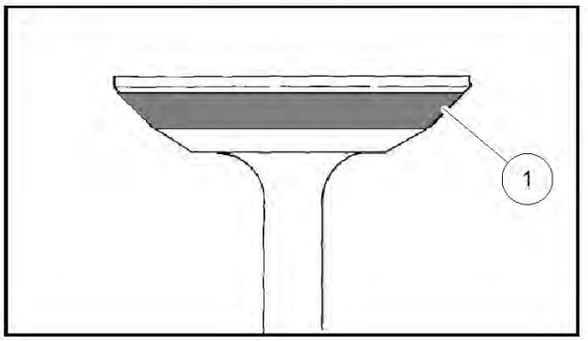
1. Install pilot into valve guide.
2. Apply cutting oil to valve seat and cutter.
3. Place 46° cutter on the pilot and make a light cut.
4. Inspect the cut area of the seat:

- 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.

NOTICE

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

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.



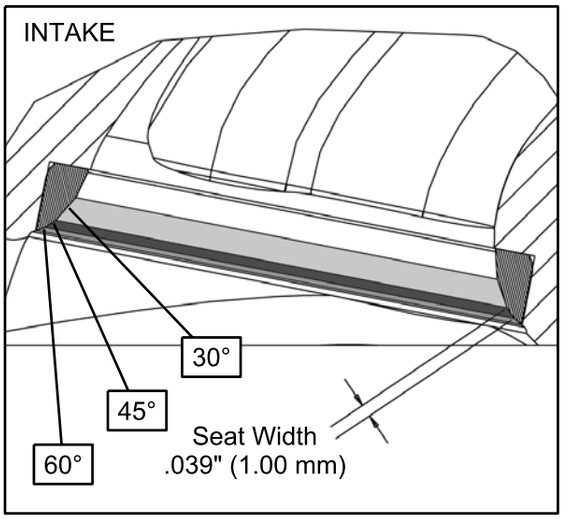
NOTICE

Valves with 100 hours or more will have noticeable markings on the valve face. This is normal and should not cause valve leakage. Both valves shown are acceptable and would not require replacement.

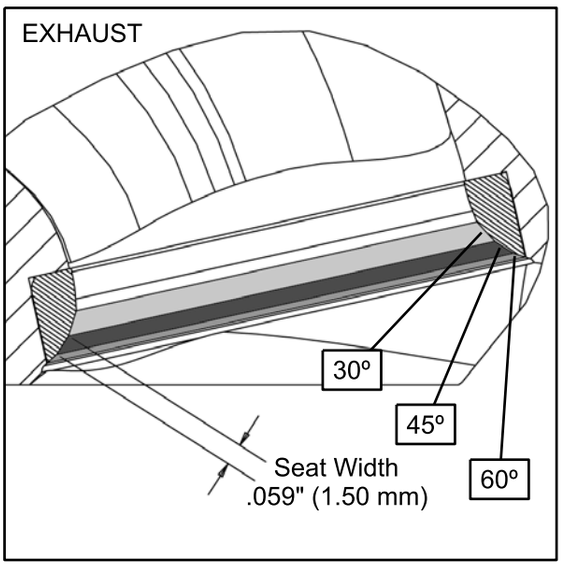
6. Insert valve into guide and tap valve lightly into place a few times.

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.

Intake Seat Cutter Diameter: 1.457″ (37.00 mm)



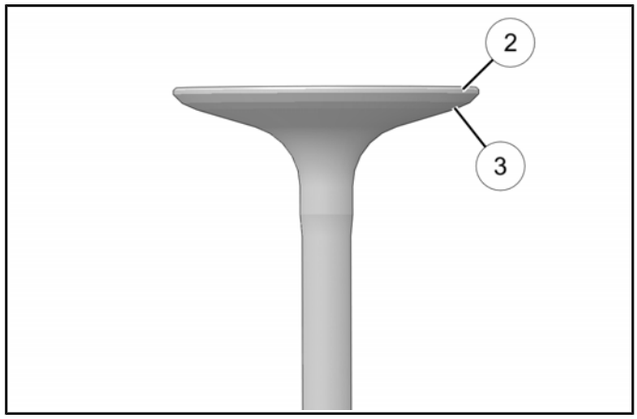
Exhaust Seat Cutter Diameter: 1.260″ (32.00 mm)



8. 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.

NOTICE
The exhaust valve seats are stellite and will be very difficult to cut.

NOTICE
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.



9. If too low, use the 60° cutter to raise the seat. When contact area is centered on the valve face, measure seat width.
10. If the seat is too wide or uneven, use both top and bottom cutters to narrow the seat.

MEASUREMENT
Valve Seat Width: Intake: **.0393 ± .0039" (1.0 ± 0.10 mm)** **Service Limit: .0551" (1.4 mm)** Exhaust: **.0590 ± .0039" (1.5 ± 0.10 mm)** **Service Limit: .0748" (1.9 mm)**

11. 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.
12. Clean all filings from the area with hot soapy water. Rinse and dry with compressed air.
13. Lubricate valve guides with clean engine oil and apply oil or water based lapping compound to the face of the valve.

NOTICE
Lapping is not required if an interference angle reconditioning method is used.

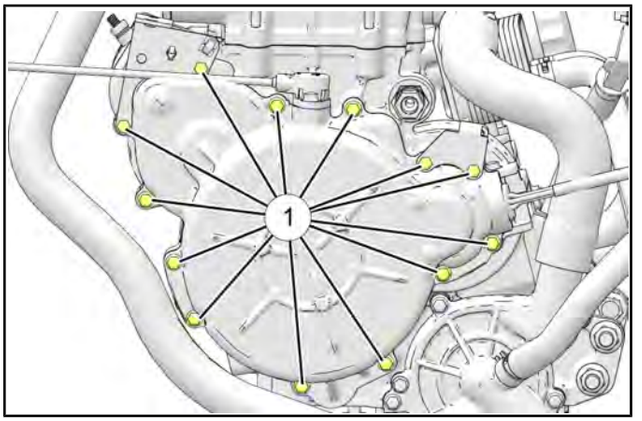
14. Insert the valve into its respective guide and lap using a lapping tool or a section of fuel line connected to the valve stem.
15. Rotate the valve rapidly back and forth until the cut sounds smooth. Lift the valve slightly off of the seat, rotate 1/4 turn, and repeat the lapping process. Do this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

ENGINE DISASSEMBLY / INSPECTION - BOTTOM END

STATOR COVER REMOVAL / INSPECTION

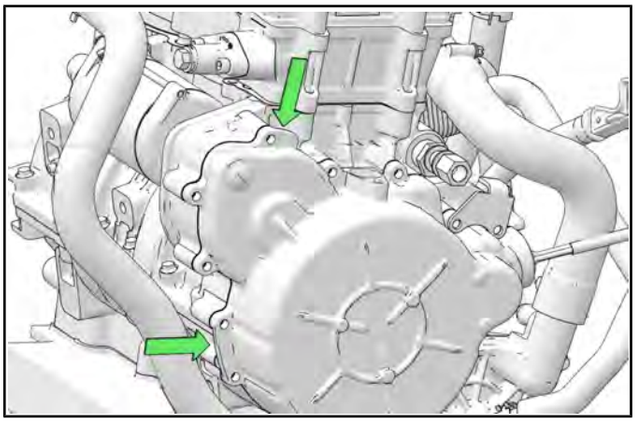
NOTICE
The stator cover can be removed with the engine installed in the chassis.

1. Remove the thirteen screws ① retaining the stator cover.

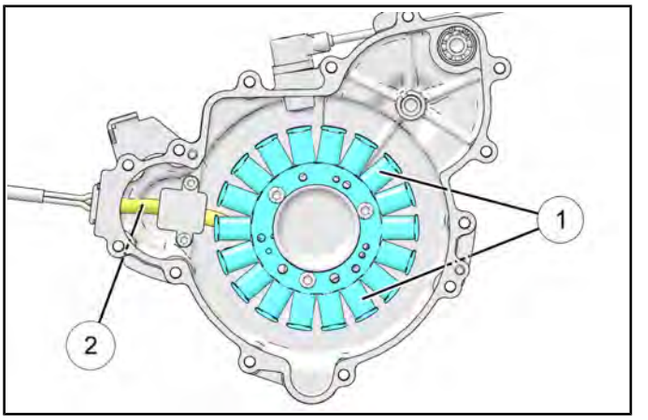


⚠ CAUTION
The flywheel contains powerful magnets. Use caution when removing and installing the stator cover. DO NOT place fingers between cover and crankcase at any time during the removal / installation process or injury could result.

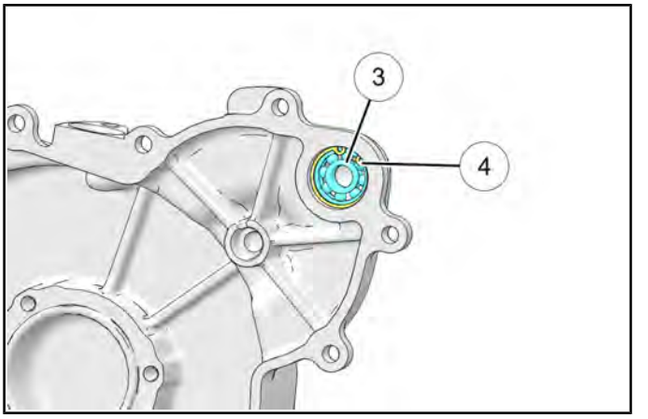
2. Carefully pry the stator cover off the engine using the two pry areas as shown below.



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



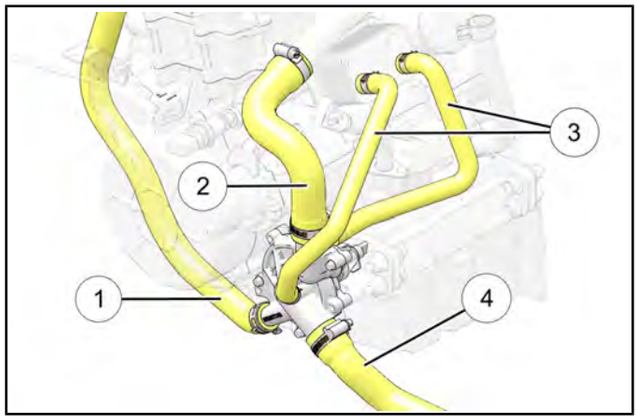
4. Inspect the ball bearing that supports the starter motor shaft.
5. If bearing ③ replacement is required, remove the retaining ring ④ and heat the stator cover around the bearing evenly with a heat gun. Tap cover on a soft work surface to remove the bearing from the housing. A blind bearing puller can also be used. Replace bearing if removed.



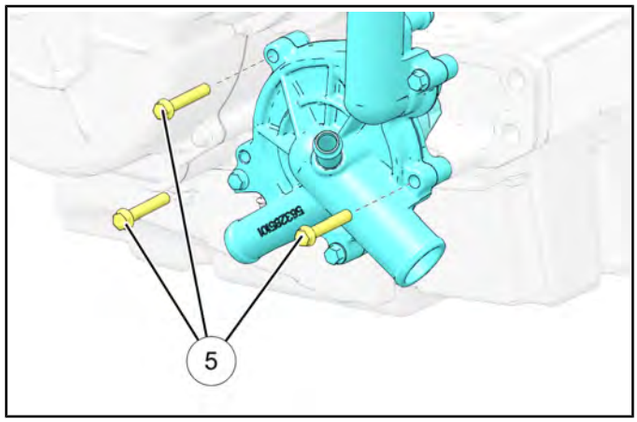
WATER PUMP HOUSING REMOVAL

NOTICE
The water pump housing can be serviced with the engine installed in the chassis.

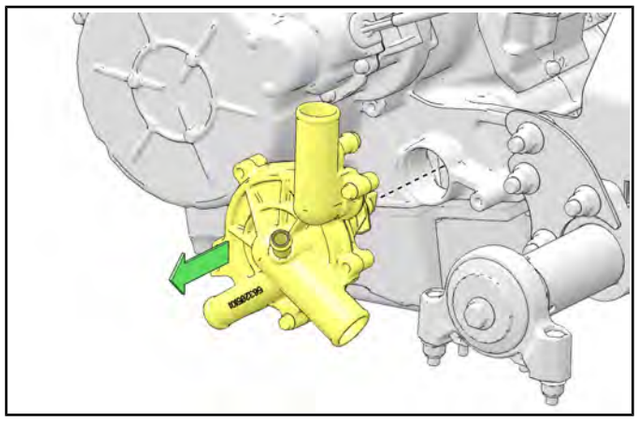
1. Remove the thermostat housing coolant lines ①, cylinder inlet hose ② , oil cooler hoses ③ and water pump inlet hose ④. Leave them all attached to the water pump housing.



2. Remove the three gold colored bolts ⑤ retaining the water pump housing to the engine.



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

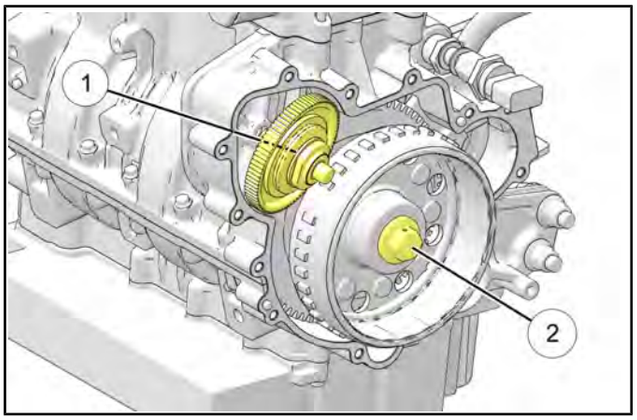


4. If water pump service is required (impeller or mechanical seal), refer to Water Pump Service page 3.38.

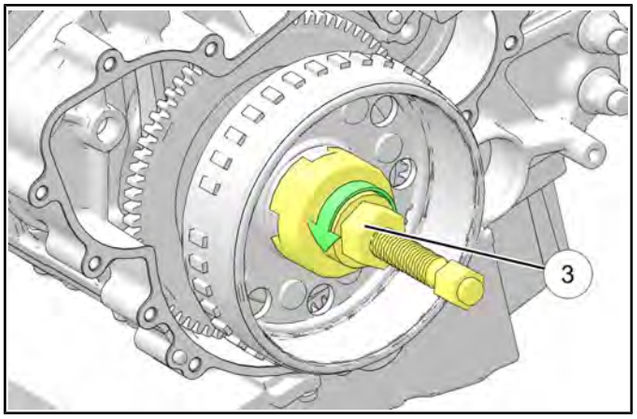
FLYWHEEL REMOVAL

NOTICE
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 ① as an assembly.



3. Inspect gear teeth for damage. Inspect fit of shaft inside gear and replace gear assembly is clearance is excessive. Inspect the shaft and bearing surfaces in the crankcase and stator cover for excessive wear.
4. Using a commercially available strap wrench, hold the flywheel and remove the flywheel retaining bolt ②.
5. Fully install Flywheel Puller PA-49316 ③ on the threads of the flywheel (left hand thread - turn flywheel puller counterclockwise to install).

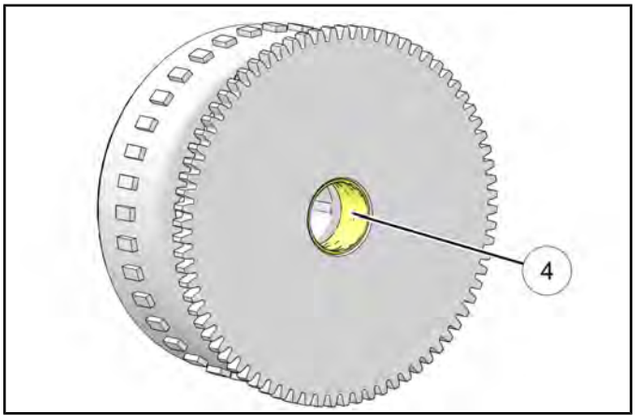


6. Hold puller body and tighten the center bolt ② to remove the flywheel.

Starter One-Way Clutch Inspection

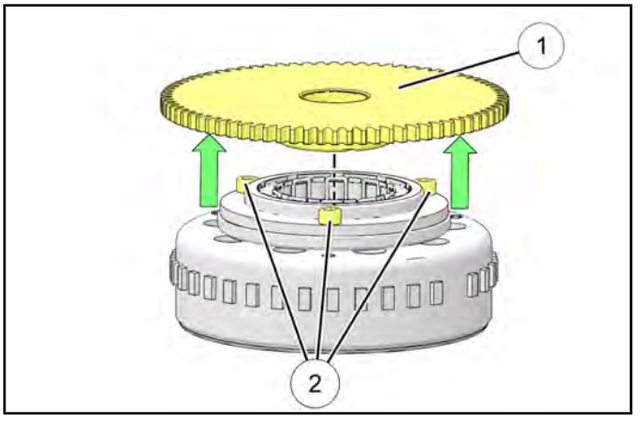
NOTICE
The starter one-way clutch can be serviced with the engine installed in the chassis.

7. 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.
8. Rotate one-way gear counterclockwise. The gear should immediately lock in position and not slip.
9. Inspect the one-way gear bushing ④ for wear or galling. If service is required, refer to Starter One-way Clutch Disassembly page 3.64.

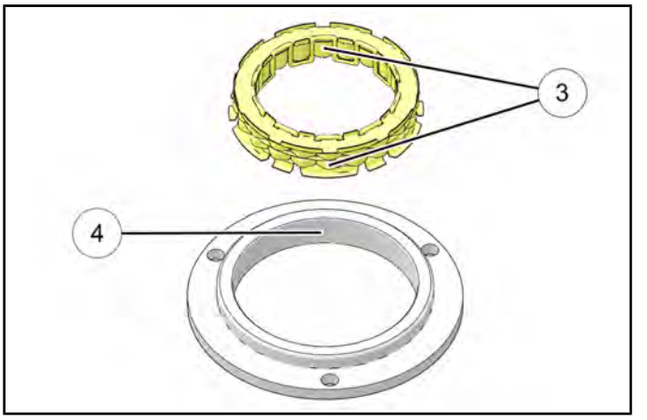


STARTER ONE-WAY CLUTCH DISASSEMBLY

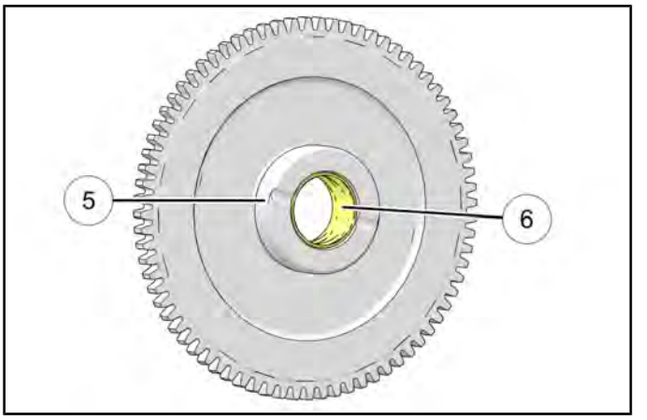
1. Lift up to remove starter one-way gear ①.



2. Remove the three one-way clutch retaining screws ②.
3. Remove the one-way clutch and inspect both sides of drive rollers ③. Inspect the roller contact surface ④ inside the hub for wear, damage or uneven surface.

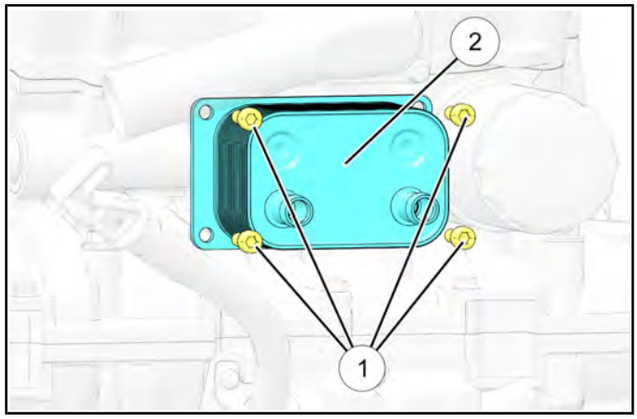


4. Inspect drive surface of starter gear ⑤ and bushing ⑥ for wear, damage or uneven surface. If any starter one-way clutch component is worn or damaged, replace the clutch and starter gear as an assembly.

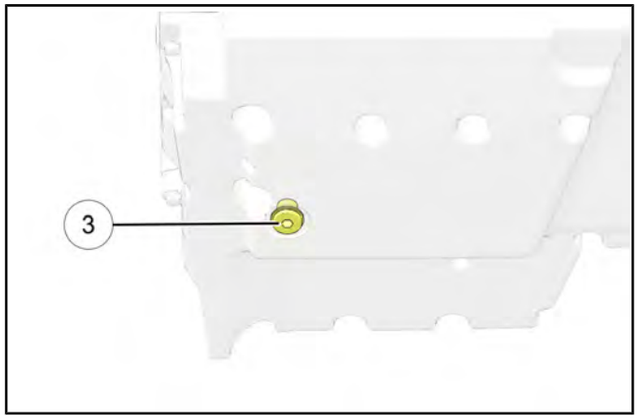


CRANKCASE DISASSEMBLY

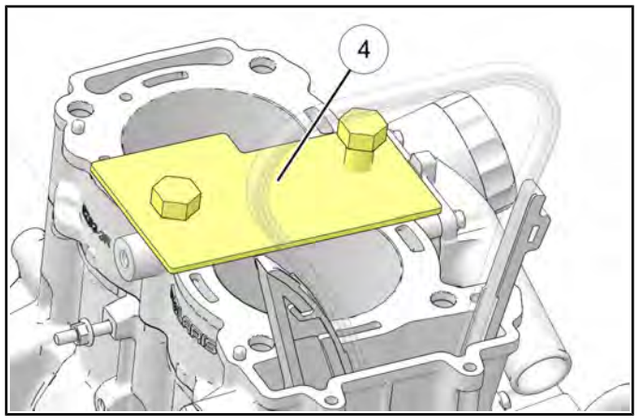
1. Remove the four fasteners ① retaining the oil cooler ② to the crankcase.



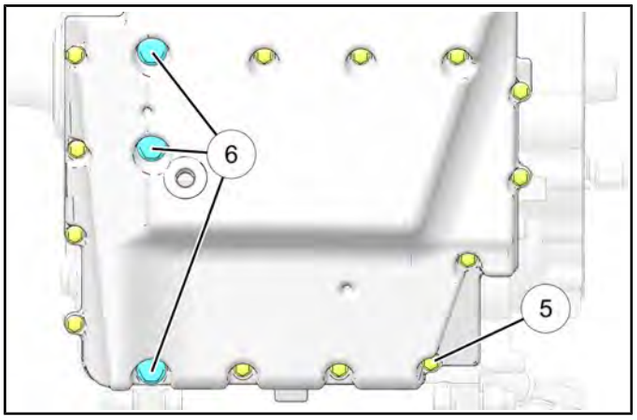
2. Remove the crankcase drain plug ③ to drain any oil remaining in the engine.



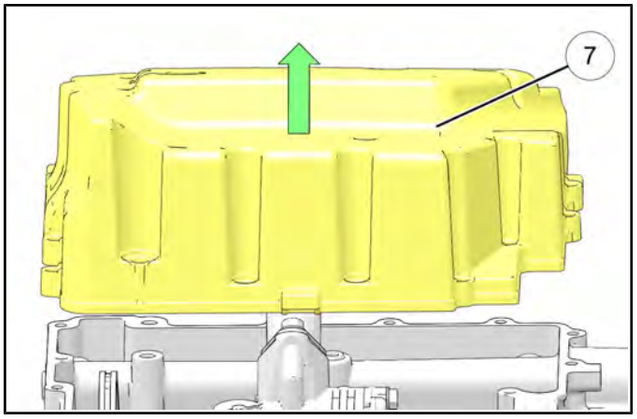
3. Remove the oil filter.
4. Install the Cylinder Holding & Camshaft Timing Plate PU-50563 ④ onto the cylinder. The cylinder holding tool retains the cylinder and pistons when the engine is rotated.



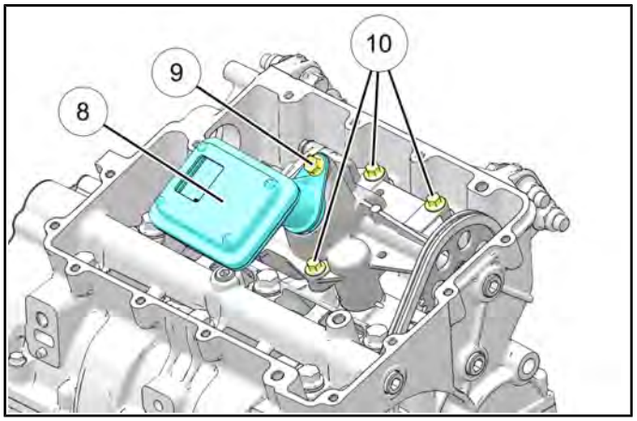
5. Rotate engine to access the crankcase sump cover.
6. Remove the thirteen M6 ⑤ and three M8 ⑥ bolts retaining the sump cover to the crankcase.



7. Remove the sump cover ⑦ from the crankcase.

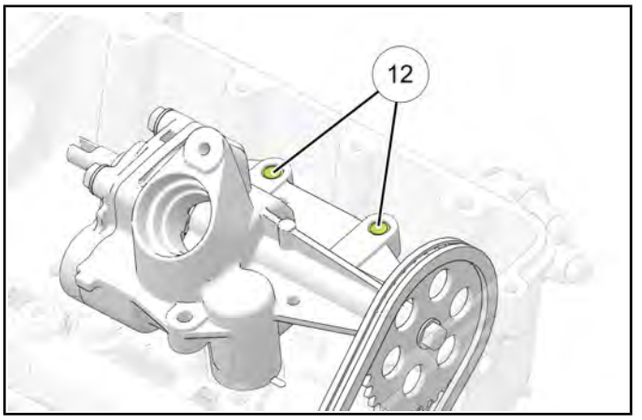


8. Remove and clean oil pump pick-up ⑧ by removing the one bolt ⑨.



9. Remove the three bolts ⑩ that retain the oil pump ⑪ to the crankcase.

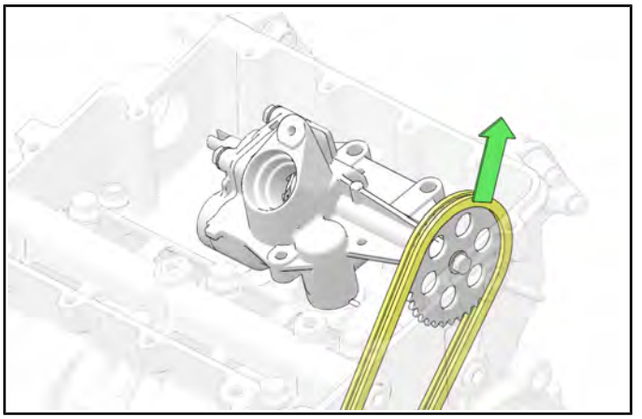
10. Use one of the oil pump retaining bolts or a pen magnet to extract the dowel pins ⑫ from the oil pump. Doing so allows for oil pump removal without having to remove the pump drive sprocket.



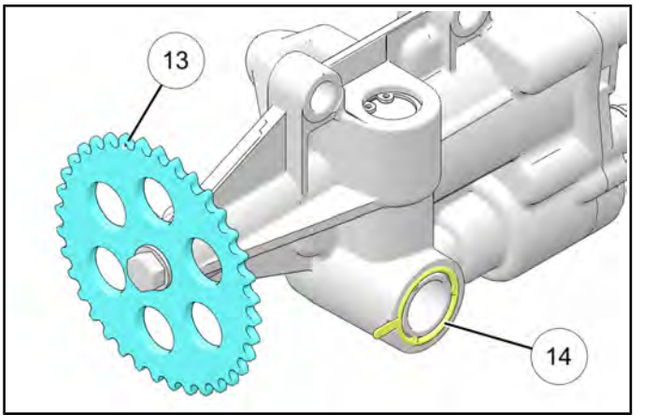
NOTICE

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 off the sprocket and remove the oil pump.



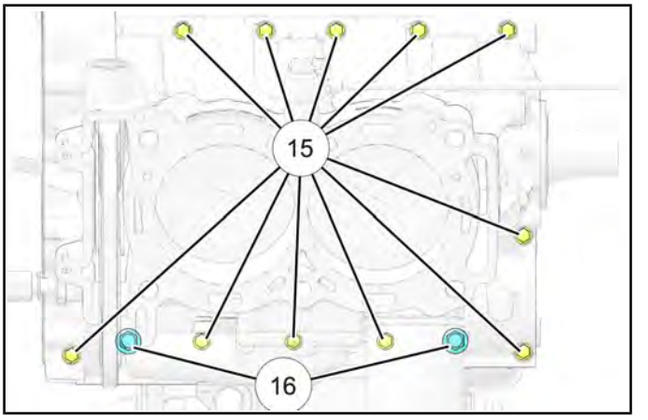
12. Visually inspect the oil pump and drive sprocket ⑬ for wear or damage. Replace oil pump drive chain and sprocket if worn or damaged. If any part of the oil pump is damaged, the entire assembly must be replaced. Replace the oil pump seal ⑭ during crankcase assembly.



NOTICE

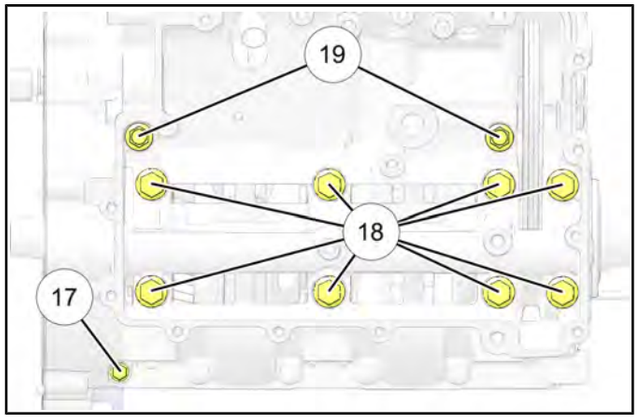
Oil pump assembly is non-serviceable

13. Rotate the engine so the cylinder is facing up.
14. Remove the eleven M6 ⑮ and two M8 ⑯ upper crankcase bolts.

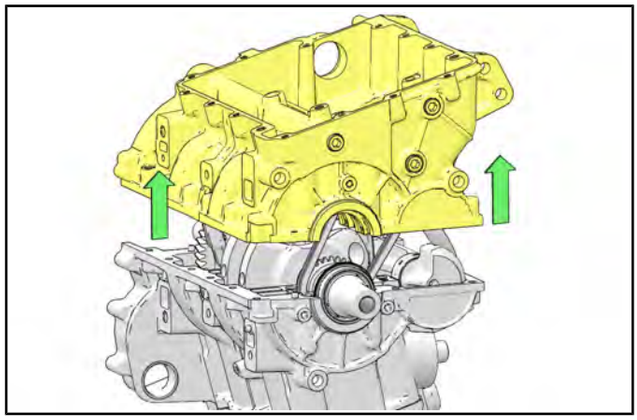


15. Rotate the engine so the cylinder is facing down.

16. Remove the one M6 ⑰, eight M10 ⑱ and two M8 ⑲ lower crankcase bolts. Discard the eight M10 bolts.



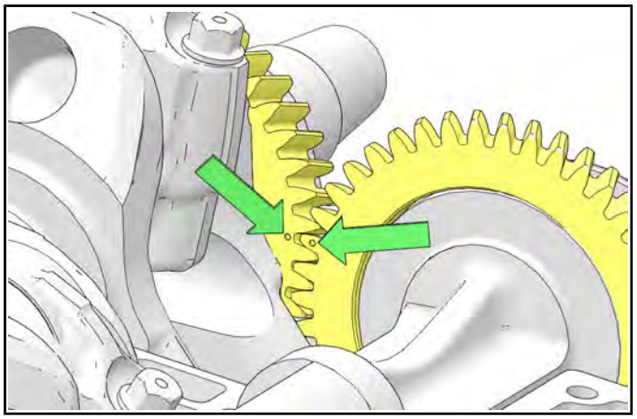
17. Tap on the lower crankcase in reinforced areas with a soft faced hammer to loosen. Carefully lift up and remove the lower crankcase half.



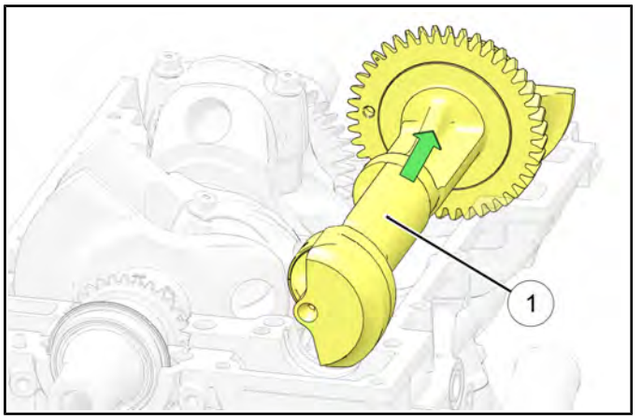
BALANCE SHAFT REMOVAL / INSPECTION

1. Perform Crankcase Disassembly page 3.65.

2. Note timing marks on balance shaft and crankshaft drive gears. Shafts must be properly timed upon assembly.

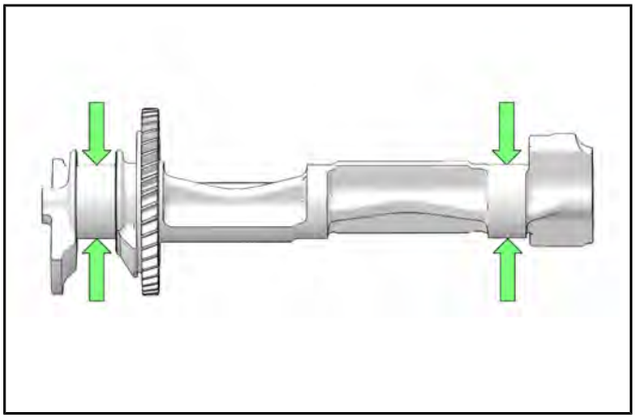


3. Carefully rotate the balance shaft ① and remove it from the crankcase.



4. Inspect the balance shaft gear teeth for damage.

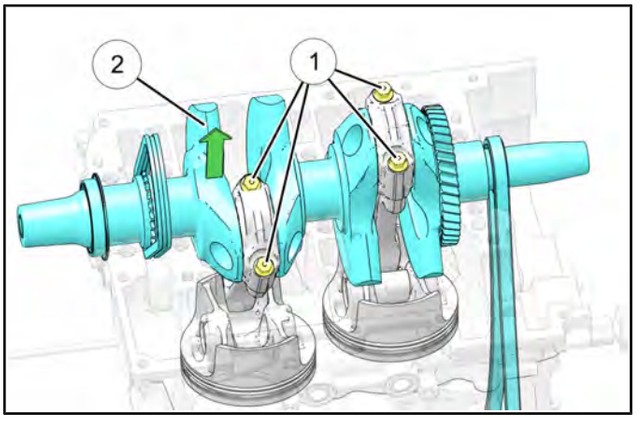
5. Measure each bearing journal in two locations, 90 degrees apart. Replace balance shaft if either journal is worn below the service limit specification. If worn past the service limit, replace the balance shaft assembly.



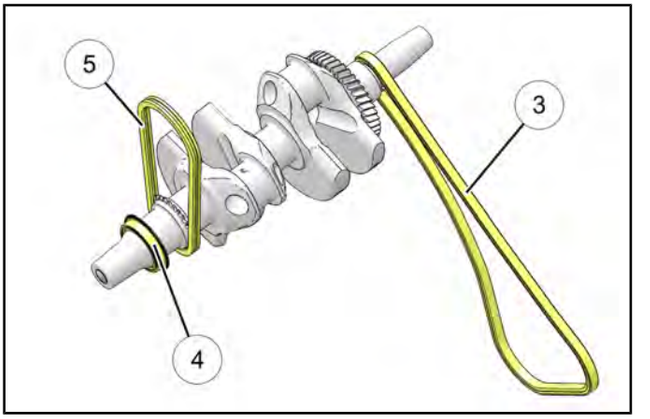
MEASUREMENT
Balance Shaft Diameter (MAG & PTO): **1.4939 - 1.4946" (37.946 - 37.962 mm)** **Service Limit: 1.4921" (37.900 mm)**

CRANKSHAFT REMOVAL / INSPECTION

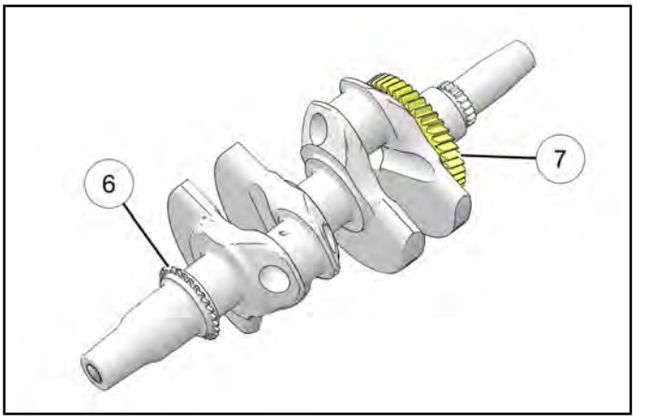
1. Perform Balance Shaft Removal / Inspection page 3.67
2. For ease of assembly, mark each connecting rod and end cap.
3. Loosen, remove and discard the four connecting rod bolts ①. Remove the end caps from the crankshaft ②.



4. Carefully lift the crankshaft out of the crankcase.
5. Remove the cam chain ③, PTO main seal ④ and oil pump drive chain ⑤ from the crankshaft.

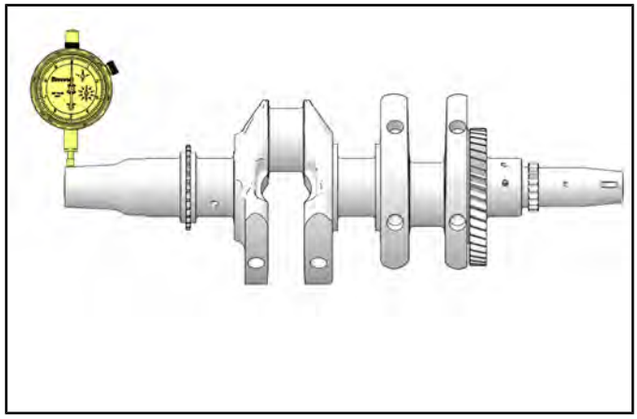


6. Inspect the auxiliary sprocket ⑥ and crankshaft gear ⑦ for broken or worn teeth.



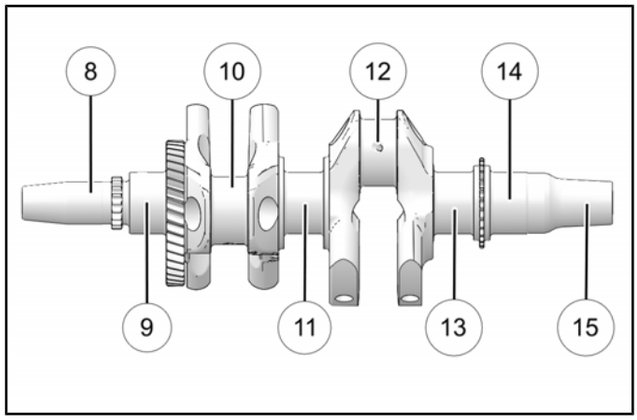
NOTICE
If either the crankshaft gear or auxiliary sprocket is damaged, the crankshaft assembly must be replaced.

7. 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.



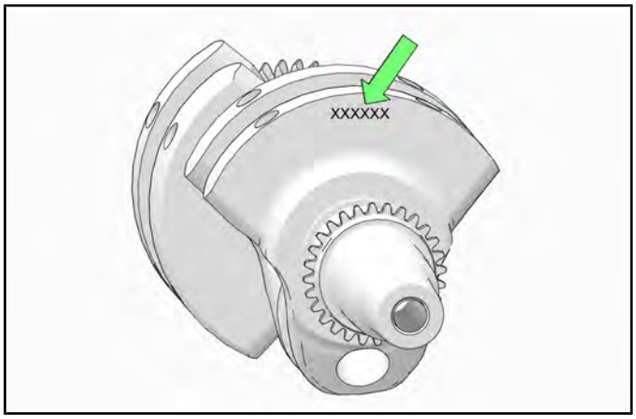
MEASUREMENT
Crankshaft Maximum Runout: **Less than .001″ (0.035 mm)**

8. Visually inspect surface of crankshaft main and connecting rod journals. Replace crankshaft if any journal is scratched or pitted.
9. 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

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



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

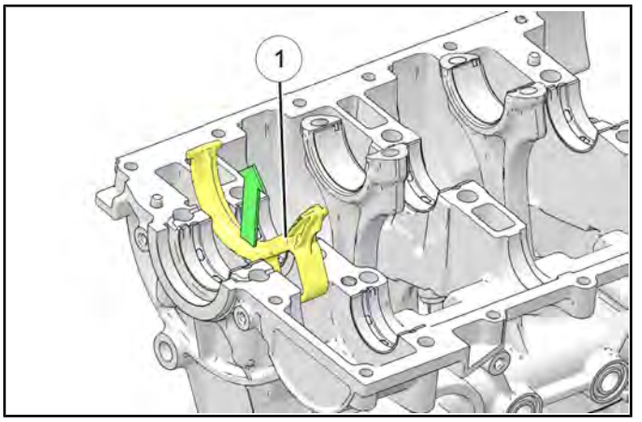
CRANKSHAFT BEARING JOURNAL DIAMETERS

A		
Main Bearing	Standard	**1.6140 - 1.6143" (40.996 - 41.004 mm)**
	Service Limit	**1.6129" (40.970 mm)**
Connecting Rod Bearing	Standard	**1.7715 - 1.7717" (44.995 - 45.002 mm)**
	Service Limit	**1.7704" (44.968 mm)**
B		
Main Bearing	Standard	**1.6137 - 1.6140" (40.988 - 40.995 mm)**
	Service Limit	**1.6129" (40.970 mm)**
Connecting Rod Bearing	Standard	**1.7718 - 1.7720" (45.003 - 45.010 mm)**
	Service Limit	**1.7707" (44.976 mm)**
C		
Main Bearing	Standard	**1.6134 - 1.6137" (40.980 - 40.987 mm)**
	Service Limit	**1.6129" (40.970 mm)**
Connecting Rod Bearing	Standard	**1.7721 - 1.7724" (45.011 - 45.019 mm)**
	Service Limit	**1.7710" (44.984 mm)**

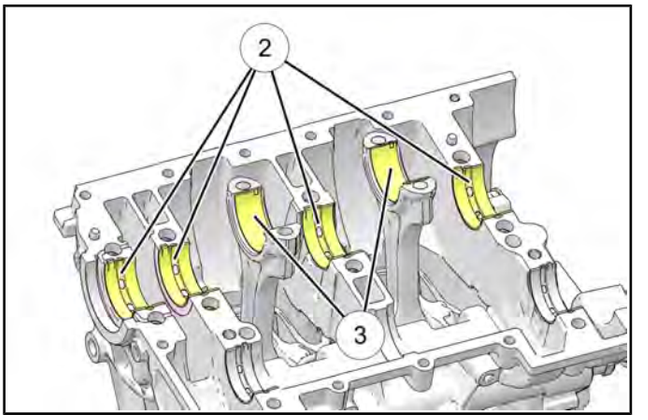
12. Whether installing a new crankshaft or re-installing the original, refer to the bearing selection chart provided in the Connecting Rod Bearing Selection page 3.76 and Crankshaft Main Bearing Selection page 3.77 procedures.

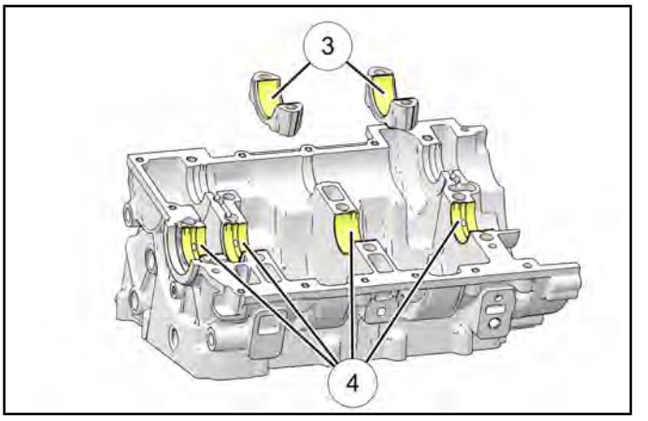
CRANKCASE INSPECTION

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.
5. Remove and discard the plain bearings located in the upper crankcase ②, connecting rods ③, and lower crankcase 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.



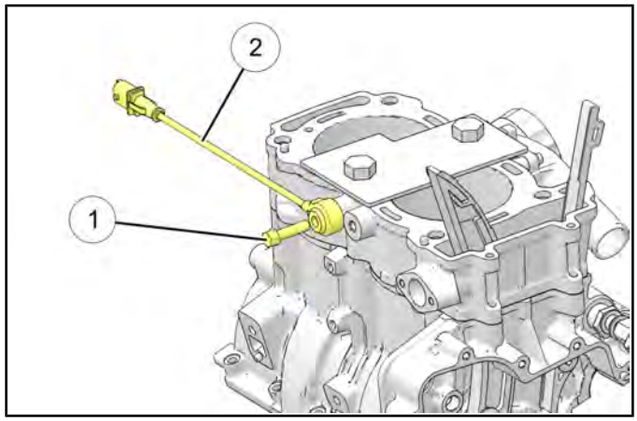


NOTICE
Always replace plain bearings when the crankcase or connecting rods have been disassembled. Refer to Crankshaft Main Bearing Selection page 3.77.

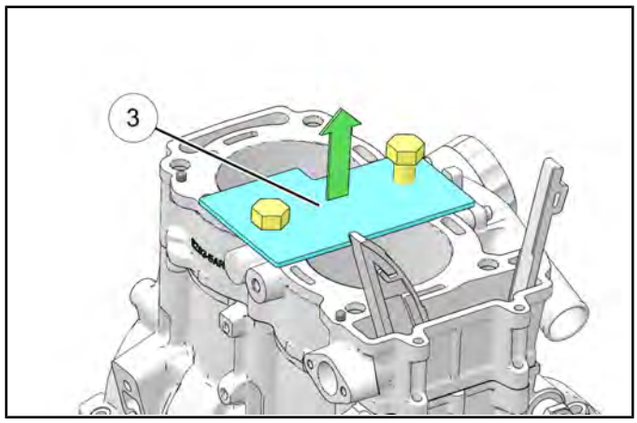
CYLINDER / PISTON REMOVAL

IMPORTANT
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.

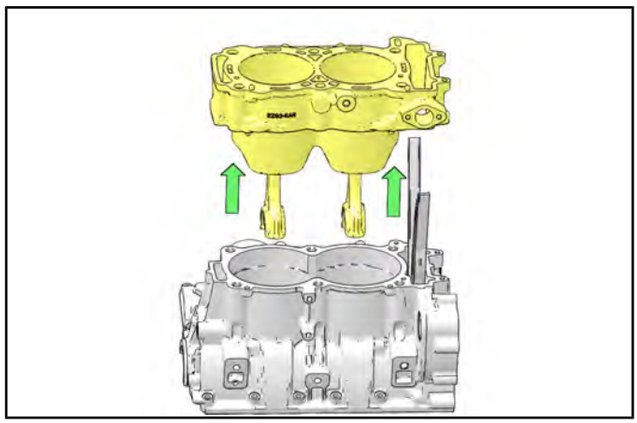
1. Perform “ENGINE DISASSEMBLY / INSPECTION - TOP END” and the “ENGINE DISASSEMBLY / INSPECTION - LOWER END” procedures.
2. Rotate the engine so the cylinder is facing up.
3. Remove the fastener ① retaining the knock sensor ② to the cylinder and remove the knock sensor.



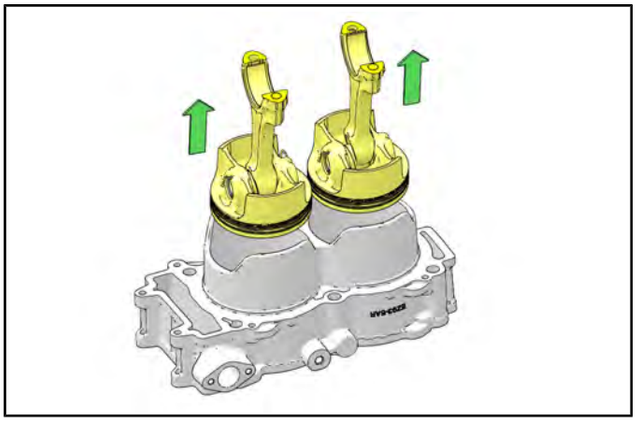
4. Remove the Cylinder Holding & Camshaft Timing Plate (PU-50563) ③ from the cylinder.



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



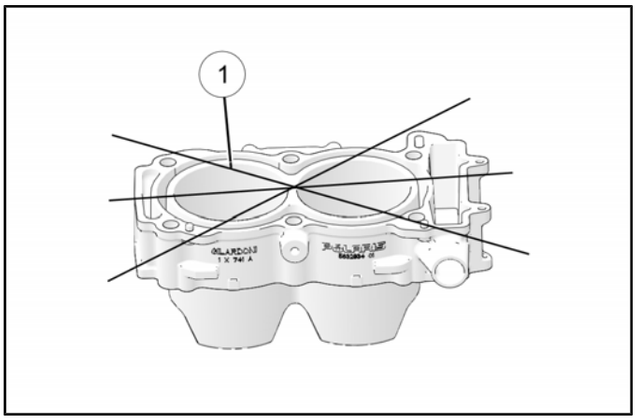
6. Remove the piston / connecting rod assemblies from the cylinder.



NOTICE
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.



MEASUREMENT
Cylinder Warp Limit: **.002″ (0.05 mm)**

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

CAUTION
DO NOT hone the cylinders or attempt to repair a damaged cylinder by honing.

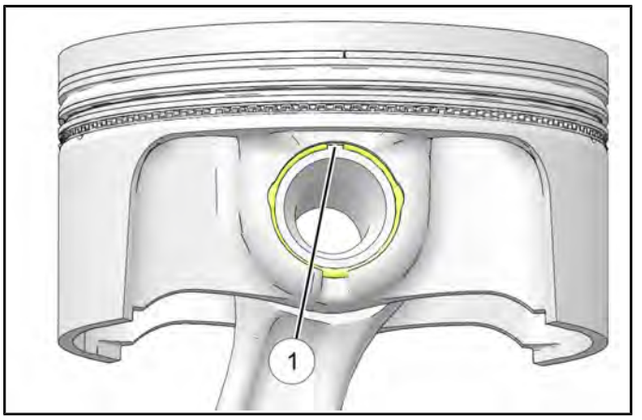
3. Inspect taper and out of round with a dial bore gauge.
4. Inspect cylinder for taper and out of round with a dial bore gauge. Measure in two different directions (front to back and side to side), on three levels (0.6″ down from top, the middle, and 1.5″ up from bottom). Record measurements. If cylinder is tapered or out of round beyond the service limit, the cylinder must be replaced.

MEASUREMENT
Standard Bore Size: **3.6614 ± .0003" (93 mm ± 0.008 mm)** Cylinder Taper: **Service Limit: .001″ (0.025 mm)** Cylinder Out of Round: **Service Limit: .001″ (0.025 mm)**

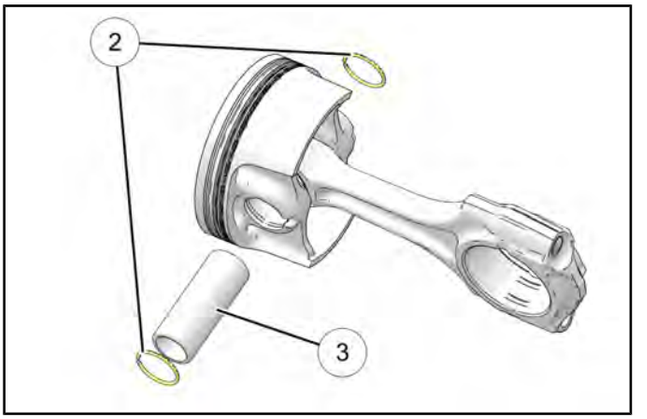
PISTON DISASSEMBLY / INSPECTION

NOTICE
New pistons are directional (intake vs. exhaust), but can be placed in either cylinder. The arrow will point towards the exhaust side.

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

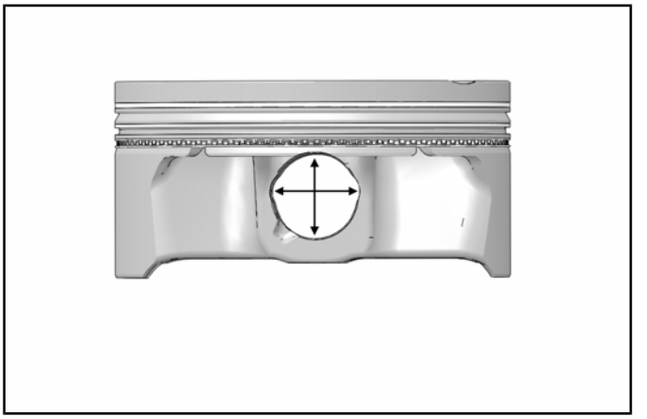


2. Remove piston circlips ② and push piston pin ③ out of piston. If necessary, heat the crown of the piston slightly with a heat gun if pin cannot be removed by hand. Discard circlips.



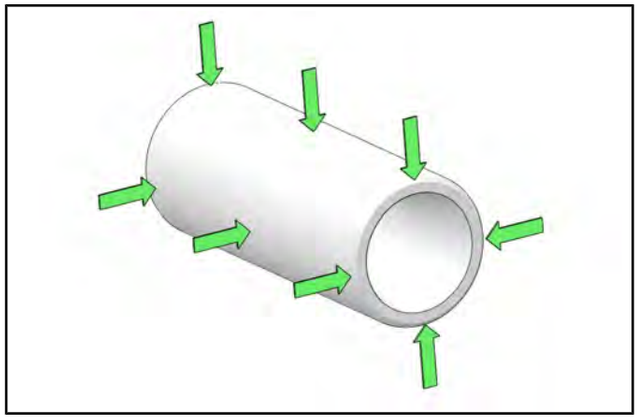
CAUTION
DO NOT apply heat to piston rings or a loss of radial tension could result.

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



MEASUREMENT
Piston Pin Bore I.D.: **.8665 - .8668" (22.009 - 22.017 mm)** **Service Limit:.8678" (22.042 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.

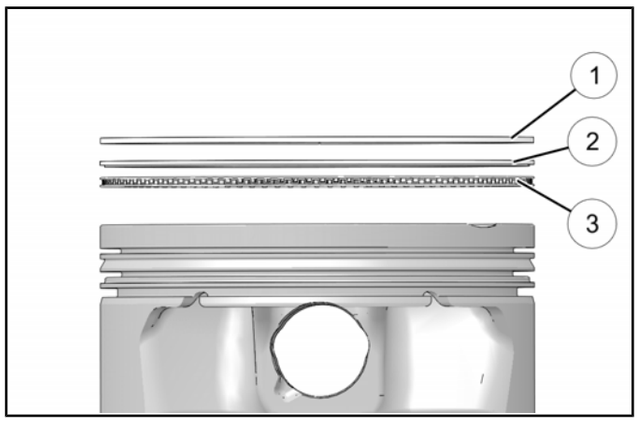


MEASUREMENT
Piston Pin O.D.: **.8659 - .8661" (21.995 - 22.000 mm)** **Service Limit: .8651" (21.975 mm)**

PISTON RING REMOVAL

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

- **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.

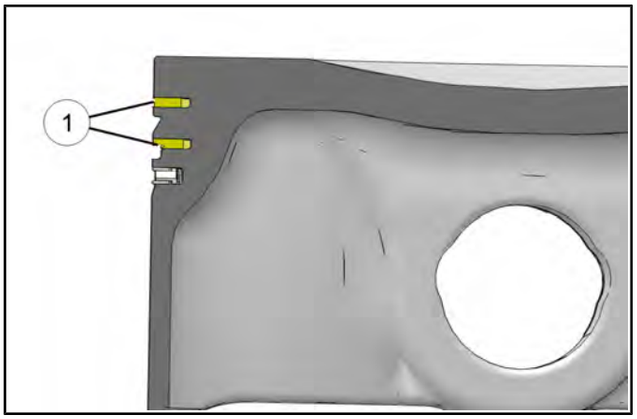


CAUTION
DO NOT expand the ring more than necessary to remove it from the piston or the ring may break or lose radial tension.

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.

PISTON RING TO GROOVE CLEARANCE

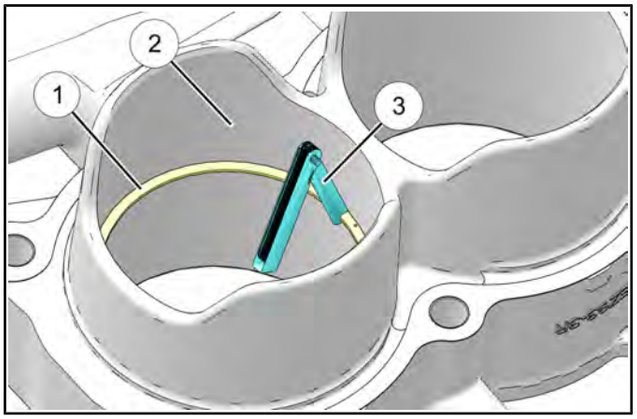
Measure piston ring to groove clearance ① by placing the ring in the ring land and measuring with a thickness (feeler) gauge. Replace piston and rings if ring-to-groove clearance exceeds service limits.



MEASUREMENT
Piston Ring to Groove Clearance: **Top Ring/ Second Ring:** **.0007 - .0023" (0.020 - 0.060 mm)** **Service Limit:.0047" (0.12 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.



2. Measure installed gap with a feeler gauge ③ at both the top and bottom of the cylinder.

NOTICE
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.

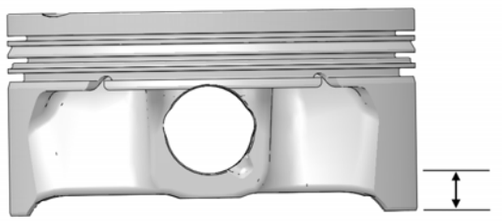
MEASUREMENT
Piston Ring Installed Gap: Top Ring: **.010 - .016" (0.24 - 0.40 mm)** Service Limit: **.0196" (0.50 mm)** Second Ring: **.015 - .025" (0.37 - 0.63 mm)** Service Limit: **.028" (0.70 mm)** Oil Control Rails: **.010 - .040" (0.25 - 1.02 mm)** Service Limit: **.045" (1.15 mm)**

IMPORTANT
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.

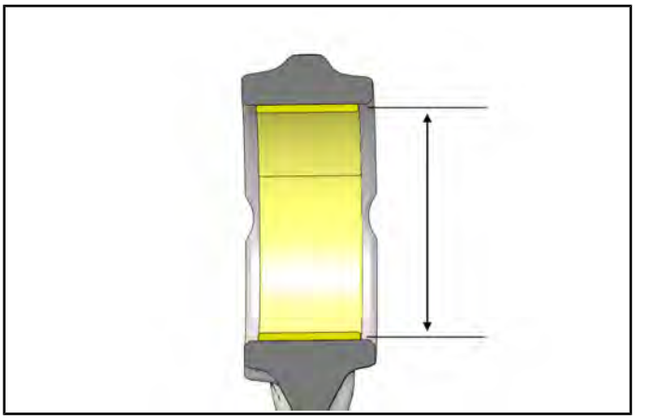


MEASUREMENT
Piston O.D. (Standard): **3.6597 ± .0003" (92.959 ± 0.008 mm)**

MEASUREMENT
Piston to Cylinder Clearance: **.0009 - .0019" (0.025 - 0.050 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.

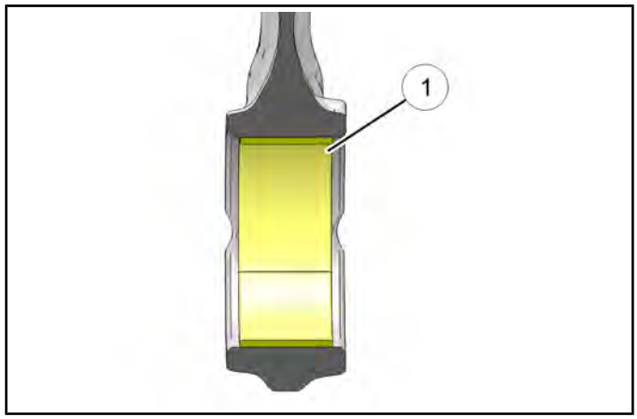


MEASUREMENT
Connecting Rod Small End I.D.: **.8667 - .8673" (22.015 - 22.03 mm)** Service Limit: **.8677" (22.04 mm)**

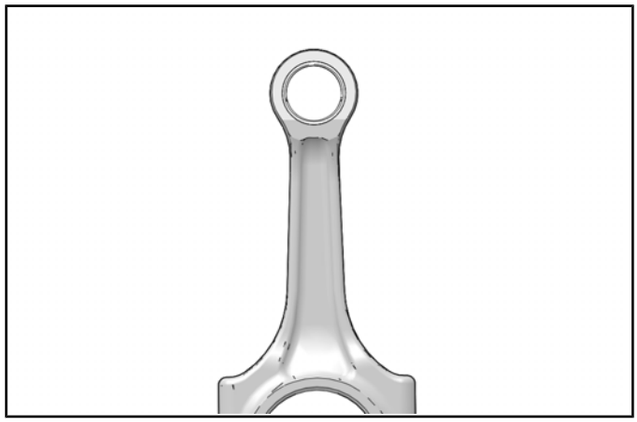
3. Install matching rod cap on connecting rod **(without bearings)** and install the bolts.
4. Tighten bolts by hand, then torque to specification prior to taking any measurements.

TORQUE
Connecting Rod Cap Bolts: **Step 1: 9 ft-lbs (12 Nm)** **Step 2: 22 ft-lb (30 Nm)** **Step 3: Tighten add’n 90°**

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.

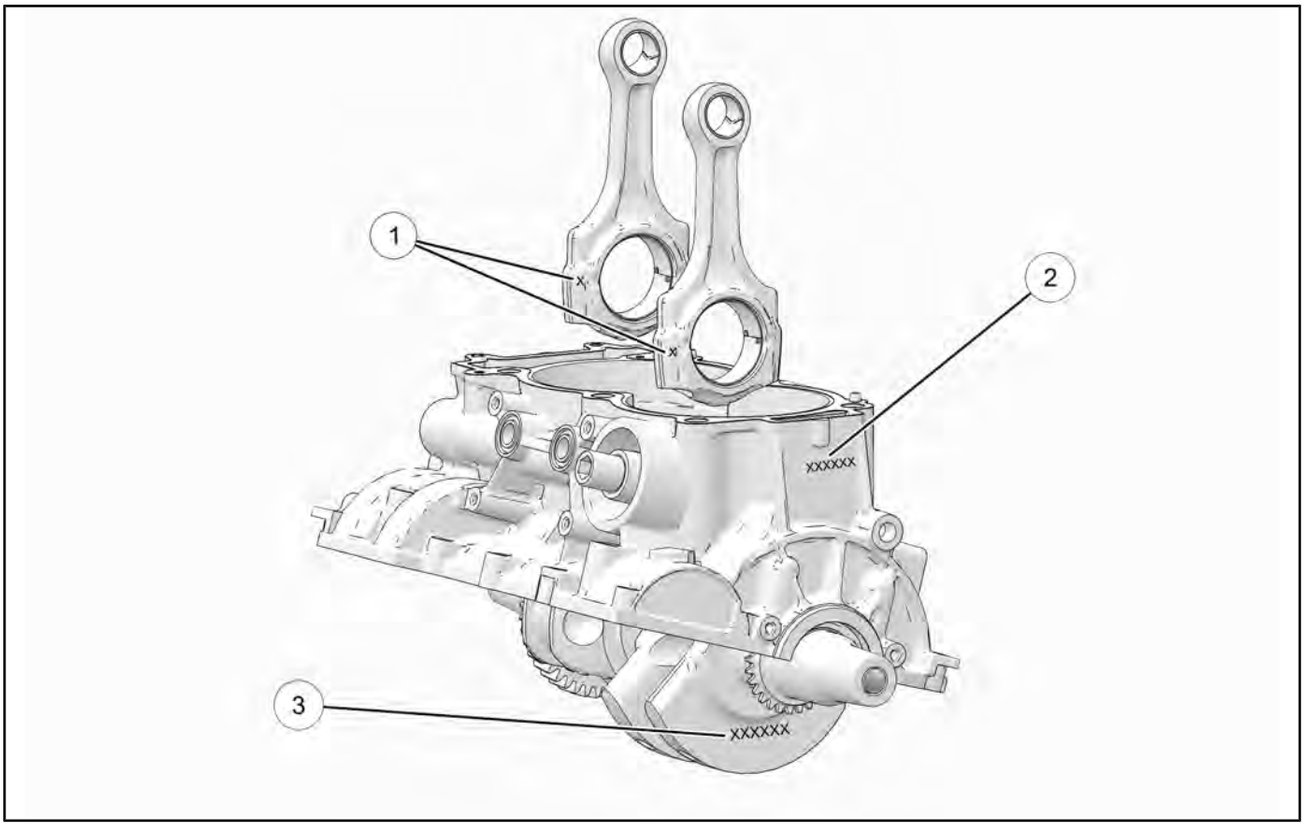
CONNECTING ROD BIG END BORE DIAMETERS

1	2	3
1.8892 - 1.8895" (47.987 - 47.994 mm)	**1.8896 - 1.8898" (47.995 - 48.001 mm)**	**1.8898 - 1.8901" (48.002 - 48.008 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 - BOTTOM END

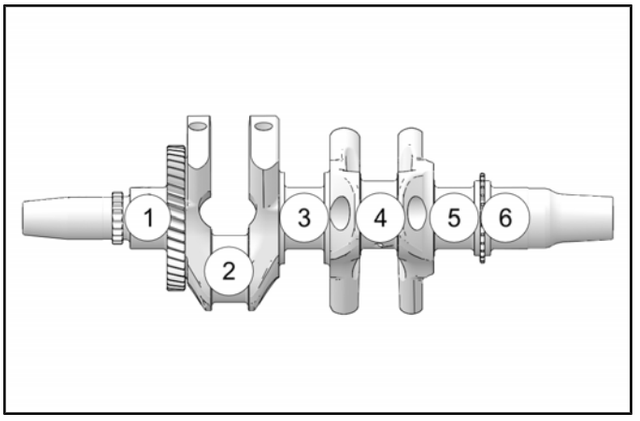
BEARING SELECTION IDENTIFICATION



① Connecting Rod Bearing Identification Number (one number)	② Crankcase Bearing Identification Number (six numbers)	③ Crankshaft Bearing Identification Letters (six letters)

CONNECTING ROD BEARING SELECTION

In order to select the proper bearing for the connecting rods, you must reference the number on each connecting rod and match that up with the rod journal letters on the crankshaft. Reference Bearing Selection Identification page 3.76



For example, the stamping on the crankshaft reads *ABBCBA*. The crankshaft connecting rod journals are ② and ④. Based on the crankshaft code, one journal would be *B* and the other *C*. The connecting rods were both stamped *2*

Based off the bearing selection chart, you would use:

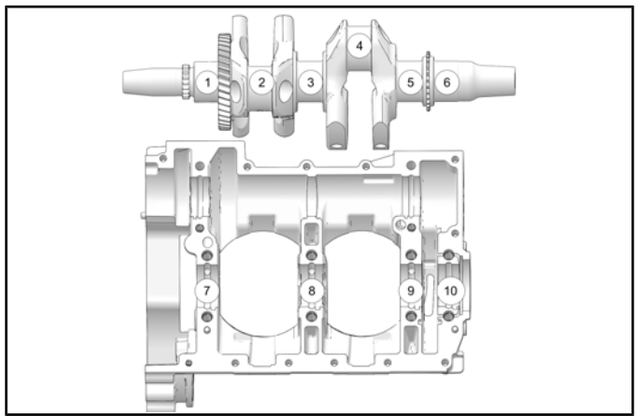
Green bearing for connecting rod journal ② and *Yellow* for connecting rod journal ④.

BEARING SELECTION CHART – ROD BEARINGS

	CRANKSHAFT			
Rod	Code	A	B	C
	1	White	Red	Red
	2	Blue	White	Red
	3	Yellow	Blue	White

CRANKSHAFT MAIN BEARING SELECTION

In order to select the proper main bearings for the crankshaft, you must reference the six numbers on the crankcase and match that up with the main journal letters on the crankshaft. Reference Bearing Selection Identification page 3.76



For example, you would use the number *2* as the crankcase codes (case journals ①, ②, ③, ④). The stamping on the crankshaft reads *ABBCBA* (crank journals①, ③, ⑤, ⑥). Based off the bearing selection chart, you would use:

Blue bearing for Main #1 ⑦

Green bearing for Main #2 ⑧

Green bearing for Main #3 ⑨

Blue bearing for Main #4 ⑩

BEARING SELECTION CHART — MAIN BEARINGS

	Crankshaft			
Case	Code	A	B	C
	1	Blue	Blue	Green
	2	Blue	Green	Yellow
	3	Green	Yellow	Yellow

UPPER CRANKCASE PREPARATION

IMPORTANT

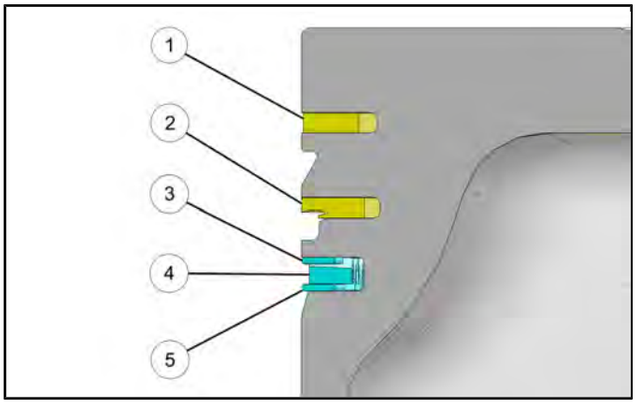
Always replace plain bearings when the crankcase or connecting rods have been disassembled. Refer to bearing selection procedures.

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 page 3.6 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

NOTICE

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 Piston Ring Installed Gap page 3.73). Clean accumulated carbon from piston ring grooves and oil ring lube holes if piston has been in service.



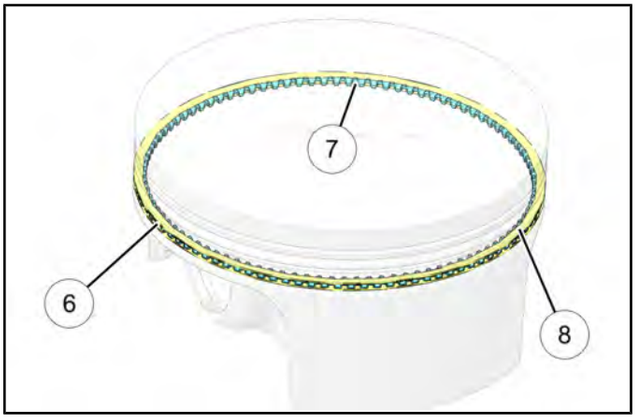
① Top Ring	④ Spring Expander
② Second Ring	⑤ Lower Rail
③ Upper Rail	

1. Place oil control ring expander in oil ring groove. Rotate expander in groove until butt ends are on PTO side of piston ⑥.

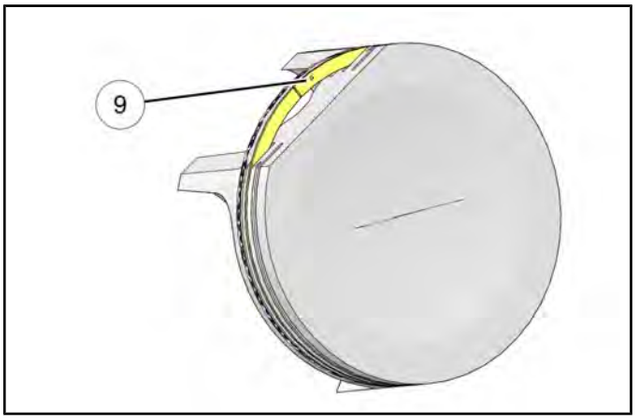
NOTICE

Ends must butt squarely together and must not overlap.

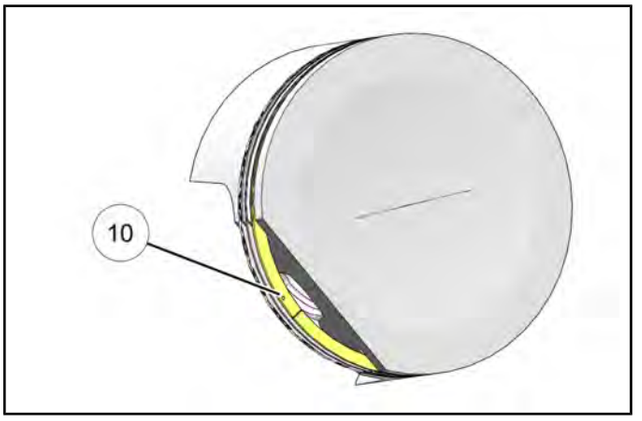
2. Install lower rail with end gap positioned on the intake side of piston ⑦.



3. Install upper rail with end gap positioned on the exhaust side of piston ⑧.
4. Install second compression ring with marking facing top of piston ⑨. Rotate ring to position the end gap toward intake side of piston as shown below.



5. Install top compression ring with marks facing top of piston ⑩. 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.

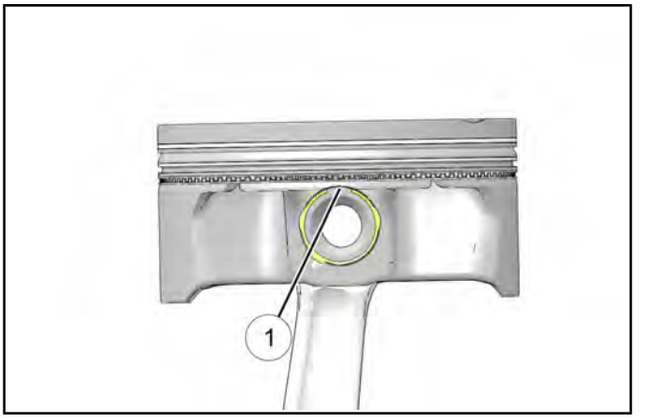
PISTON / CONNECTING ROD ASSEMBLY

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).



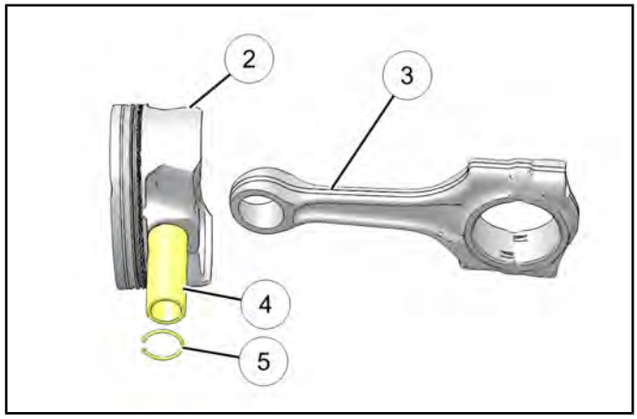
IMPORTANT

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.



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

PISTON / CYLINDER 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.

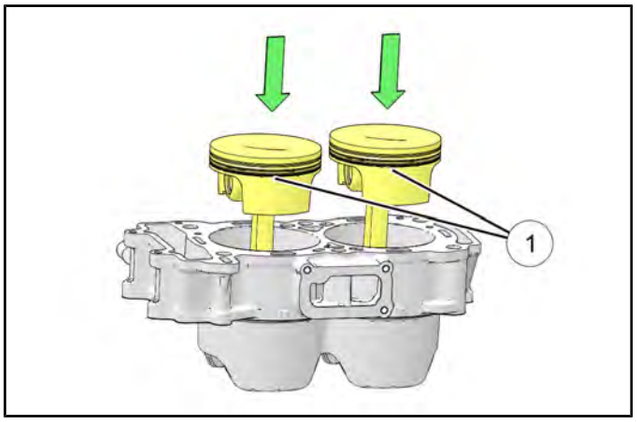
IMPORTANT

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

CAUTION

The pistons ARE directional. The relief pockets in the pistons must face the intake side and the arrow points towards the exhaust side.

1. Apply clean engine oil to each piston assembly ① and cylinder bore prior to installation.



2. Verify that all ring end gaps are correctly located on each piston (see Piston Ring Installation page 3.77).
3. Carefully compress the piston rings with your fingers and install the piston / connecting rod assemblies into the cylinder from the top side.

NOTICE

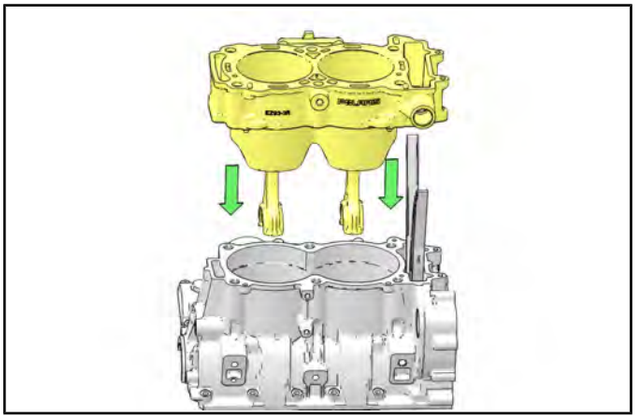
Use a slight front to back rocking motion until all rings are captive in cylinder.

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

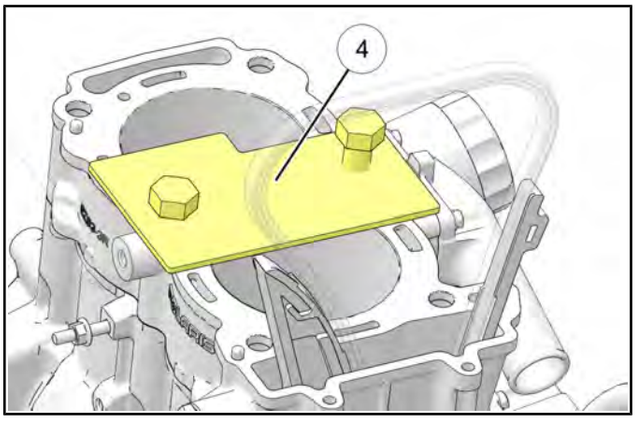
NOTICE

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

6. Reinstall dowel pins in crankcase if previously removed.
7. Install a new cylinder base gasket.
8. Carefully place the cylinder and pistons into the upper crankcase.



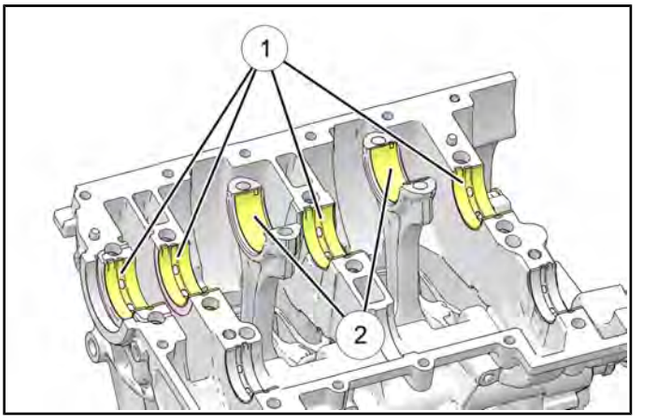
9. Install the Cylinder Holding & Camshaft Timing Plate (PU-50563) ④ onto the cylinder. The cylinder holding tool retains the cylinder and pistons when the engine is rotated.



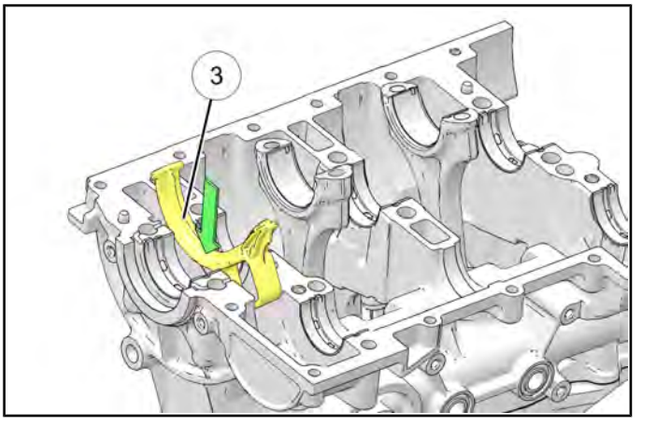
CRANKSHAFT INSTALLATION

NOTICE
Whether installing a new crankshaft or re-installing the original, refer to the bearing selection charts (see Crankshaft Main Bearing Selection page 3.77 and Connecting Rod Bearing Selection page 3.76.

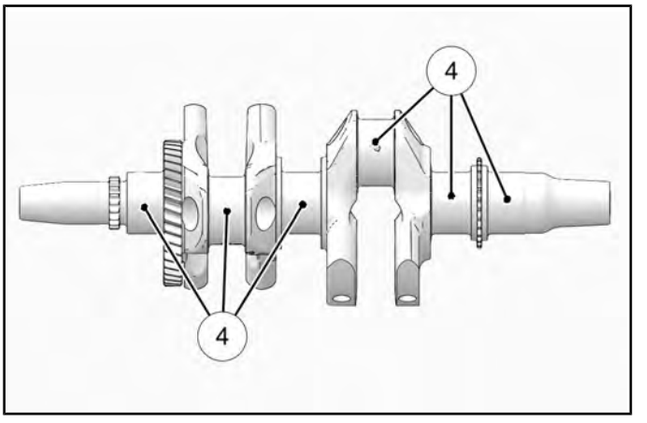
1. Rotate the engine so the cylinder is facing down.
2. Clean the bearing bore surfaces of upper crankcase (main bearings), connecting rods and connecting rod caps.
3. Align tab of new main bearing ① with the slot in main bearing bore of crankcase. Press bearing insert firmly into place. Repeat for all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



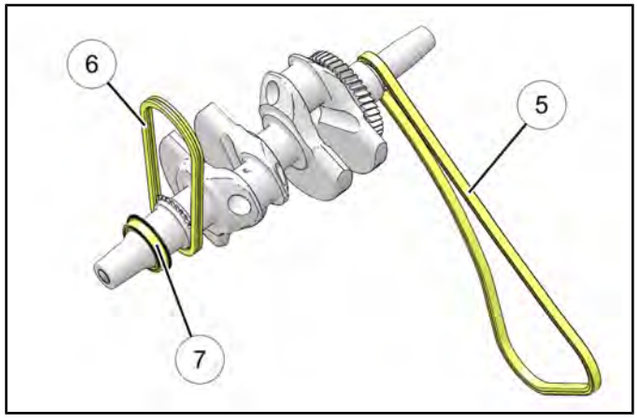
4. Align tab of new connecting rod bearings ② with the slot in the connecting rod stem and connecting rod end cap. Press bearing insert firmly into place. Repeat for the other connecting rod.
5. Install oil drain diverter ③ into the upper crankcase.



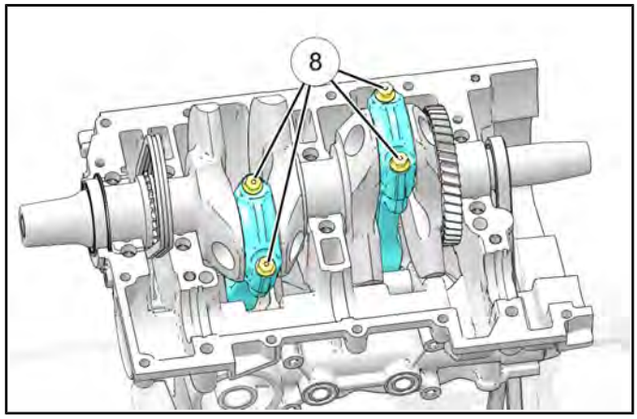
6. Apply Polaris PS-4 engine oil to each main and rod bearing journal of crankshaft ④.



7. Loop cam chain ⑤ and oil pump drive chain ⑥ 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.
9. Carefully lower the crankshaft into upper crankcase. Guide connecting rods onto the rod journals of crankshaft as necessary.
10. Adjust the PTO crankshaft seal so it rests properly in the upper crankcase.
11. Clean bolt hole threads in connecting rod to remove all oil.
12. Install matching rod cap on connecting rod using markings made upon disassembly.
13. Install *new bolts* ⑧ and tighten evenly until snug.

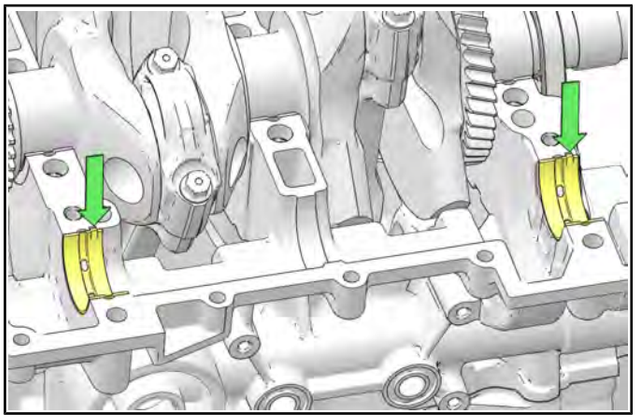


14. Torque connecting rod bolts to specification.

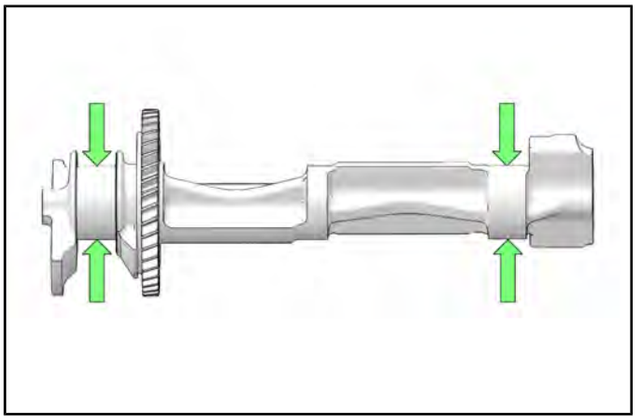
TORQUE
Connecting Rod Bolts: **Step 1: 9 ft-lbs (12 Nm)** **Step 2: 22 ft-lb (30 Nm)** **Step 3: Tighten add'n 90°**

BALANCE SHAFT INSTALLATION

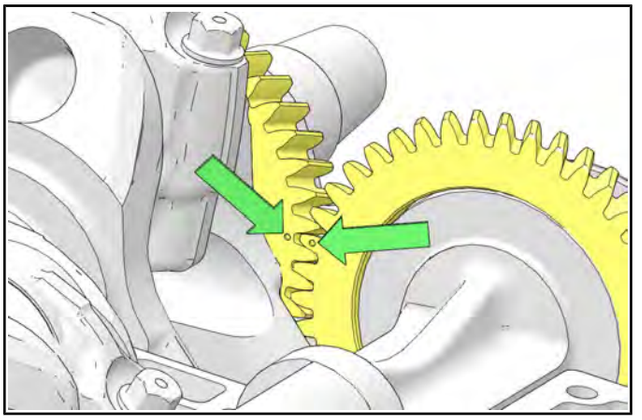
1. Clean the upper crankcase balance shaft bearing bore surfaces.
2. Align tab of new balance shaft bearings with the slot in each bearing bore of crankcase. Press bearing insert firmly into place.



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



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



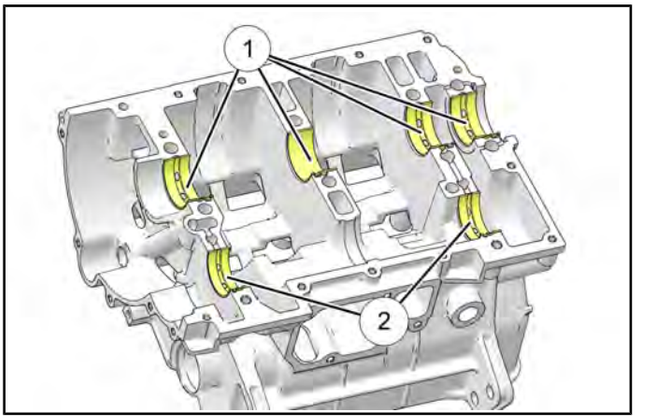
LOWER CRANKCASE PREPARATION

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

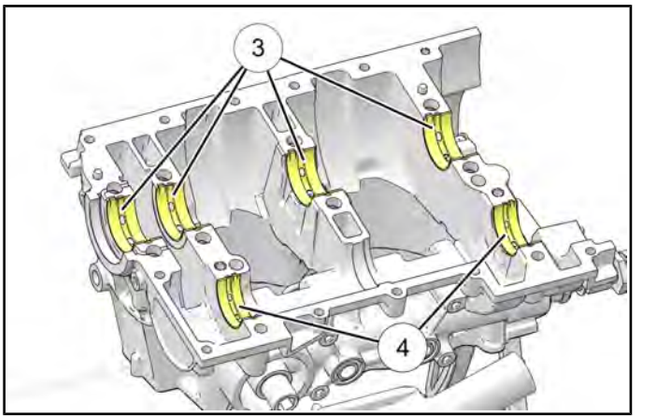
1. Remove all traces of crankcase sealant from the crankcase mating surfaces. Inspect the surfaces closely for nicks, burrs or damage.
2. Clean bolt hole threads to remove any oil or crankcase sealant.
3. Inspect crankcase bearing bores. Replace the crankcase assembly if a bearing bore is galled or if bearing inserts have rotated in the case.
4. Be sure alignment pins are in place where used.
5. Refer to Oil Flow Chart page 3.6 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. Ensure 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.

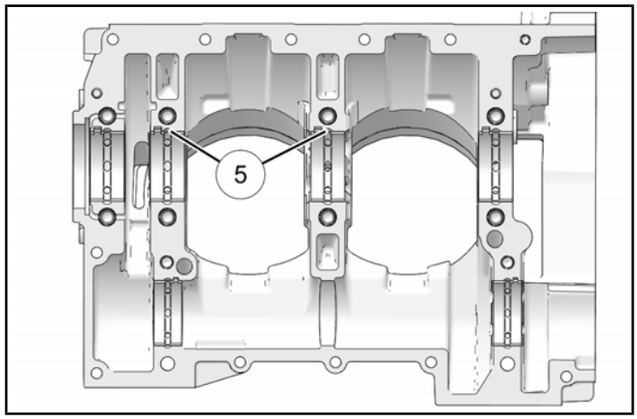


3. Apply Polaris PS-4 engine oil to the new bearings installed in the lower crankcase half.
4. Clean crankcase mating surfaces to remove any oil.
5. Align tab of new main bearings ③ and new balance shaft bearings ④ with the slot in each bearing bore of the upper crankcase. Press bearing inserts firmly into place.



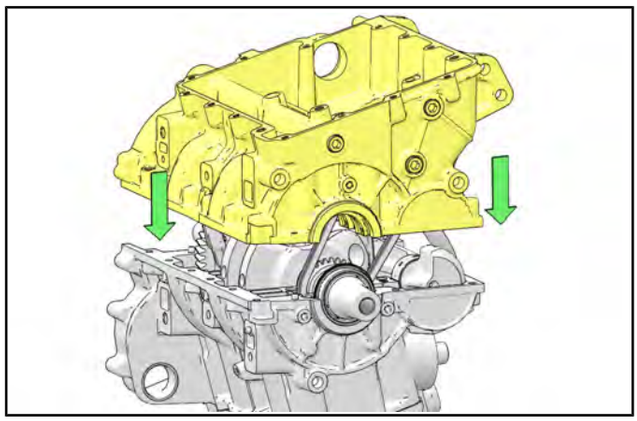
6. Apply Polaris PS-4 engine oil to the new bearings installed in the upper crankcase half.

7. Apply a thin, continuous film of Crankcase Sealant **(PN 2871557)** to upper crankcase mating surface as shown. Do not allow sealant to dry before assembly.

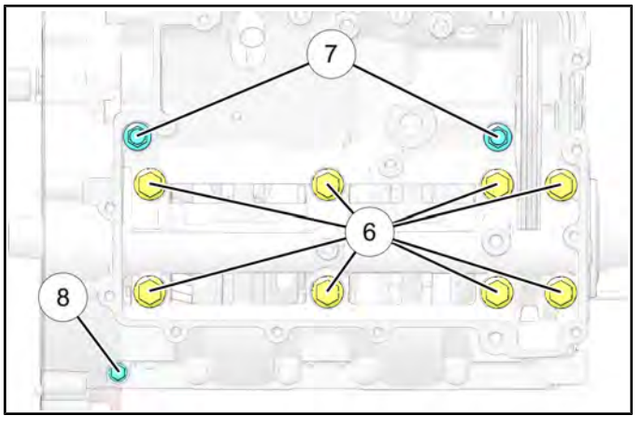


NOTICE
DO NOT block oil passages ⑤ with crankcase sealant.

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

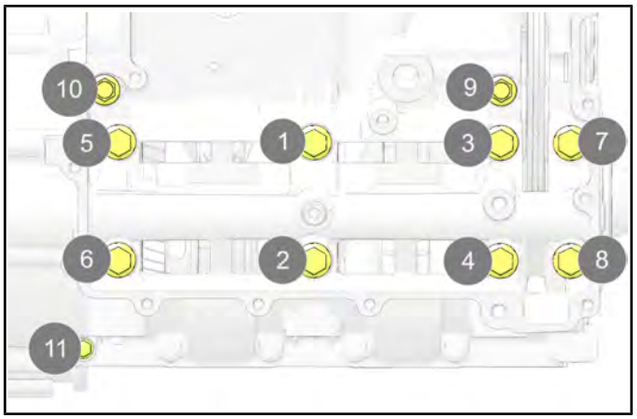


9. Tap lower crankcase with a rubber hammer to seat the case halves together.
10. Inspect crankcase mating surfaces to be sure they are joined properly. Investigate the cause of any gaps.
11. Install the eight M10 ⑥, two M8 ⑦ and one M6 ⑧ lower crankcase bolts. Tighten all bolts lightly by hand.



NOTICE
Install new M10 lower crankcase bolts.

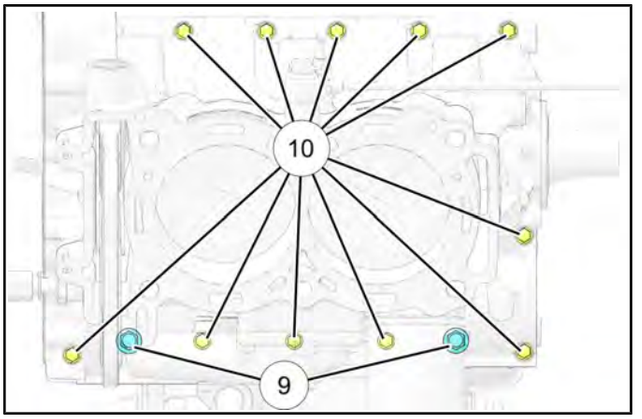
12. Torque lower crankcase bolts in sequence to specification. Repeat sequence to verify final torque.



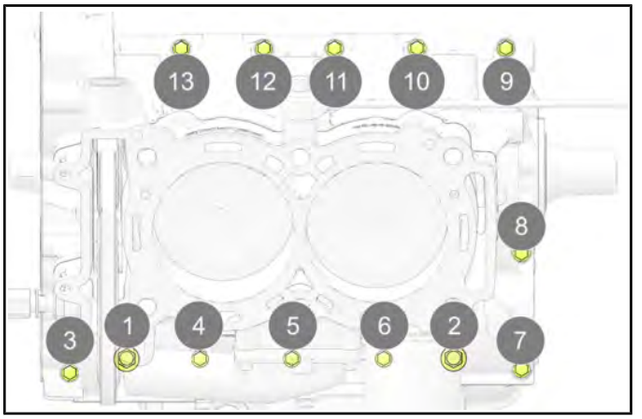
TORQUE
Lower Crankcase Bolts: **M10 Bolts:** **Step 1: 9 ft-lb (12 Nm)** **Step 2: 21 ft-lb (28 Nm)** **Step 3: Tighten add'n 90°** **M8 Bolts:** **26 ft-lb (35 Nm)** **M6 Bolts:** **9 ft-lb (12 Nm)**

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

14. Install the eleven M6 ⑨ and two M8 ⑧ upper crankcase bolts. Tighten all bolts lightly by hand.

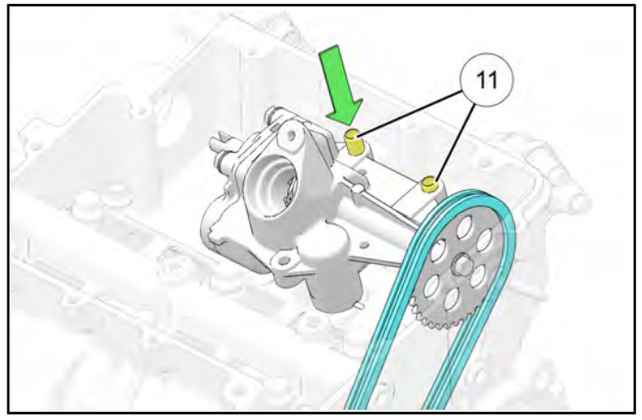


15. Torque the upper crankcase bolts in sequence to specification. Repeat the sequence to verify final torque.

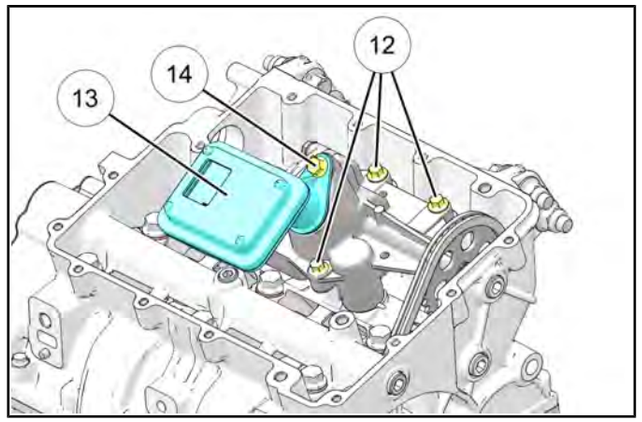


TORQUE
Upper Crankcase Bolts: M8 Bolts: **26 ft-lb (35 Nm)** M6 Bolts: **9 ft-lb (12 Nm)**

16. Rotate the engine so the cylinder is facing down.
17. Install a new seal on the oil pump.
18. Lift the oil pump drive chain and install the oil pump.
19. Install dowel pins ⑪ into oil pump mounting holes.



20. Install the three bolts ⑫ that retain oil pump to the crankcase. Torque mounting bolts to specification.



TORQUE
Oil Pump Mounting Bolts: **7 ft-lbs (10 Nm)**

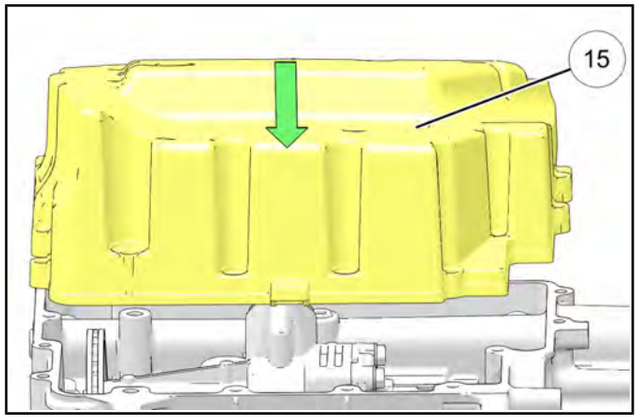
21. Reinstall oil pump pick-up ⑬. Torque mounting screw ⑭ to specification.

TORQUE
Oil Pump Pick-Up Retaining Screw: **7 ft-lb (10 Nm)**

22. Clean the gasket sealing surfaces on oil sump cover and crankcase to remove old gasket material and any oil.

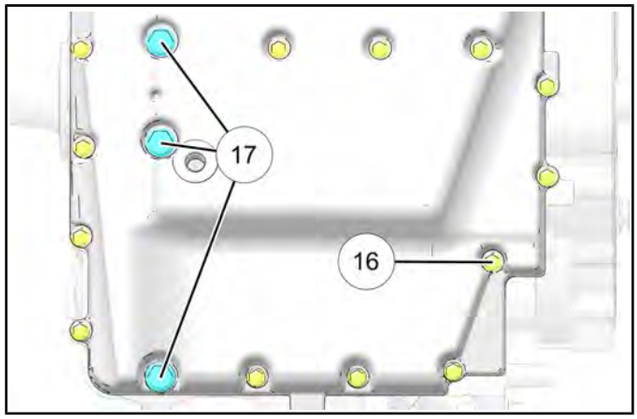
NOTICE
Gasket surfaces must be DRY and oil free. Use care upon assembly to keep oil away.

23. Apply a thin, continuous film of Crankcase Sealant **(2871557)** to sump cover mating surface and install the oil sump cover ⑮ onto the crankcase.

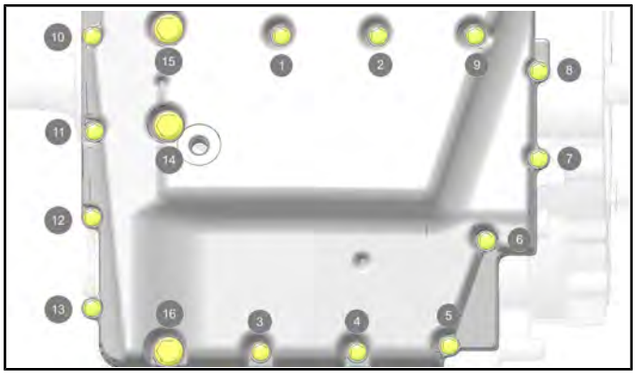


IMPORTANT
Do not allow sealant to dry before assembly.

24. Install the thirteen M6 ⑯ and three M8 bolts that retain the oil sump cover ⑰ to the crankcase.



25. Torque the oil sump cover bolts in sequence to specification. Repeat the sequence to verify final torque.

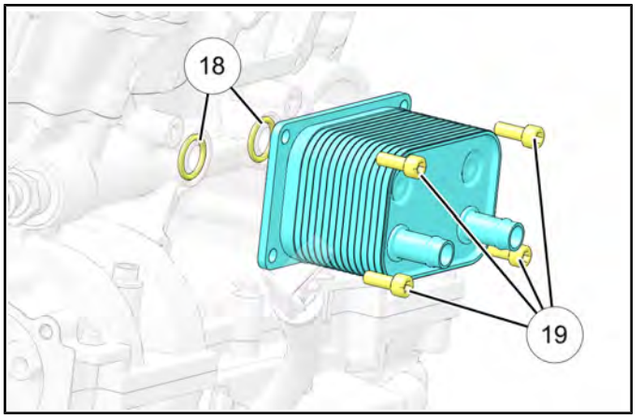


TORQUE
Oil Pan Bolts: *M8 Bolts:* **26 ft-lb (35 Nm)** *M6 Bolts:* **9 ft-lb (12 Nm)**

26. Reinstall the crankcase drain plug if previously removed. Torque drain plug to specification.

TORQUE
Crankcase Drain Plug: **12 ft-lbs (16 Nm)**

27. Reinstall the oil cooler ⑱, if previously removed. Use *new O-rings* ⑲ upon installation. Torque fasteners to specification.

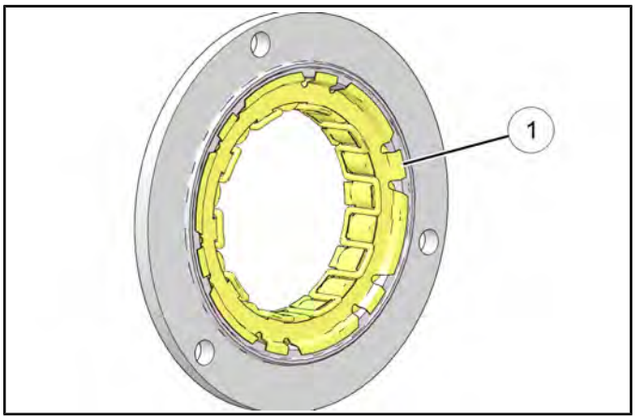


TORQUE
Oil Cooler bolts: **7 ft-lb (10 Nm)**

28. Proceed to Flywheel Installation page 3.86 and then Cylinder Head Installation page .

STARTER ONE-WAY CLUTCH ASSEMBLY

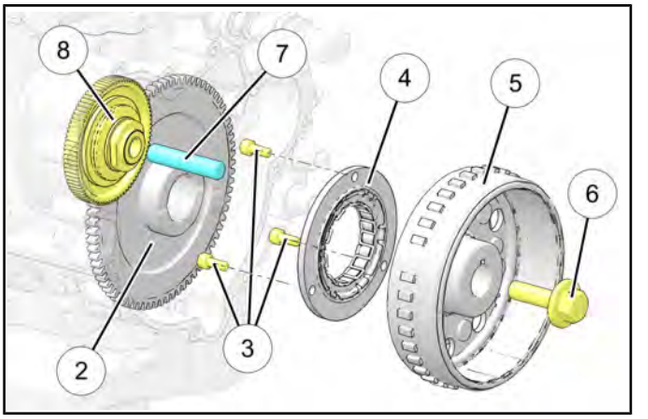
1. Install one-way clutch in clutch hub with flange of clutch ① engaged in recess.



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

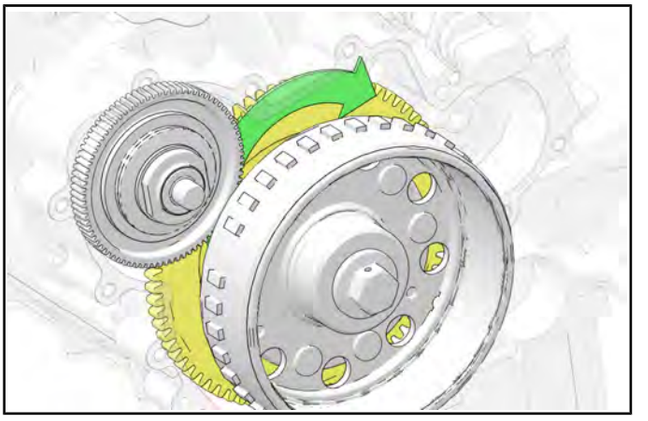
TORQUE
One-Way Clutch Retaining Screws: **9 ft-lb (12 Nm)**

4. 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	

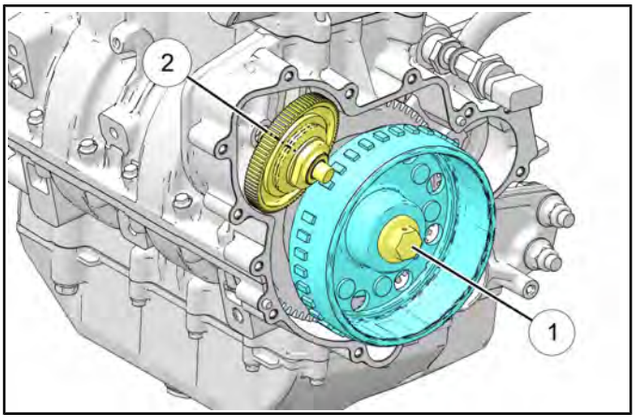
5. If starter gear was replaced, inspect the torque limit gear.
6. After assembly, be sure the starter gear rotates in the clockwise direction only.



FLYWHEEL INSTALLATION

1. If previously removed, reinstall the flywheel key.
2. Inspect and clean crankshaft and flywheel taper with isopropyl alcohol or similar cleaning solution. Replace crankshaft if surface damage is present. Clean taper of crankshaft to remove all oil or grease.

3. Using an applicator, apply a 360 degree bead of Loctite 641 (Yellow) to the internal taper surface on the flywheel. Apply Loctite bead 5-6 mm from the center of the taper, offset to the larger diameter of the taper on the flywheel.
4. Using an applicator, apply a 360 degree bead of Loctite 641 (Yellow) to the external taper surface on the crankshaft. Apply Loctite bead 5-6 mm from the center of the taper and offset to the smaller end on the crankshaft. Be careful to not apply any Loctite to the starter gear bearing.
5. Align flywheel key-way with key and install the flywheel, seating it fully on taper.
6. Install flywheel retaining bolt ①. Using a commercially available strap wrench , hold flywheel and torque the retaining bolt to specification.



NOTICE

If the Cylinder Holding & Camshaft Timing Plate (PU-50563) is installed, remove it before tightening the flywheel.

TORQUE
Flywheel Retaining Bolt: **133 ft-lbs (180 Nm), loosen 180°, retorque to 133 ft-lb (180 Nm)**

7. Wipe off excess Loctite and let stand for 1 hour before starting engine.

NOTICE

Loctite cures with time, the longer the unit is let stand before engine starting the better the bond will be.

8. Install the starter torque limit gear ② as an assembly.
9. Proceed to Stator Cover Installation page 3.87.

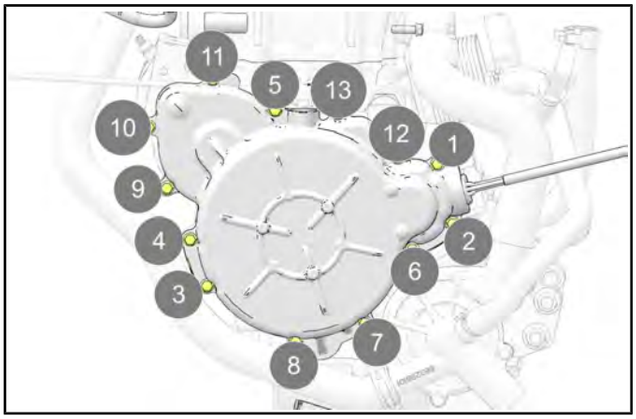
STATOR COVER INSTALLATION

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.



TORQUE
Stator Cover Screws: **9 ft-lb (12 Nm)**

ENGINE ASSEMBLY - TOP END

CYLINDER HEAD ASSEMBLY

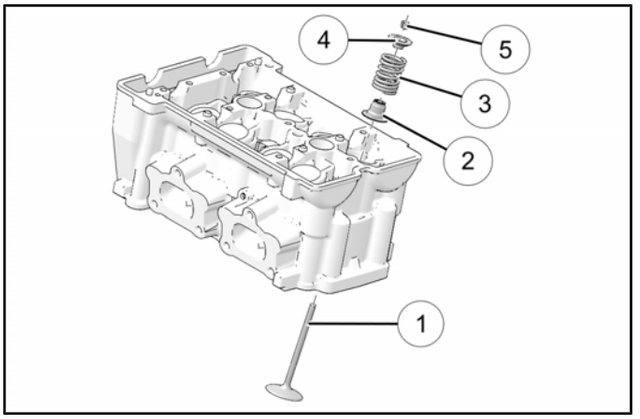
NOTICE

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.

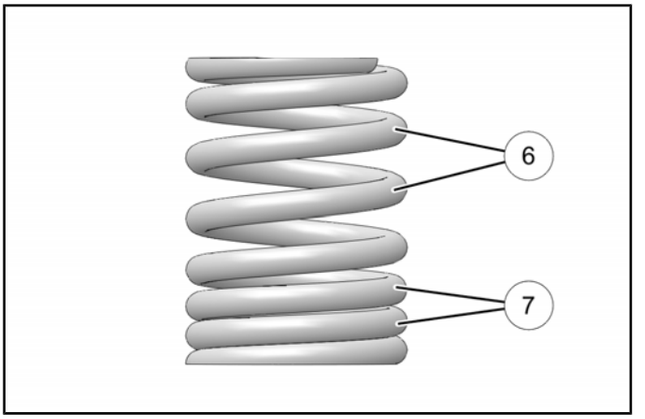


4. Carefully install a new valve seal / seat ② on the valve guide with a rotating motion. Push firmly until seated in retaining groove and square with the guide.

NOTICE

Valve seals should be installed AFTER the valves are in the head to avoid valve seal damage.

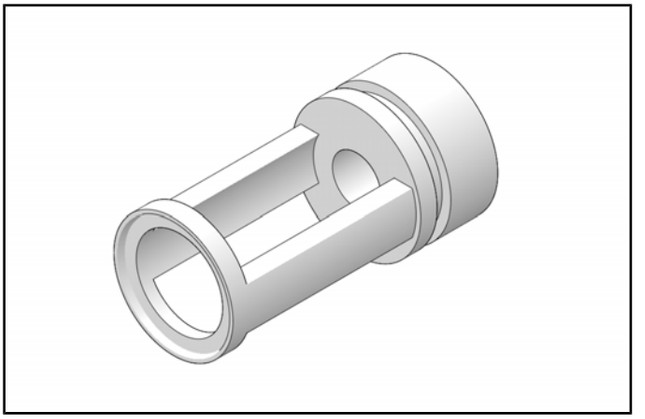
5. Dip the valve spring ③ and retainer ④ in clean engine oil.
6. Install the valve spring with widely spaced coils ⑥ on the top and tightly spaced coils ⑦ facing down toward the cylinder head.



NOTICE

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.



NOTICE

To prevent damage to the valve seals, do not compress the valve spring more than necessary to install the keepers.

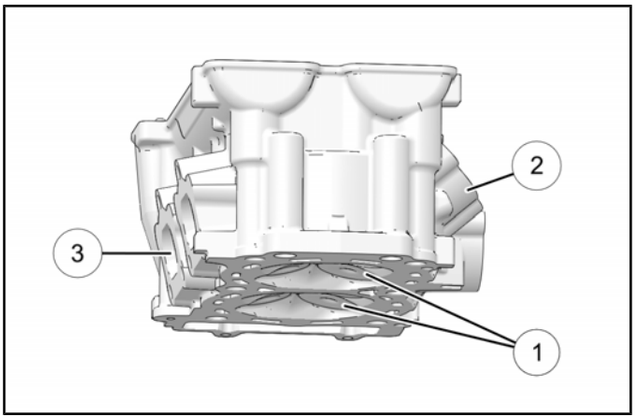
9. Install split keepers ⑤ with gap even on both sides.
10. Repeat this procedure for remaining valves.

11. Install the valve tappet ⑧ for each valve in the order they were removed.

NOTICE
Oil the tappet prior to installing. If any valve train components were replaced, refer to Valve Clearance Adjustment page 2.32.

VALVE SEALING TEST

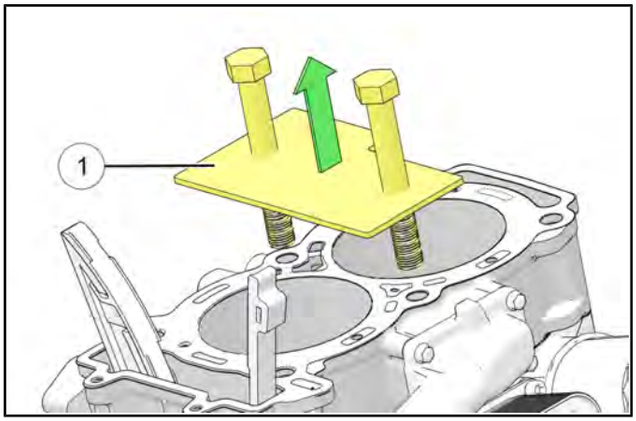
1. Clean and dry the combustion chamber area ①.



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.

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.

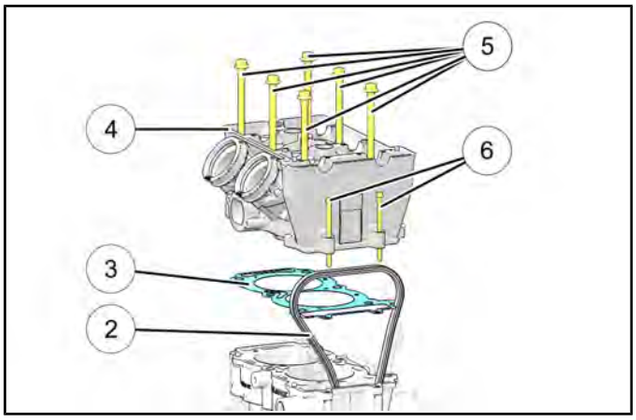


NOTICE
Once the cylinder head is removed, nothing retains the cylinder to the engine. DO NOT rotate the engine without using the Cylinder Holding & Camshaft Timing Plate (PU-50563).

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.

NOTICE
Do not touch the gasket sealing surfaces.

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.

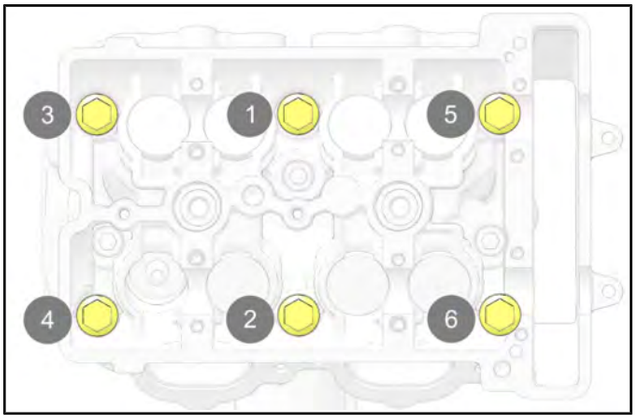
6. Install *new bolts* and finger tighten the six cylinder head bolts ⑤ evenly.

IMPORTANT
Lightly oil the threads and under the flange head on all the head bolts with new engine oil.

7. Install and finger tighten the two outer M6 bolts ⑥ evenly.

NOTICE
Install new cylinder head bolts any time the head is removed.

8. Torque cylinder head bolts in sequence to specification.

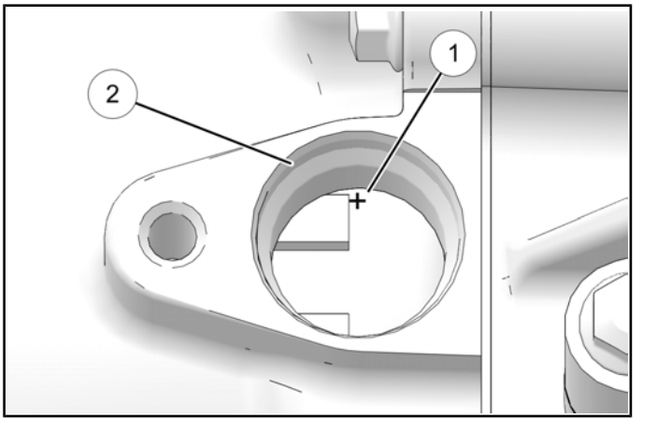


TORQUE
Cylinder Head Bolts: **Torque in sequence** **Step 1: 13 ft-lbs (18 Nm)** **Step 2: 26 ft-lb (35 Nm)** **Step 3: Additional 180°** **Step 4: Additional 180°** **Step 5: M6 bolts: 7 ft-lb (10 Nm)**

CAMSHAFT INSTALLATION / TIMING

NOTICE
If any valve train components were replaced, refer to Valve Clearance Adjustment page 2.32 procedure prior to performing this procedure.

1. Rotate the engine until the flywheel Top Dead Center (TDC) mark ① is aligned with the top edge of the Crankshaft Position Sensor (CPS) mounting hole ②. This places the PTO cylinder at TDC for camshaft installation.

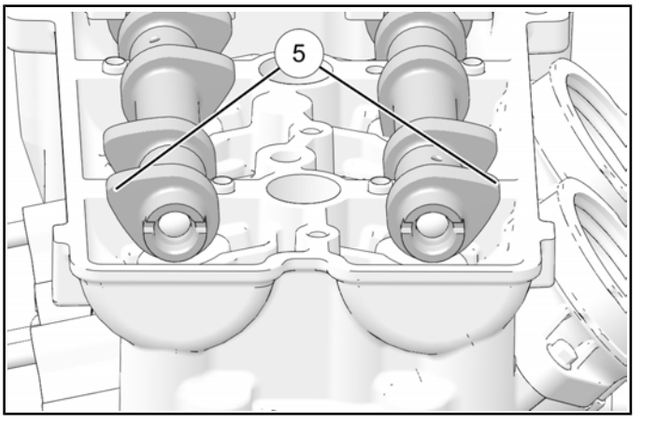


NOTICE
DO NOT use the “V” mark located on the flywheel. Only the “+” mark should be used as a TDC reference.

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.

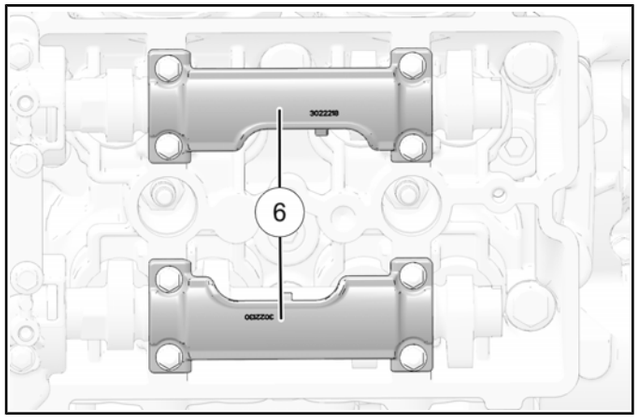
Intake Camshaft - 3023171 Exhaust Camshaft - 3023172

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.

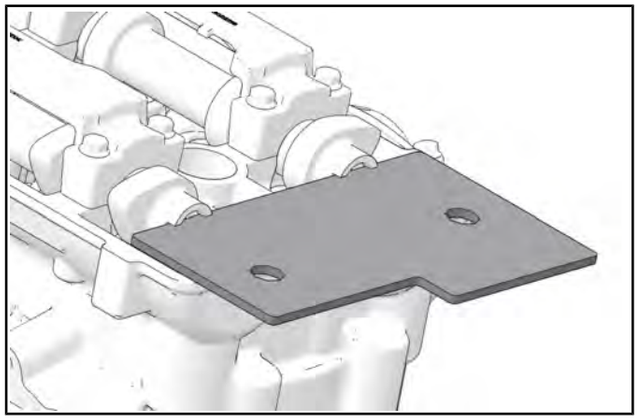


5. Carefully install the rear camshaft carriers onto the camshafts. Carriers should face each as shown.

6. Install the four bolts that retain each rear camshaft carrier ⑥ and tighten the bolts evenly until snug.



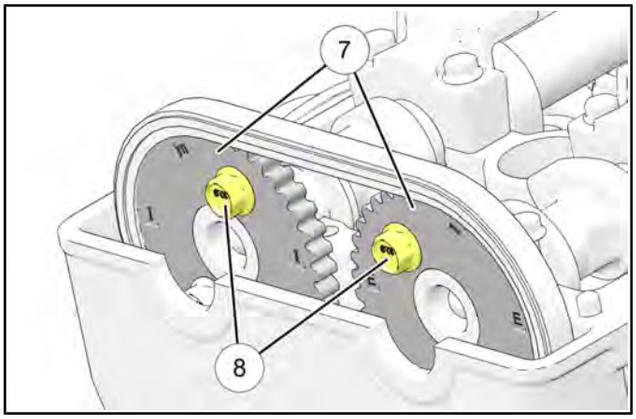
7. Install the Cylinder Holding & Camshaft Timing Plate (PU-50563) into the end of camshafts as shown. Use an open-end wrench to rotate camshafts slightly.



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 (refer to Camshaft Timing Quick Reference page 3.94).

NOTICE
Intake cam sprocket should have “I” marks aligned close to gasket surface and the exhaust cam sprocket should have “E” marks aligned. Install the exhaust cam sprocket first to ensure proper cam timing.

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.



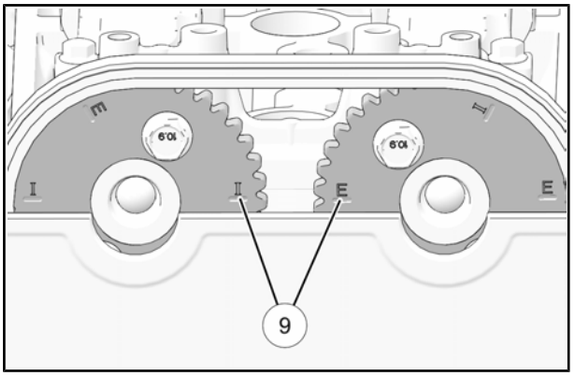
NOTICE
Use new sprocket retaining bolts upon assembly.

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.

NOTICE
The I and E marks may not be exactly parallel with the top of the cylinder head.

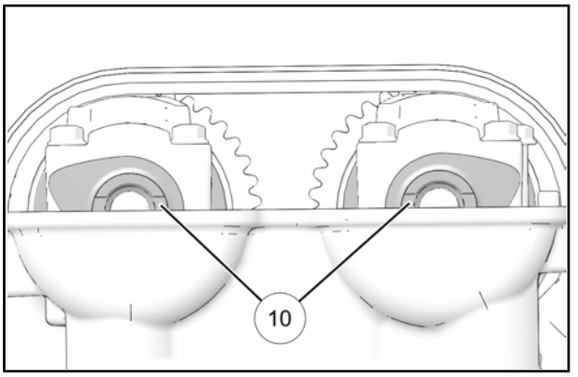
Timing View for Sprockets

For correct sprocket orientation, ensure the “I” for intake and the “E” for exhaust are positioned as shown ⑨. View from mag side.



Timing View for Camshafts

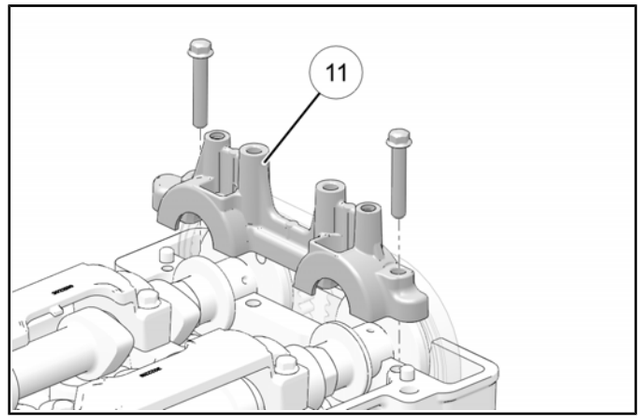
Align slot of both cams with the top deck of the head ⑩. Position 4mm thick flat bar through slots to lock cams in correct position.



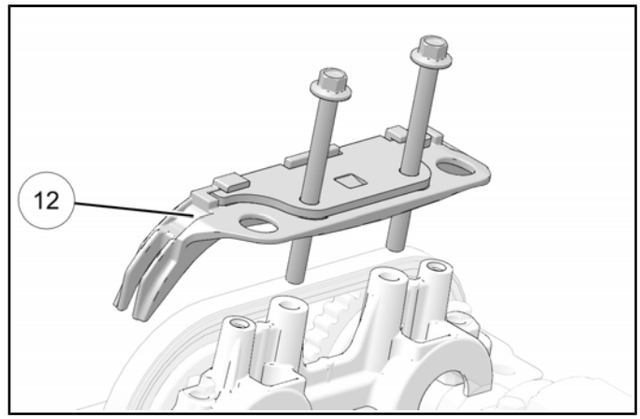
14. If timing marks are not aligned, remove sprockets and correct alignment.
15. Remove the Cylinder Holding & Camshaft Timing Plate (PU-50563) from the end of the camshafts.
16. Apply Polaris PS-4 engine oil to the cam chain tensioner bore prior to assembly.
17. Rotate the engine using the flywheel 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.

TORQUE
Camshaft Sprocket Bolts: **14 ft-lb (19 Nm)**

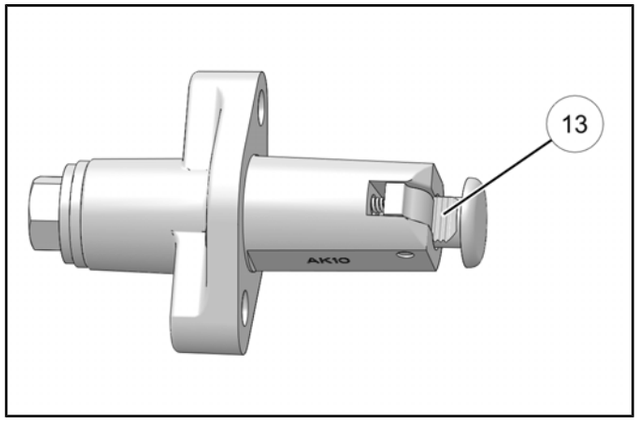
18. Rotate the engine using the flywheel and torque the remaining sprocket bolts to specification.
19. Install the front camshaft carrier ⑪ and two outer retaining bolts.



20. Install the fixed cam chain guide ⑫ and two retaining bolts.

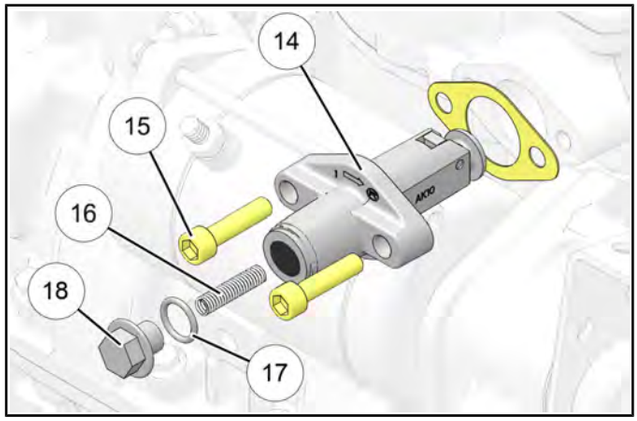


21. Lubricate the rack ⑬ on the tensioner with white lithium grease.



22. Remove the spring retainer bolt and push the adjuster all the way in.

23. Using a *new* gasket, install the cam chain tensioner ⑭ into the cylinder and torque mounting bolts ⑮ to specification.



TORQUE
Cam Chain Tensioner: **7 ft-lb (10 Nm)**

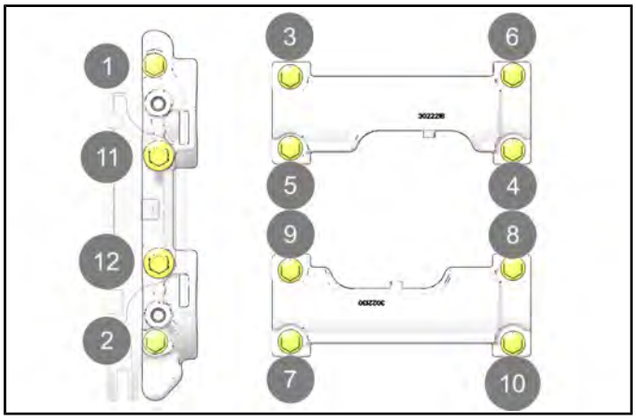
24. Install the tensioner spring ⑯, washer ⑰, and retainer bolt ⑱. Torque retainer bolt to specification.

TORQUE
Tensioner Spring Retainer: **12 ft-lb (16 Nm)**

NOTICE
The tensioner will automatically adjust to the proper tension once the spring and retainer are installed. No further adjustment is required.

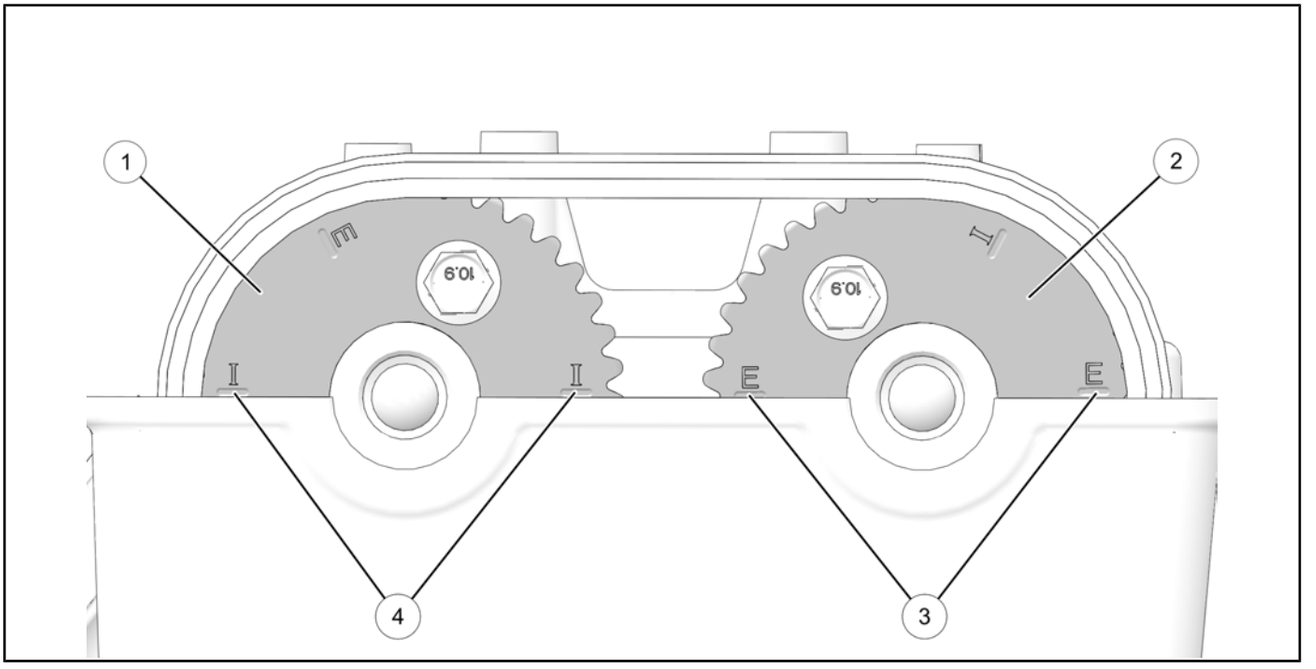
25. Torque the camshaft carriers bolts in sequence to specification.

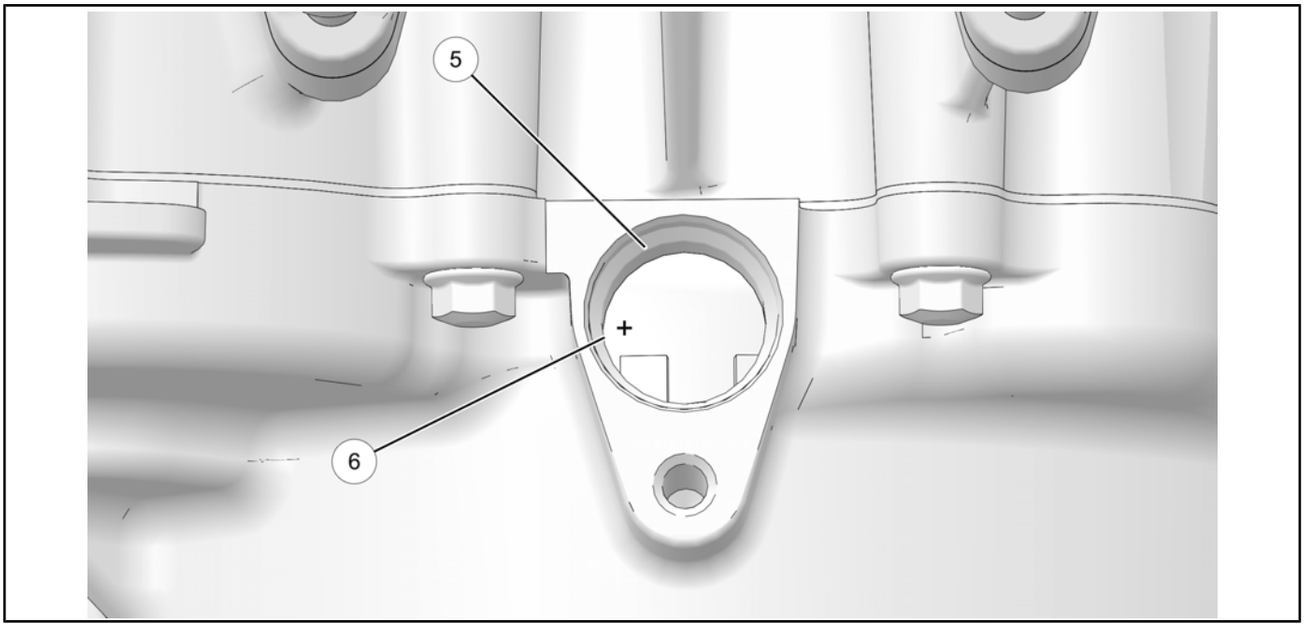
TORQUE
Camshaft Carrier Bolts: **7 ft-lb (10 Nm)**



26. Rotate crankshaft through two revolutions and verify camshaft timing is correct.

CAMSHAFT TIMING QUICK REFERENCE





① Intake Cam	④ Align Exhaust Marks with Top of Head
② Exhaust Cam	⑤ CPS Mounting Hole
③ Align Intake Marks with Top of Head	⑥ Align Flywheel Mark (+) to edge of Mounting Hole

VALVE CLEARANCE ADJUSTMENT

CAUTION

Do not rotate the engine backwards. The timing chain may jump teeth and lead to poor performance and/or severe engine damage.

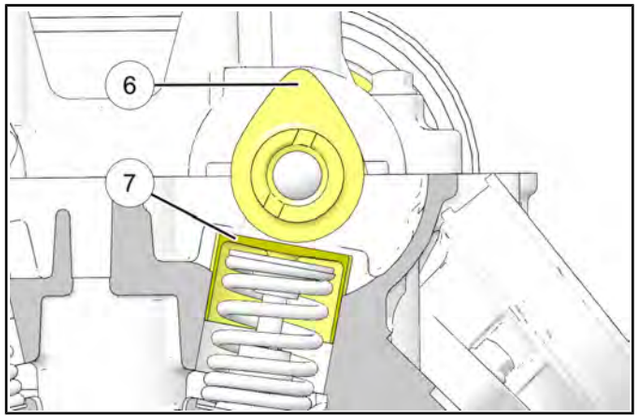
NOTICE

Always inspect valve clearance prior to final engine assembly.

IMPORTANT

The engine has a 270° offset crank. There will always be at least one valve open at any position of the crank. Turn the camshaft until two valves are not loaded.

1. Remove the valve cover (if it is not already off).
2. Rotate the camshaft until the cam lobes above the valves you are inspecting are facing up ⑥.



3. Measure the valve clearance ⑦ using a thickness (feeler) gauge. Record the measurement if clearance is out of specification.

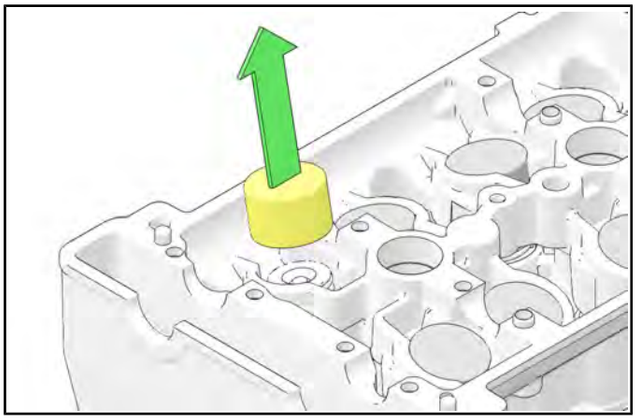
MEASUREMENT
Intake Valve Clearance (cold): **.006 ± .002" (0.15 ± 0.05 mm)**
Exhaust Valve Clearance (cold): **.010 ± .002" (0.25 ± 0.05 mm)**

4. Repeat steps 6 and 7 until all eight valves have been inspected.
5. If any of the valve clearance measurements are out of specification, remove the camshaft carriers and camshafts and proceed with this procedure.

NOTICE

If all valve clearance measurements are within specification, remove the camshaft carriers and proceed to Camshaft Installation / Timing.

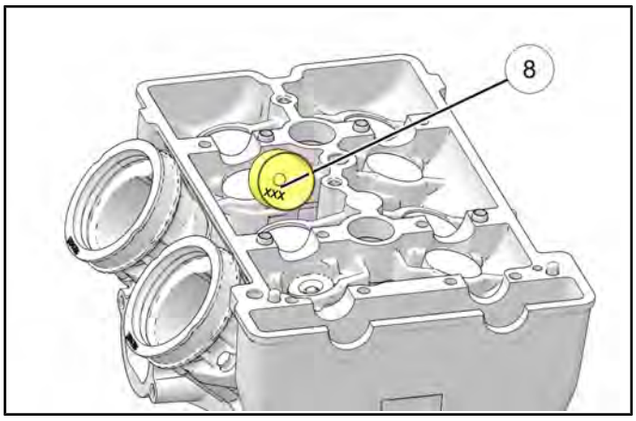
6. Remove the valve tappet from a valve that was out of specification.



NOTICE

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.

7. Record the 3 digit number ⑧ on the bottom of the tappet.



8. Reference the valve clearance measurement recorded for that valve, along with the 3-digit tappet number.
9. Refer to Valve Lash - Tappet Selection page 3.96 and select the proper tappet.

10. Install the appropriate tappet into the cylinder head.

NOTICE
Lubricate the outer portion of the valve bucket upon installation.

11. Repeat steps 10-14 until all necessary valves have been adjusted.
12. Reinstall the camshafts and camshaft carriers and tighten the bolts evenly to specification.

TORQUE
Camshaft Carrier Bolts: **7 ft-lb (10 Nm)**

13. Measure and confirm that valve clearance is now within specification for each valve.
14. If valve clearance is not within specification, repeat this procedure.
15. If all valve clearance measurements are now within specification, remove the camshaft carriers and proceed to Camshaft Installation / Timing page

VALVE LASH - TAPPET SELECTION

A 440 tappet means the thickness of the tappet is 4.40 mm. Part Number: 5138477-XXX (X's represent 3 digit tappet size)

An Engine Valve Lash Adjustment calculator has been created and is located under Service and Warranty – News, Forms and Links. Click or go to
https://www.polarisdealers.com/files/ServWarr/English/Engine%20Valve%20Adjustment%20Calculator.pdf

The proper valve tappet may also be obtained by completing these steps:

IMPORTANT
The Valve Lash Specification and Measured Valve lash must be calculated in millimeters (mm)

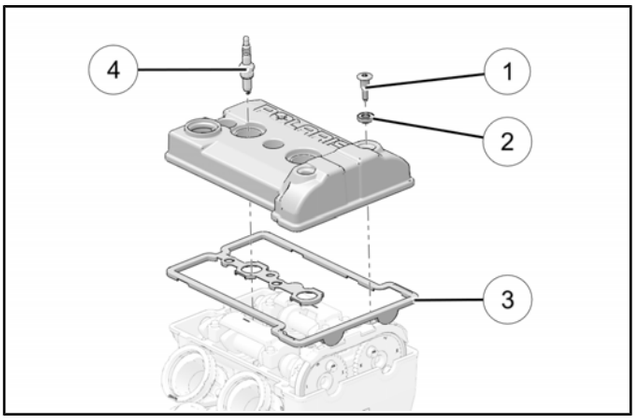
1. Subtract the valve lash specification from the actual valve lash on the engine (i.e. 0.29 mm – 0.20 mm) = 0.09 mm.
2. Divide the 3 digit tappet number by 100 (i.e. 450 / 100) = 4.5 mm.
3. Add the results of step 1 and step 2 (i.e. 0.09 mm + 4.5 mm) = 4.59 mm.
4. Multiply that answer by 100 to obtain the correct new tappet (i.e. 4.59 mm x 100 = 459).
5. Refer to the table below to find the closest available tappet size to the result from step 4 (i.e. 459 should be rounded to 460 since there is a 460 tappet).

AVAILABLE TAPPETS

440	450	460	470	480	490	500	510	520	530	540
442	452	462	472	482	492	502	512	522	532	542
445	455	465	475	485	495	505	515	525	535	545
448	458	468	478	488	498	508	518	528	538	

VALVE COVER INSTALLATION

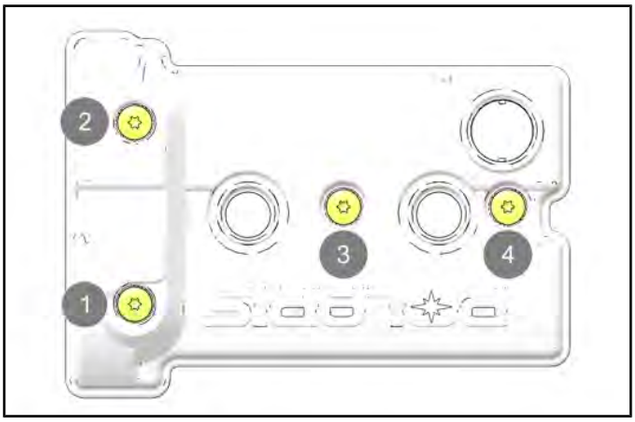
1. Install spark plugs ① and torque to specification.



TORQUE
Spark Plugs: **9 ft-lbs (12 Nm)**

2. Prepare valve cover sealing surfaces by cleaning thoroughly to remove all residue.
3. Inspect the valve cover seal ② and replace if necessary.
4. Replace the isolators ③ around each T40 bolt.
5. Install the four valve cover shoulder bolts ④ and isolators using a T40 driver.
6. Torque valve cover bolts in sequence to specification.

TORQUE
Valve Cover Bolts: **7 ft-lbs (10 Nm)**



TROUBLESHOOTING

ENGINE TROUBLESHOOTING

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
- Improperly assembled air intake system
- Injector Spray Pattern
- High Leakdown
- Valvetrain / Valve Clearances
- Restricted exhaust
- Vehicle not reaching operating temperature (Short tripping)
- Oil contaminated with fuel
- Weak ignition (loose coil ground, faulty coil, or stator)
- Restricted engine breather system
- Restricted air filter (main or pre-cleaner) or breather system

ENGINE TURNS OVER BUT FAILS TO START

- No fuel
- Dirt in fuel line or filter
- Fuel will not pass through fuel valve
- Clogged / Failed Fuel Injector
- Fuel pump inoperative/restricted
- Tank vent plugged or pinched
- Engine flooded
- Injector control circuit failure
- Low compression (high cylinder leakage)
- No spark (Spark plug fouled) ignition component failure
- Intake leak / vacuum leak

ENGINE DOES NOT TURN OVER

- Battery, Starter, and Ground Cable Connections
- Engine seized, rusted, or mechanical failure
- Starter motor does not turn
- Starting system circuit concern (blown fuse / failed relay / damaged wiring)
- Dead battery

ENGINE RUNS BUT WILL NOT IDLE

- Restricted fuel supply
- Intake leak / vacuum leak
- Low compression
- TPS (installed incorrect / electrical concern / failed sensor)
- Throttle Body (installed incorrect / electrical concern / failed)
- Crankcase breather restricted

ENGINE IDLES BUT WILL NOT ACCELERATE

- Spark plug fouled/weak spark
- Broken throttle cable
- Obstruction in air intake
- Air box removed (reinstall all intake components)
- Incorrect ignition timing
- Throttle Body
- Cam worn excessively
- Restricted exhaust system
- Low fuel pressure

ENGINE HAS LOW POWER		
• Spark plug fouled	• PVT not operating properly	• Restricted exhaust muffler
• Cylinder, piston, ring, or valve wear or damage (check compression)	• Cam worn excessively	• Low fuel pressure
• Poor fuel quality		

PISTON FAILURE - SCORING		
• Lack of lubrication	• Dirt entering engine through cracks in air filter or ducts	• Engine oil dirty or contaminated
• Improper air filter maintenance		

EXCESSIVE SMOKE (BLUE / BLACK) AND CARBON BUILDUP		
• Excessive piston-to-cylinder clearance	• Worn rings, piston, or cylinder	• Restricted breather
• Wet sumping	• Worn valve guides or seals	• Air filter dirty or contaminated

LOW COMPRESSION		
• Cylinder head gasket leak	• Cylinder or piston worn	• Piston rings worn, leaking, broken, or sticking
• No valve clearance (cam wear)	• Bent valve or stuck valve	• Valve spring broken or weak
• Valve not seating properly (bent or carbon accumulated on sealing surface)		

BACKFIRING		
• 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	• Intake system air leaks • Fouled spark plug or incorrect plug or plug gap • Low fuel pressure • Poor fuel quality	• Exhaust system air leaks • Valve sticking • Throttle Body (installed incorrect / electrical concern / failed)

COOLING TROUBLESHOOTING

OVERHEATING		
• Low coolant level • Air in cooling system • Wrong type/mix of coolant • Faulty pressure cap or system leaks • High oil level • Spark plug incorrect heat range • Radiator	• 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) • Fuel pump output weak • Cooling fan inoperative or turning too slowly (perform current draw test) • Faulty hot light circuit	• Electrical malfunction • Water pump failure/ Loose impeller • Thermistor failure • Low oil level • Thermostat stuck closed or not opening completely

LEAK AT WATER PUMP WEEP HOLE	
• Faulty water pump mechanical seal (coolant leak)	• Faulty pump shaft oil seal (oil leak)

TEMPERATURE TOO LOW	
• Thermostat stuck open • Thermostat opening too soon	• Contaminated coolant

TURBOCHARGER TROUBLESHOOTING

Common symptoms of turbocharger issues would be reduced power, vehicle in limp-home mode, and trouble codes being set relating to the turbo / boost pressure.

Refer to Turbocharger Inspection page 3.22 for further information.

- Check charge air duct and LCAC for damage.
- Check all duct clamps for proper retention.
- Check boost pressure sensor and TMAP for proper sealing.
  - Check wires running to both Sensors for damage or wear
  - Check wire continuity end to end
- Inspect waste gate for damage or debris.
  - Inspect hoses running to / from waste gate
- Check for modified boost pressure sensor wiring.
- Check exhaust manifold for leaks and check torque on mounting bolts.
- Check for proper motion of waste gate (see Actuator / Wastegate Inspection page 3.25).
  - Replace pod if actuator / waste gate is sticky or loose.
- Check waste gate is actuating / sealing properly
  - Apply 5 PSI with a hand pump to the top of the waste gate. Pressure should hold if the waste gate is good..
  - Apply slight vacuum using a MityVac. If vacuum holds, the valve is not leaking. Replace waste gate if it fails either test.
- Check oil feed / return line to turbo for leaks, damage or blockage.

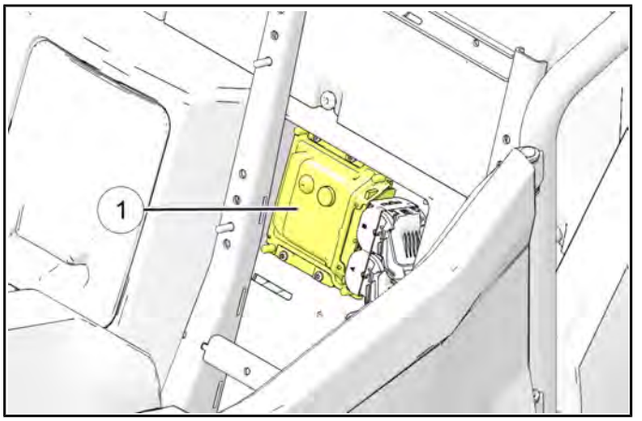
NOTES

CHAPTER 4
ENGINE ELECTRICAL

ELECTRONIC CONTROL UNIT (ECU)

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), barometric pressure, intake air temperature, boost pressure, 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 it self in rapid succession, limiting operation to the preset maximum.

RPM Limit:
8800

ECU SERVICE

Never attempt to disassemble the ECU. It is sealed to prevent damage 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 pre-set. No internal servicing or readjustment may be performed. If a problem is encountered, and you determine the ECU to be faulty, contact the Polaris Service Department for specific handling instructions. Do not replace the ECU without factory authorization.

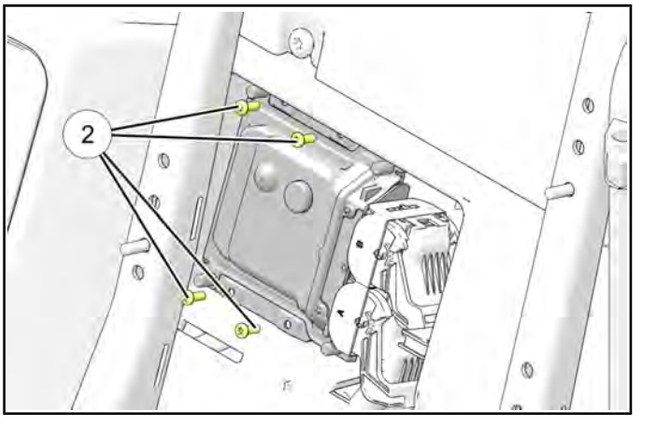
For the purpose of troubleshooting, a known-good ECU from another Polaris ***RZR*** of the same model may be used without system or engine component damage.

ECU REPLACEMENT

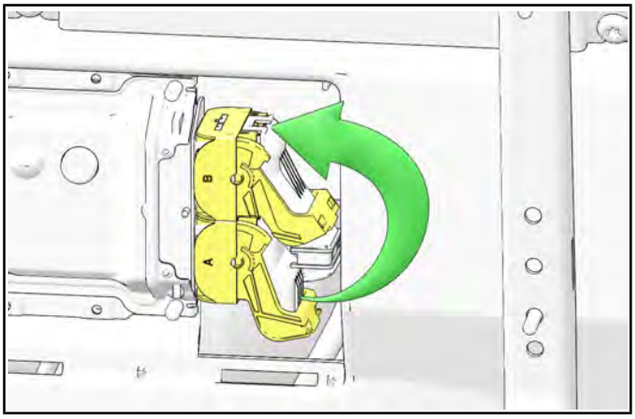
Although the need for ECU replacement is unlikely, a specific replacement procedure is required to ensure that all essential data contained within the original ECU is transferred to the replacement ECU.

NOTICE
Refer to this procedure and carefully follow all instructions provided in Digital Wrench®.

1. Carefully follow the ECU replacement instructions provided in Digital Wrench® to ensure that all essential data contained within the original ECU is transferred to the replacement ECU.
2. Remove the black plastic cover by lifting up on the tab.
3. Remove the screws ② that attach the ECU to the driver’s rear fender well.



4. With the ignition turned off, disconnect the wire harness from the ECU. Lift the connector locking lever and rotate it up until the connector is free from the ECU.



NOTICE
Upon removing the ECU connector, you should hear a “click” when the connector is fully open.

5. To install, reverse the procedure and tighten the mounting screws to specification.

NOTICE
Upon installing the ECU connector, you should hear a “click” when the connector is fully closed.

TORQUE
ECU Retaining Screws: **24 in-lbs (3 N·m)**

ETC LEARN PROCEDURE

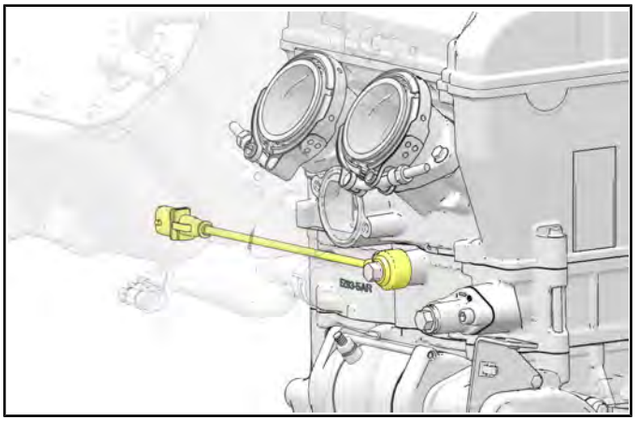
IMPORTANT
This procedure MUST be performed on the vehicle whenever the ECU is replaced or reflashed or the throttle body is replaced.

1. After the reflash / ECU replacement / throttle body change, leave the key on (engine not running) for 60 seconds. Do NOT crank the engine during this time.
2. Turn the key off and wait 3 minutes. During this time, the ECU will write values into memory and then completely shut down.
3. Turn key back on and start the vehicle. The vehicle should operate normally.
4. If the procedure was interrupted at any time, start back at step 1.

KNOCK SENSOR

KNOCK SENSOR OVERVIEW

The knock sensor is located on the cylinder block, below the MAG intake port.



The knock sensor “listens” for combustion knock by converting internal engine noise in to an electrical signal. The ECU uses the signal to determine the level of knock within the combustion chambers after each combustion event.

When the ECU determines detonation has occurred, the CHECK ENGINE lamp will turn on.

The ECU will retard timing first and then reduce the boost target if detonation continues.

If detonation occurs:

- Drain the fuel and fill with fresh fuel. Always use premium fuel (91+ octane)
- Check for non-approved Polaris modifications to the engine or exhaust system
- Verify there is no water or foreign material in the fuel
- Verify there is no internal engine damage
- Verify the cooling system is working properly

NOTICE
Install the knock sensor fastener clean and without thread locker or oil.

KNOCK SENSOR TESTING

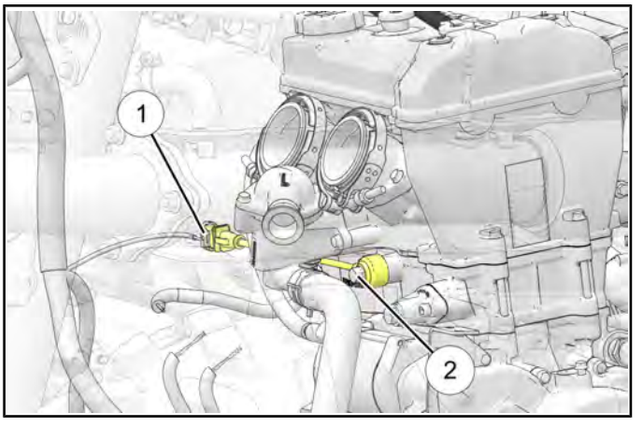
1. Disconnect the harness going to the knock sensor.
2. Use a multimeter to ohm between the two pins on the sensor harness.

Knock Sensor:
4,870 kΩ

3. If the sensor measures OL between the pins or there is continuity to chassis ground, replace the knock sensor.

KNOCK SENSOR REPLACEMENT

1. Disconnect the harness ① going to the knock sensor.



2. Remove the knock sensor mounting bolt ② and remove the sensor from the cylinder.

NOTICE
The knock sensor does not run through a coolant jacket in the cylinder. No fluid should come out of the hole when the sensor is removed.

3. Install the new knock sensor. The knock sensor should be orientated so the sensor lead does not rub on any component. The sensor lead should point straight back and be retained. Torque mounting bolt to specification.

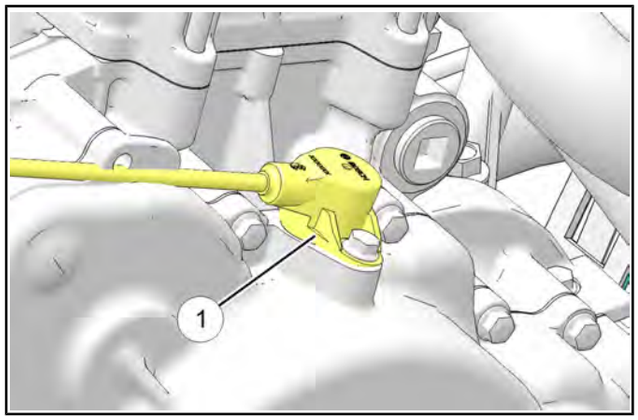
TORQUE
Knock Sensor Mounting Bolt: **15 ft-lb (20 Nm)**

4. Connect knock sensor harness.

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.



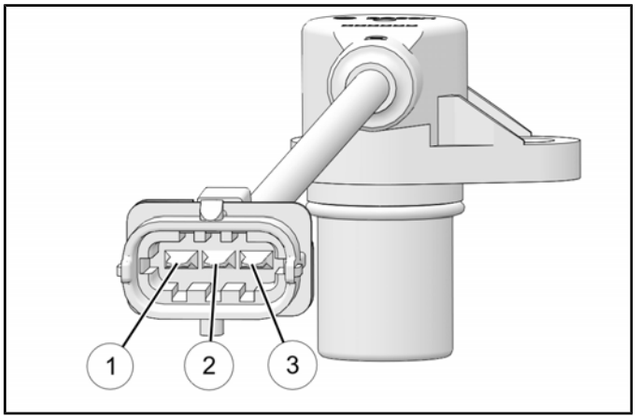
A ferromagnetic 35-tooth encoder ring with a missing tooth is built onto the flywheel. The inductive speed sensor is mounted 1.0 ± 0.26 mm (0.059 ± 0.010 in.) away from the encoder ring. During rotation, an AC pulse is created within the sensor for each passing tooth. The ECU calculates engine speed 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 transmission on the RH side of the vehicle and disconnect the harness.
2. Pin ① is for the shield circuit and it should be OL to pins ② & ③. A resistance reading would indicate a shorted sensor.



3. Connect an ohmmeter between CPS pin terminals ② & ③. A resistance value of **1000Ω ± 10%** at room temperature should be obtained.

CPS Resistance Specification:
1000Ω ± 10%

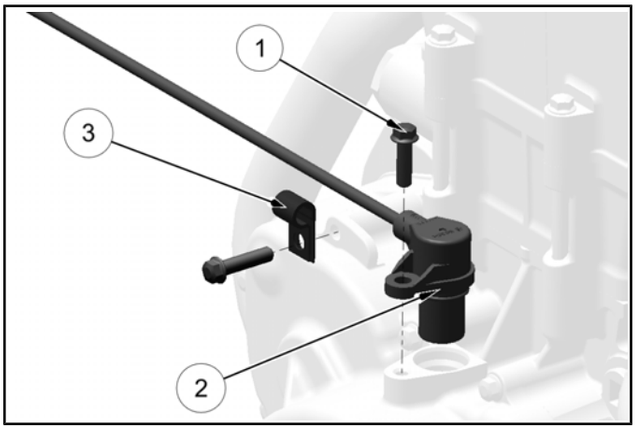
4. If the resistance is correct:

- 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. Follow the CPS Replacement procedure to inspect CPS and flywheel encoder ring for damage.

5. If the resistance is incorrect, follow the CPS Replacement page 4.6 procedure.

CPS REPLACEMENT

1. If not done already; disconnect the CPS harness connector (see Chapter 4 – CPS Test page 4.5).
2. Using an 8mm socket, remove the CPS retaining bolt ① and remove the sensor ② from the stator cover.



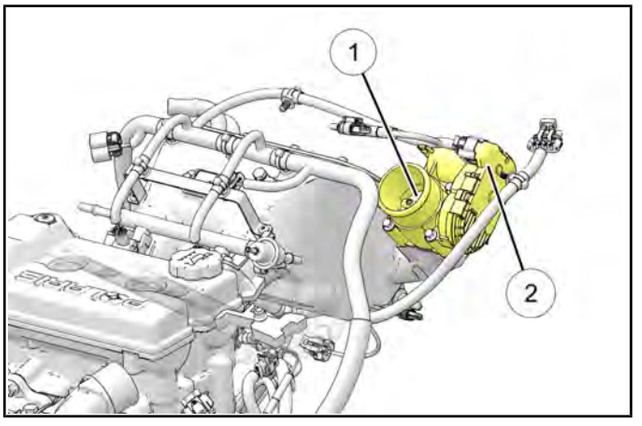
3. Unclip the wire harness retainer ③ and remove the CPS harness from the retainer to allow replacement.
4. Install new sensor using a light coating of oil on the O-ring to aid installation.
5. Torque the CPS retaining bolt to specification.

TORQUE
CPS Retaining Bolt: **9 ft-lbs (12 N·m)**

ELECTRONIC THROTTLE CONTROL (ETC) / THROTTLE BODY

ETC OPERATION OVERVIEW

Mounted to the intake manifold, the throttle body ① assembly provides the proper air/fuel ratio needed for engine operation.



The throttle body assembly includes the Electronic Throttle Control and Idle Air Control systems.

NOTICE
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.

Mounted on the throttle body, the ETC ② electronically controls the throttle body. The ETC controls engine throttle operation to provide the proper air/fuel ratio needed for engine operation at all RPM ranges based off input provided by the Pedal Position Sensor (PPS) and Electronic Control Unit (ECU).

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.

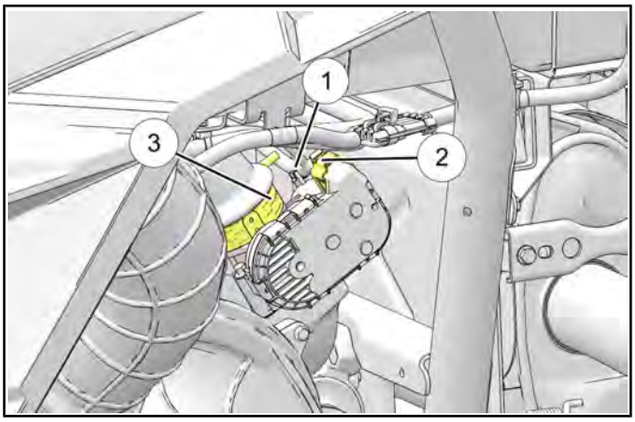
Use Digital Wrench® to perform all troubleshooting of this component. Use a Volt Ohm meter to test the vehicle harness continuity between the ETC connector and ECU connector. Refer to the wire diagram for pin-out details. If the ETC is faulty, the entire ETC assembly must be replaced (see ETC / Throttle Body Replacement page 4.7).

If code P1227 is being set, verify the following:

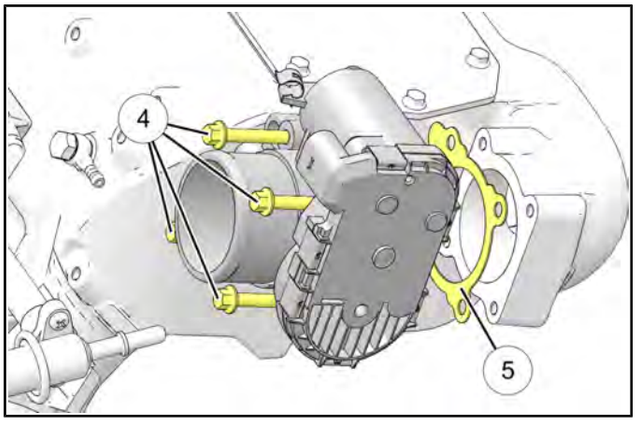
1. Check power supply voltage on pin for Pedal
2. Verify voltage at pedal for supply line. Troubleshoot wiring
3. Check the pedal for sensor/physical damage (circuit fault). Troubleshoot pedal 1 and 2 vs each other (depending on faults)

ETC / THROTTLE BODY REPLACEMENT

1. Remove the cargo box. Refer to Cargo Box Assembly Removal page 11.23.
2. Remove wire harness from ETC retainer clip ① and remove the ETC connector ②.



3. Loosen the clamp ③ retaining the intake boot to the ETC. Remove the boot from the ETC.
4. Remove the four bolts ④ retaining the ETC housing to intake plenum.



5. Remove the ETC housing and gasket ⑤ from intake plenum.
6. Reverse these steps for installation. Torque the ETC housing retaining bolts, intake boot clamps and body fasteners to specification.

TORQUE
ETC Housing Retaining Bolts: **7 ft-lb (10 Nm)**
Intake Boot Clamp: **49 in-lb (6 Nm)**
Body Fasteners: **8 ft-lb (11 Nm)**

4

ETC LEARN PROCEDURE

IMPORTANT
This procedure MUST be performed on the vehicle whenever the ECU is replaced or reflashed or the throttle body is replaced.

1. After the reflash / ECU replacement / throttle body change, leave the key on (engine not running) for 60 seconds. Do NOT crank the engine during this time.
2. Turn the key off and wait 3 minutes. During this time, the ECU will write values into memory and then completely shut down.
3. Turn key back on and start the vehicle. The vehicle should operate normally.
4. If the procedure was interrupted at any time, start back at step 1.

PEDAL POSITION SENSOR (PPS)

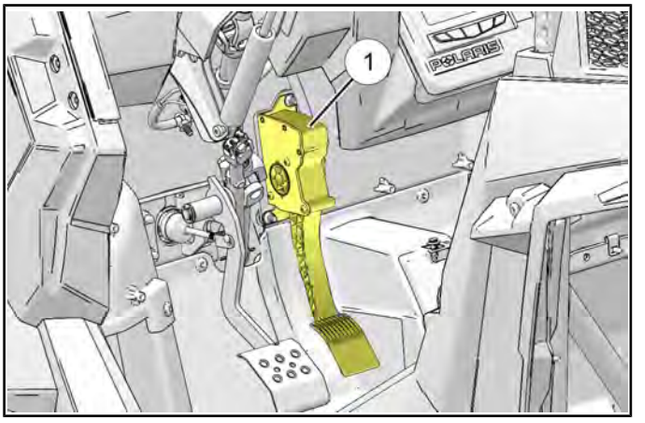
OPERATION OVERVIEW

NOTICE
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 pedal position sensor. The PPS provides accelerator 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.

LOCATION

The Pedal Position Sensor ① is located in the drivers foot control area, mounted on the top of the throttle pedal assembly.



PPS TEST

The PPS can be tested utilizing Digital Wrench® by verifying that throttle position readout varies as the pedal is pressed. There should not be any dead spots in the reading if using the graph mode in Digital Wrench. Reference the Data Display section and be sure Throttle Position is displayed. With the ignition key on for at least 15 seconds and engine not running, the Throttle Position will read approximately 13% when the pedal is released. With the pedal fully depressed, the Throttle Position will vary depending on what gear you have selected.

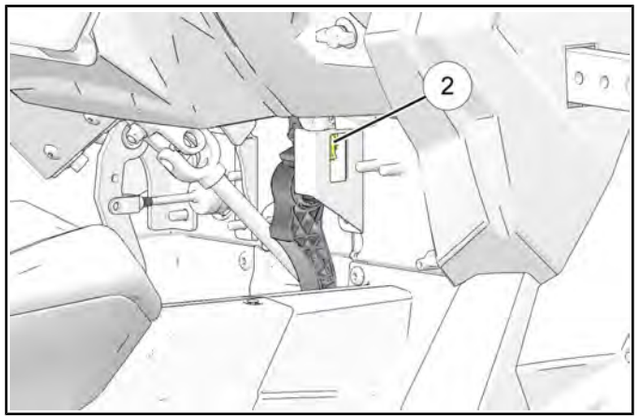
- High ≈ 60%.
- Low ≈ 39%.
- Neutral / Reverse / Park ≈ 19%

The Pedal Position Sensor is calibrated to the throttle pedal. If the PPS is faulty, the throttle pedal assembly must be replaced (see Chapter 4 – PPS Replacement page 4.9).

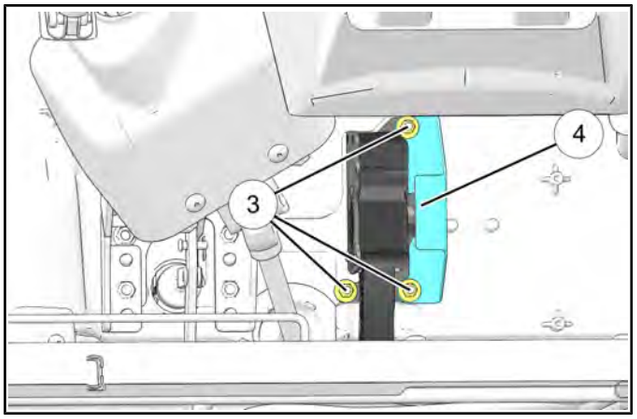
PPS REPLACEMENT

NOTICE
The PPS is calibrated to the throttle pedal. If the PPS is faulty, the throttle pedal assembly must be replaced.

1. Remove the drivers seat and disconnect the negative (-) battery cable.
2. Disconnect the PPS harness connection ② located on the throttle pedal.



3. Remove the three fasteners ③ retaining the throttle pedal assembly to the frame support.



4. Remove the protective shield ④.
5. Remove the pedal assembly from the vehicle.

PPS Installation

6. Place the throttle pedal assembly and protective shield on the mounting studs and loosely install the three fasteners.
7. Torque the three mounting bolts to specification and connect the PPS harness connection.

TORQUE
Throttle Pedal Mounting fasteners: **18 ft-lbs (24 N·m)**

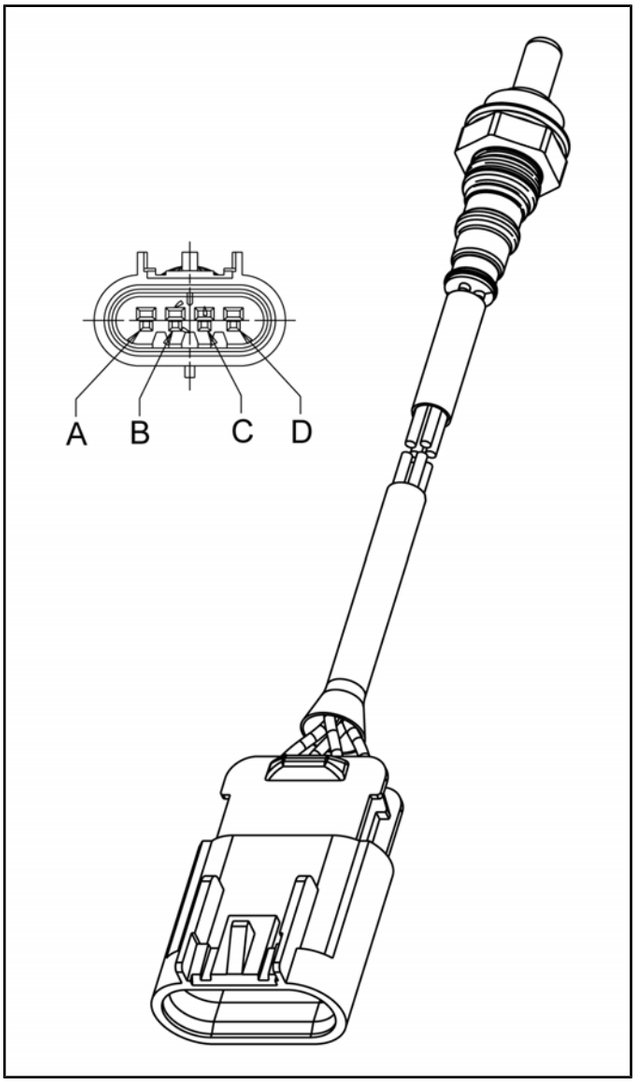
8. Manually cycle the throttle pedal to verify the throttle pedal moves freely.
9. Connect the negative (-) battery cable and install the drivers seat.

OXYGEN SENSOR

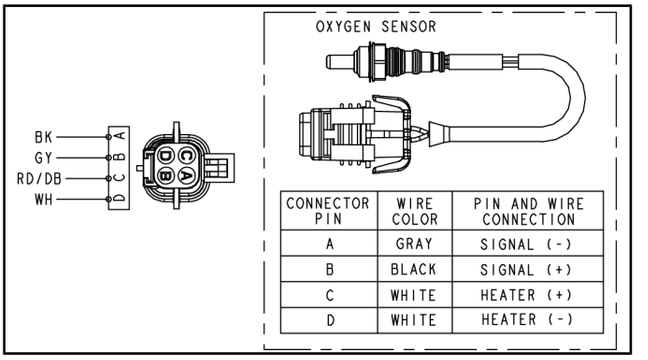
OXYGEN SENSOR INFORMATION

The oxygen sensor, located on the exhaust pipe before the muffler, uses a 4 wire heated element.

2015–2016		
CONNECTOR PIN	**WIRE COLOR**	**PIN AND WIRE CONNECTION**
A	Purple	Heater Power
B	White	Heater Ground
C	Gray	Sensor Output
D	Black	Sensor Ground



2017+		
CONNECTOR PIN	**WIRE COLOR**	**PIN AND WIRE CONNECTION**
A	Gray	Sensor Ground
B	Black	Sensor Output
C	White	Heater Power
D	White	Heater Ground



The sensor element in the oxygen sensor cannot be tested effectively with static tests. The heater circuit element in the sensor however, can be tested with an ohmmeter.

MEASUREMENT
Oxygen Sensor Heater Element Resistance 15.8–18.6 Ohms

NOTICE
This test MUST be performed with the sensor at room temperature.

First, verify if there are any stored codes for the oxygen sensor.

NOTICE
The ECU must first run though the O2 sensor time delay before a trouble code will be set. This may take several minutes at idle to occur.

Short drive cycles and cold temperatures will both affect the delay time of the O2 sensor (increases the delay). The delay time ensures the oxygen sensor heater has run long enough to provide accurate data.

OXYGEN SENSOR REPLACEMENT

1. Disconnect the harness going to the oxygen sensor.
2. Remove the oxygen sensor from the exhaust pipe.
3. Install new oxygen sensor. Torque sensor to specification.

TORQUE
Oxygen Sensor: **13 ft-lb (18 Nm)**

4. Connect the harness going to the oxygen sensor.

POLARIS DIGITAL WRENCH

DIGITAL WRENCH® DIAGNOSTIC SOFTWARE OVERVIEW

NOTICE
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 (DIGITAL WRENCH)

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
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.

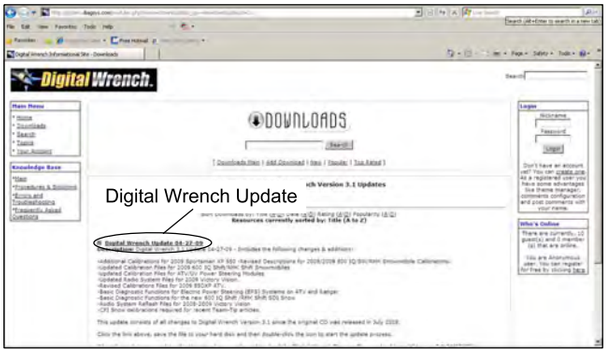
Knowing what Digital Wrench® version and update is installed will help determine which updates are required.

NOTICE

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

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*.

NOTICE

Only authorized Polaris dealers and distributors can access the dealer website.

1. Log on to *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**".

NOTICE

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 to 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.

NOTICE
Do not "run" or "open" the file from where they are. Select "save" and download them to your PC before running the install.

8. 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.

NOTICE
Versions and updates are subject to change.

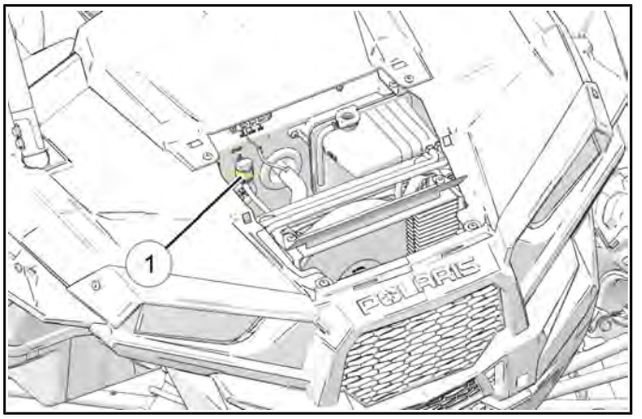
DIGITAL WRENCH® COMMUNICATION ERRORS

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.diagsys.com/.*

4

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:

1. Assemble the SmartLink Module and attach the PC Interface Cable to your laptop.
2. Remove the protective cap from the Digital Wrench® connector.
3. Connect the Vehicle Interface Cable to the Digital Wrench® diagnostic connector.
4. 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.
5. 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).

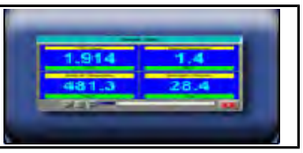
In addition, guided diagnostics are also available for many other electrical sub systems.

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.

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®.

ETC LEARN PROCEDURE

IMPORTANT

This procedure MUST be performed on the vehicle whenever the ECU is replaced or reflashed or the throttle body is replaced.

1. After the reflash / ECU replacement / throttle body change, leave the key on (engine not running) for 60 seconds. Do NOT crank the engine during this time.
2. Turn the key off and wait 3 minutes. During this time, the ECU will write values into memory and then completely shut down.
3. Turn key back on and start the vehicle. The vehicle should operate normally.
4. If the procedure was interrupted at any time, start back at step 1.

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*.

NOTICE

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 4.12.
- 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.

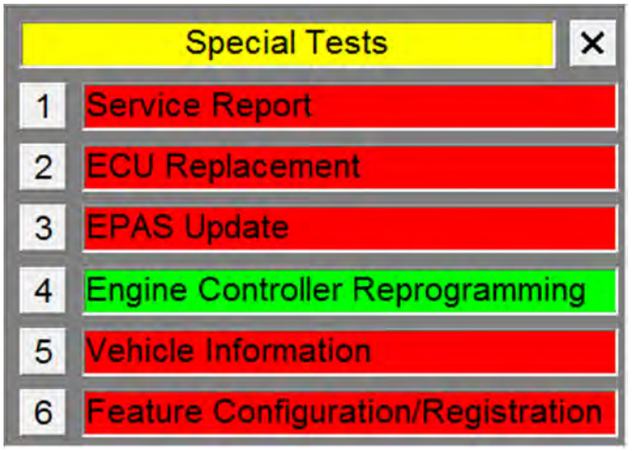
Reprogramming (Reflash) Procedure:

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.

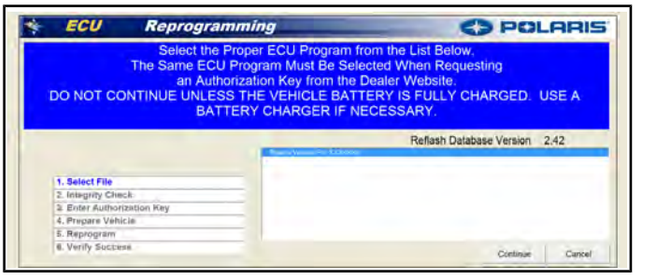
1. Verify the most current update has been downloaded and loaded into Digital Wrench®. Digital Wrench Software Version and Update ID page 4.12
2. Connect SmartLink Module cables to PC and vehicle.
3. Open the Digital Wrench® program.
4. Select the model year, product line and vehicle description by selecting the "Change Vehicle Type" icon.

5. Select the "Special Tests" icon.

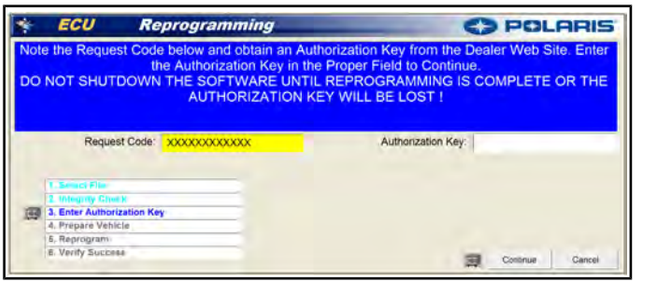
6. Select "Engine Controller Reprogramming".



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.

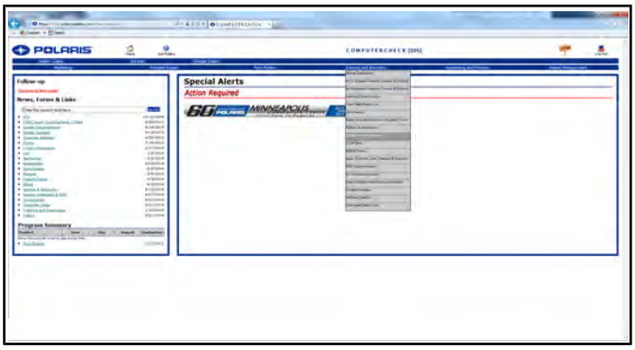


8. Copy (CTRL +C) the Request Code that will be required on the dealer website in the next step. DO NOT CLOSE Digital Wrench® or the Request Code will be invalid. **NOTE: All characters are letters; there are no numbers in a request code.**



NOTICE
Request Codes and Authorization Keys must be entered EXACTLY as they appear on the screen.

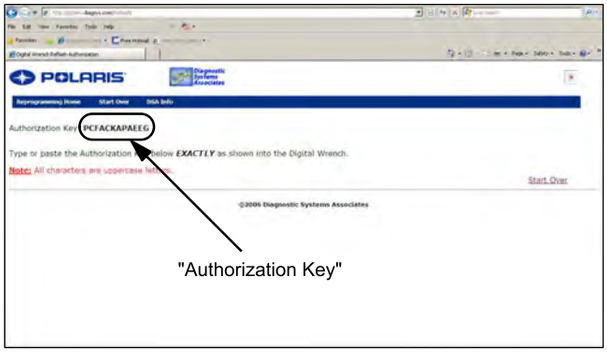
9. Go to *www.polarisdealers.com* and click on “ReFlash Authorization” from the “Service and Warranty” drop-down menu.



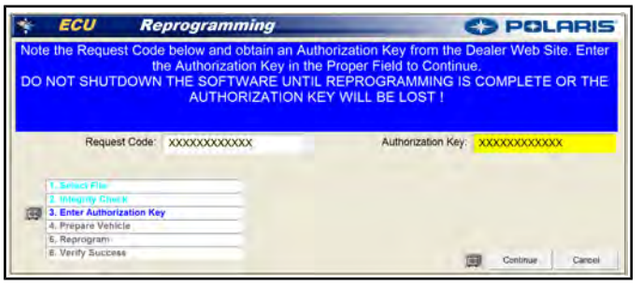
10. Enter or paste the Request Code into the box.

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. Turn the key off, wait 30 seconds, and then turn the key on to verify the reflash was successful.

4

POLARIS MOBILE DIGITAL WRENCH (PMDW)

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:

Wireless Vehicle Link (WVL) – Part Number PU-51435:

To download the PMDW app, navigate your Android device to 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

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.

CHAPTER 5
EFI / FUEL SYSTEM

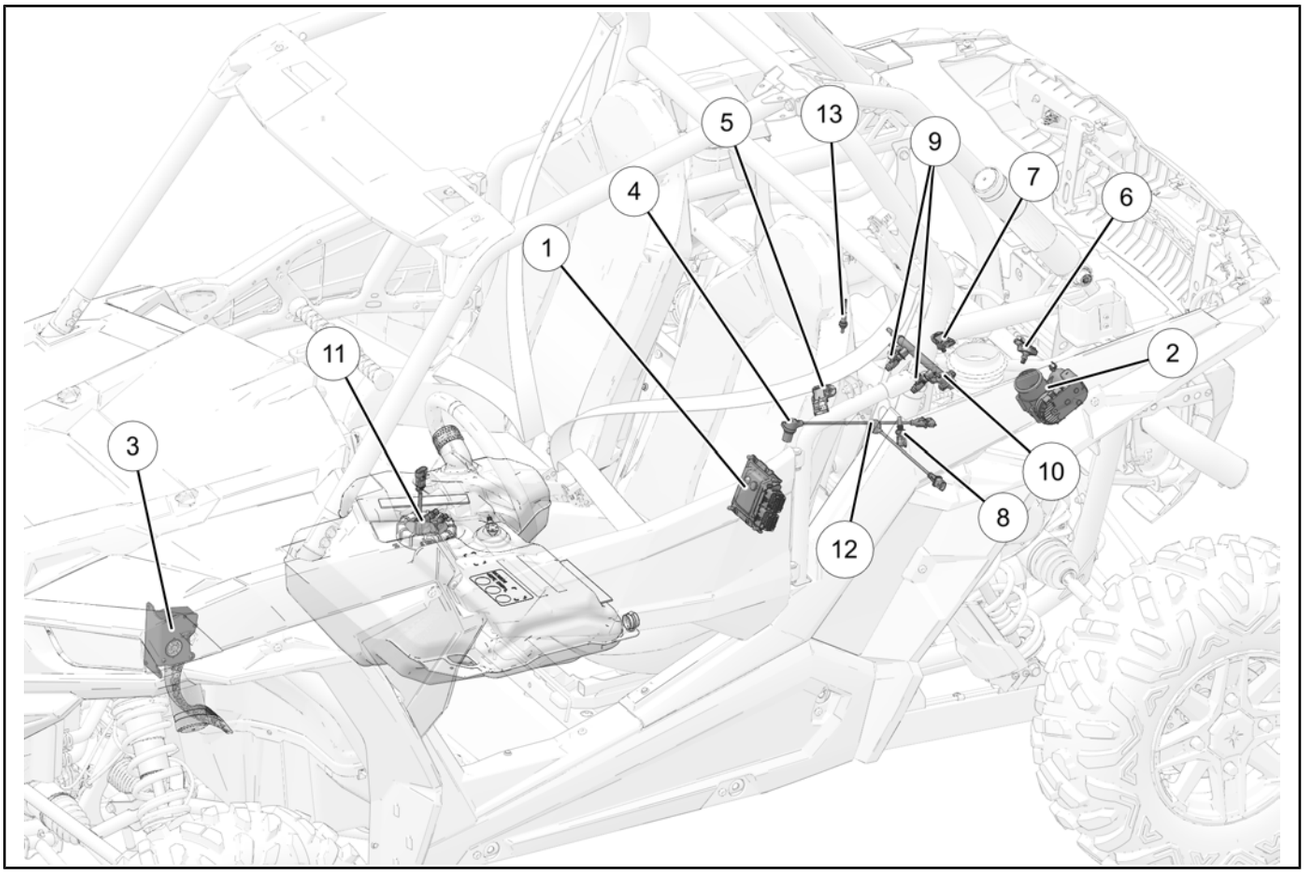
GENERAL INFORMATION

SPECIAL TOOLS

PART NUMBER	DESCRIPTION
PU-43506-A	Fuel Pressure Gauge Kit
PU-47063-B	Digital Wrench Diagnostic Software (includes most recent version of software with serial number, standard interface cable, USB-Serial Adapter cable and SmartLink Module Kit)
PU-47471	Digital Wrench SmartLink Module Kit (includes PU-47470, PU-47469, PU-47468)
PU-47468	Digital Wrench SmartLink Module
PU-47469	Digital Wrench Vehicle Interface Cable
PU-47470	Digital Wrench PC Interface Cable
PU-50326	Fuel Pump Service Tool
PA-48838	Fuel Pressure Gauge Adapter

EFI OVERVIEW

EFI SYSTEM COMPONENTS/LOCATIONS



①	Electronic Control Unit (ECU)	Located behind the driver's seat behind the access panel.
②	Electronic Throttle Control (ETC)	Located under the cargo box attached to the throttle body.
③	Pedal Position Sensor (PPS)	Located on the throttle pedal.
④	Crankshaft Position Sensor (CPS)	Located on the MAG cover.
⑤	Barometric Absolute Pressure (BAP) Sensor	Located on the intake duct after the air filter box.
⑥	Boost Pressure Sensor	Located on the pressure duct before the throttle body.
⑦	Temperature and Manifold Absolute Pressure (TMAP) Sensor	Located on the intake manifold.
⑧	Engine Coolant Temperature (ECT) Sensor	Located on the bottom side of the thermostat housing.
⑨	Fuel Injectors	Located on fuel rail between intake manifold and engine.
⑩	Fuel Pressure Regulator	Located on the fuel rail between intake manifold and engine.
⑪	Fuel Pump / Sender	Located in the fuel tank under the passenger seat.
⑫	Knock Sensor	Located on cylinder assembly between engine and transmission.
⑬	Oxygen Sensor	Located on the exhaust pipe.

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.

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.

INITIAL PRIMING / STARTING PROCEDURE

NOTICE
The injection system should be purged of all air prior to initial start up any time the fuel system has been disassembled.

If the fuel system has been completely drained of fuel, cycle the key switch from OFF to ON two times, waiting approximately 5 seconds at each ON cycle to allow the fuel pump to cycle and shut down.

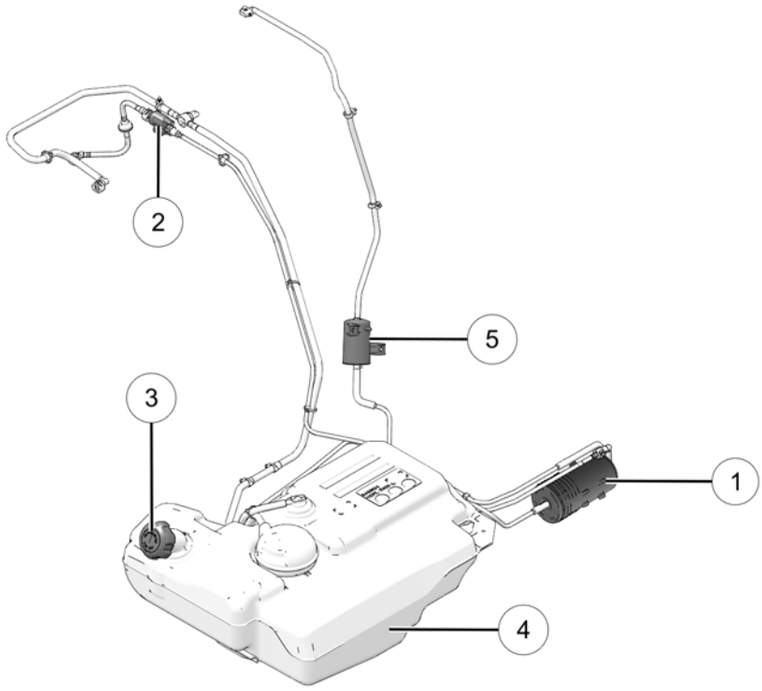
Attempt to start the vehicle normally. If the vehicle does not start after 5 seconds of cranking, a problem may exist and should be diagnosed. Verify no trouble codes are set and that the unit has good fuel pressure at key on.

NOTICE
Accurate testing of EFI components is recommended utilizing the Digital Wrench® Diagnostic Software (dealer only).

EVAP SYSTEM

EVAP SYSTEM OVERVIEW

An evaporative emission control system is a system that captures fuel tank vapors that would otherwise be vented to the atmosphere. The EVAP system components consist of:



① **Charcoal Canister:** The charcoal canister is mounted near the fuel tank. Fuel vapors from the tank are routed to and adsorbed by the canister's charcoal granules. When the vehicle is running, vapors are drawn into the engine by intake vacuum. The purge valve controls the movement of the vapors from the canister to the throttle body.
② **Purge Valve:** The purge valve is located near the throttle body and is controlled by the ECU. There are two hose assemblies that connect the two purge ports to the expansion chamber. Each hose assembly has a check valve. The check valve controls the flow of vapor so that it can only flow in one direction, toward the throttle bodies. The purge valve must be installed with the arrow pointing rearward (the direction the air flows toward the engine during a purge event).
③ **Fuel Cap:** On EVAP equipped vehicles, the fuel cap will have a ratcheting style fuel cap with a tether. It is important to note that Polaris does not use an enhanced EVAP control system. This means the system does not detect a gross leak, or restrictions in the EVAP system such as a missing or loose fuel cap. No check engine light will illuminate.
④ **Fuel Tank:** The fuel tank has a built in rollover valve to prevent liquid fuel from entering the EVAP system in case of an incident such as the vehicle being upside-down.
⑤ **Air Filter and Lines:** Before incoming air can enter the charcoal canister, it needs to be filtered. This air filter is located near the fuel tank. The vent line for the air filter is connected to a plastic fitting. The fitting is pressed into the frame tube in the left rear fender well. It is important to note that the air filter is directional. If replacement is required, be sure to follow the directional markings on the filter. The arrow marking on the air filter must point in the direction of air flow during a purge event. There are two additional markings on the air filter: CAN (canister) and ATM (atmosphere). The CAN side of the filter is closest to the charcoal canister, and the ATM side is the end where air enters first. If the air filter becomes plugged or restricted, fuel vapors will not properly flow through the air filter to the charcoal canister and purge valve. The EVAP lines are multi-layer formed lines that have low permeability. If a line needs replacement, be sure to replace the line with its direct replacement. It is critical that all lines follow their original routing and fastening points when replaced.

EVAP CONDITIONS AND SYMPTOMS

The following conditions and symptoms should be taken into consideration when working on a vehicle with an EVAP System:

- Cracks in an EVAP hose or canister may cause
  - Fuel odor
  - Trouble codes being set

NOTICE
A loose fuel cap will NOT trigger a trouble code, but may cause a fuel odor.

Excessive hydrocarbon emissions may be caused by any of the following:

- An ignition misfire
- Improper ignition timing
- Excessively lean or rich air/fuel mixture
- Low Compression
- Worn valves or guides
- Worn cylinder or piston rings
- Vacuum leaks
- Dirty fuel injector
- Defective sensor or damaged sensor wiring

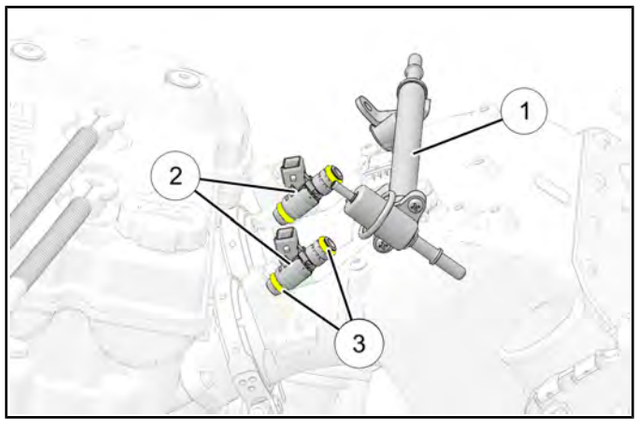
Excessive carbon monoxide emissions may be caused by any of the following:

- Rich air/fuel mixture
- Dirty air filter
- Leaking fuel injectors
- Fuel pressure too high/bad regulator

FUEL INJECTORS

FUEL INJECTOR OPERATION OVERVIEW

The fuel rail ①, located on the intake manifold, retains the fuel injectors ② to the intake assembly. O-rings ③ 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.

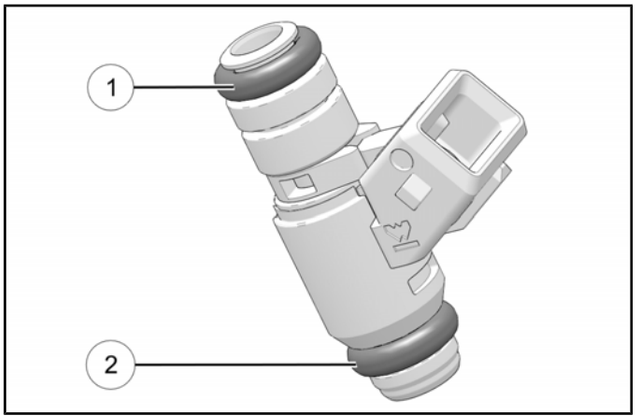
The ECU gathers fuel injection timing information from the Crankshaft Position Sensor (CPS) and the Pedal Position Sensor (PPS) to allow for sequential fuel injection.

FUEL INJECTOR O-RINGS

1. Any time an injector is removed, you must replace the upper and lower O-rings.
2. Always lubricate NEW injector o-rings with clean, silicone-free motor oil.

NOTICE
Apply oil sparingly and avoid contaminating the pintle valve / jet surface and upper inlet port.

3. Install NEW o-rings onto top and bottom of injector



ITEM	PART NUMBER	COLOR	POSITION
①	5417103	Black	TOP OF INJECTOR
②	5417104	Brown	BOTTOM OF INJECTOR

IMPORTANT
Always install NEW o-rings when removing the fuel rail or injectors.

IMPORTANT
Verify that the new top and bottom o-rings are installed in the correct position and are lubricated with clean, silicone-free oil.

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.

NOTICE
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:

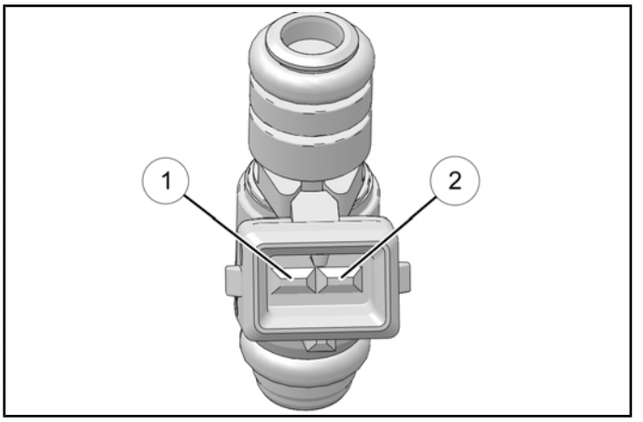
Injector leakage is very unlikely, but in rare instances it can be internal (past the tip of the valve needle), or external (weeping around the injector body). The loss of system pressure from the leakage can cause hot restart problems and longer cranking times.

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 INJECTOR TEST

NOTICE
Take note of PTO and MAG fuel injector harness connectors before disconnecting them. The harness lead to the PTO injector has green and blue wires and the MAG injector has purple and blue wires.

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 ① & ②.

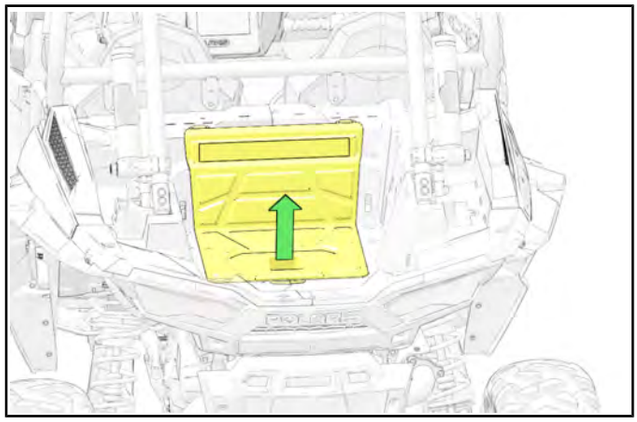


Fuel Injector Resistance Specification:
11.4 - 12.6 Ω

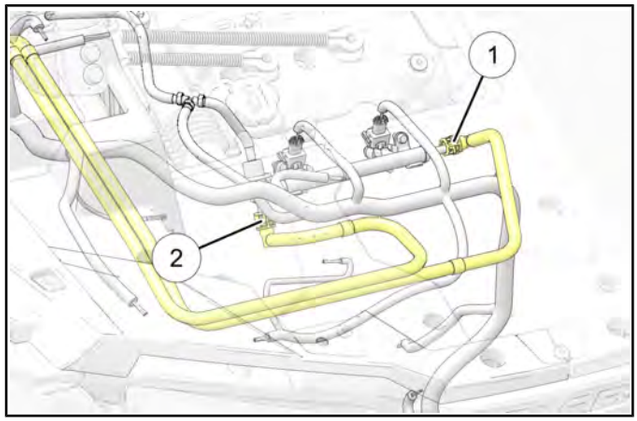
IMPORTANT
Be sure to connect the PTO harness lead to the PTO injector and the MAG harness lead to the MAG injector to ensure proper engine operation.

FUEL INJECTOR REPLACEMENT

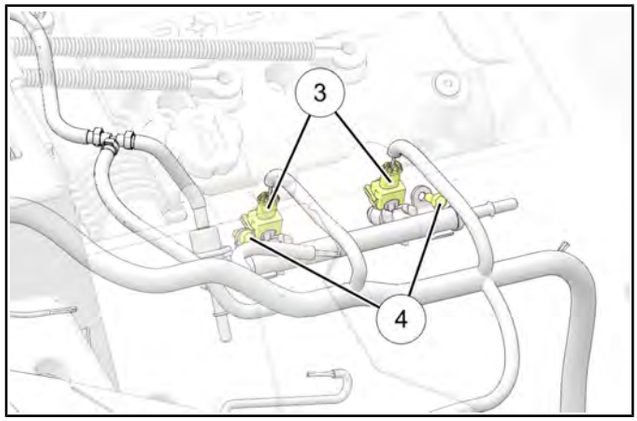
1. Be sure the engine has cooled enough to work on.
2. Disconnect the battery negative cable.
3. Remove the cargo box engine access panel.



4. Thoroughly clean the area around the fuel injectors.
5. Disconnect the fuel supply line ① and return line ② from the fuel rail.



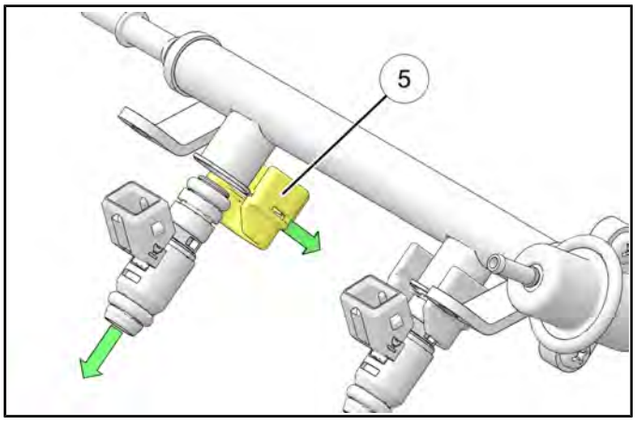
6. Disconnect the wiring ③ going to the fuel injector.



7. Remove the two fasteners ④ retaining the fuel rail to the engine intake.
8. Remove the fuel rail and fuel injectors from the engine intake.

NOTICE
Both ends of the injector are sealed with o-rings. If the injectors are going to be reused, ensure the o-rings are not damaged.

9. Pull out the injector retaining clip ⑤ and pull the injector from the fuel rail. Repeat on the other injector if necessary.



10. Upon installation of the new fuel injectors, lightly lubricate the injector O-rings to aid installation.
11. Install the new injector(s) into the fuel rail and reinstall the retaining clip.

IMPORTANT
The retaining clip(s) should click when properly engaged.

12. Lightly lubricate the injector O-rings and reinstall the fuel rail / injector assembly into the engine intake.
13. Install the fuel rail mounting screws and torque to specification.

TORQUE
Fuel Rail Mounting Screws: **7 ft-lb (10 Nm)**

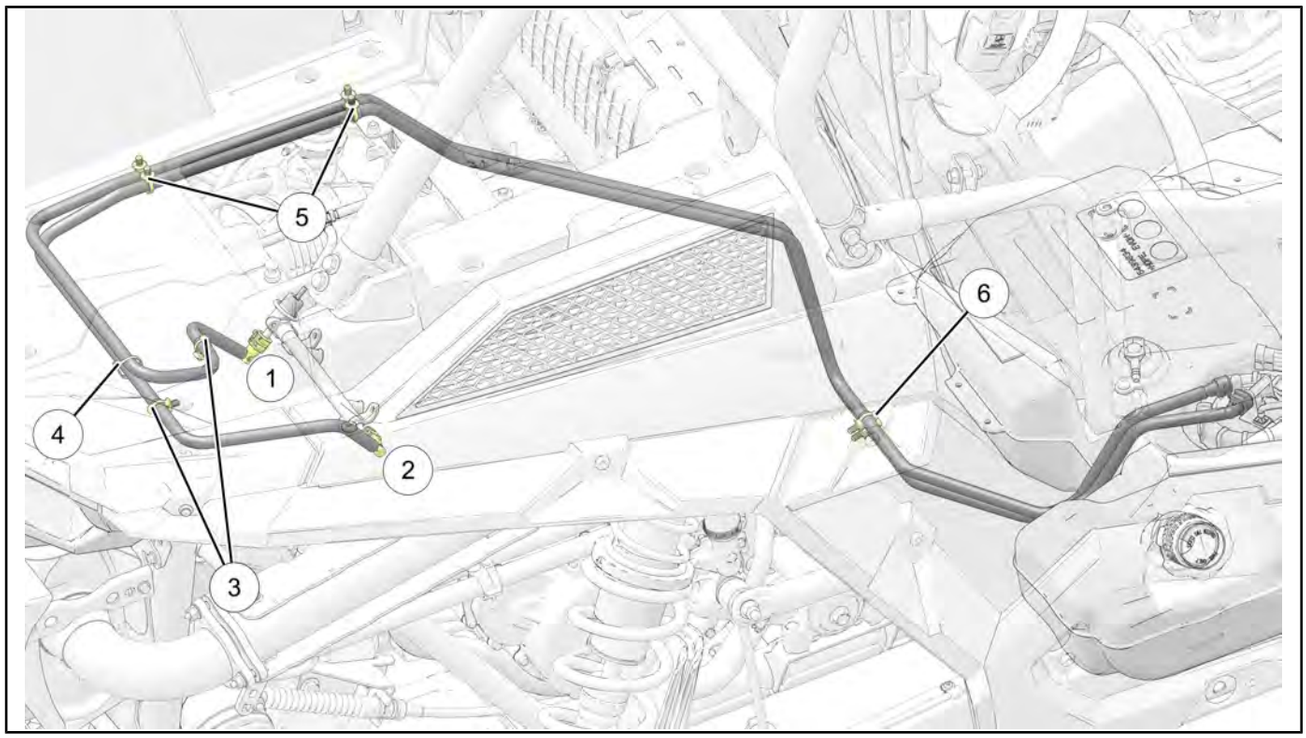
14. Connect the wiring harness to the correct fuel injector.

IMPORTANT
Be sure to connect the PTO harness lead to the PTO injector and the MAG harness lead to the MAG injector.

15. Connect the fuel supply and return lines to the fuel rail.
16. Reconnect the negative battery cable.
17. Turn key on to allow the fuel system to prime and inspect the fuel rail and injectors for fuel leaks.
18. Reinstall the cargo box engine access panel.

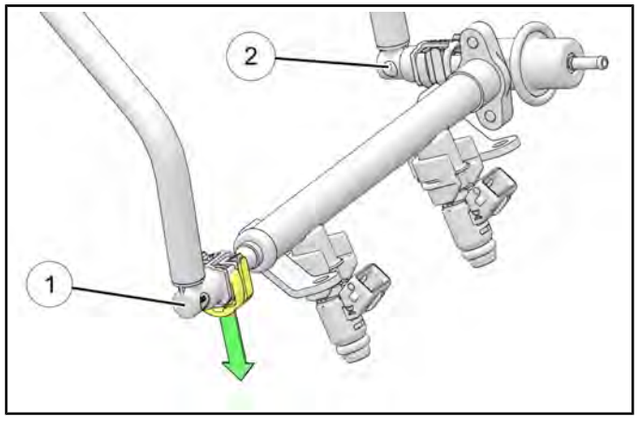
FUEL LINES

FUEL LINE REMOVAL / INSTALLATION



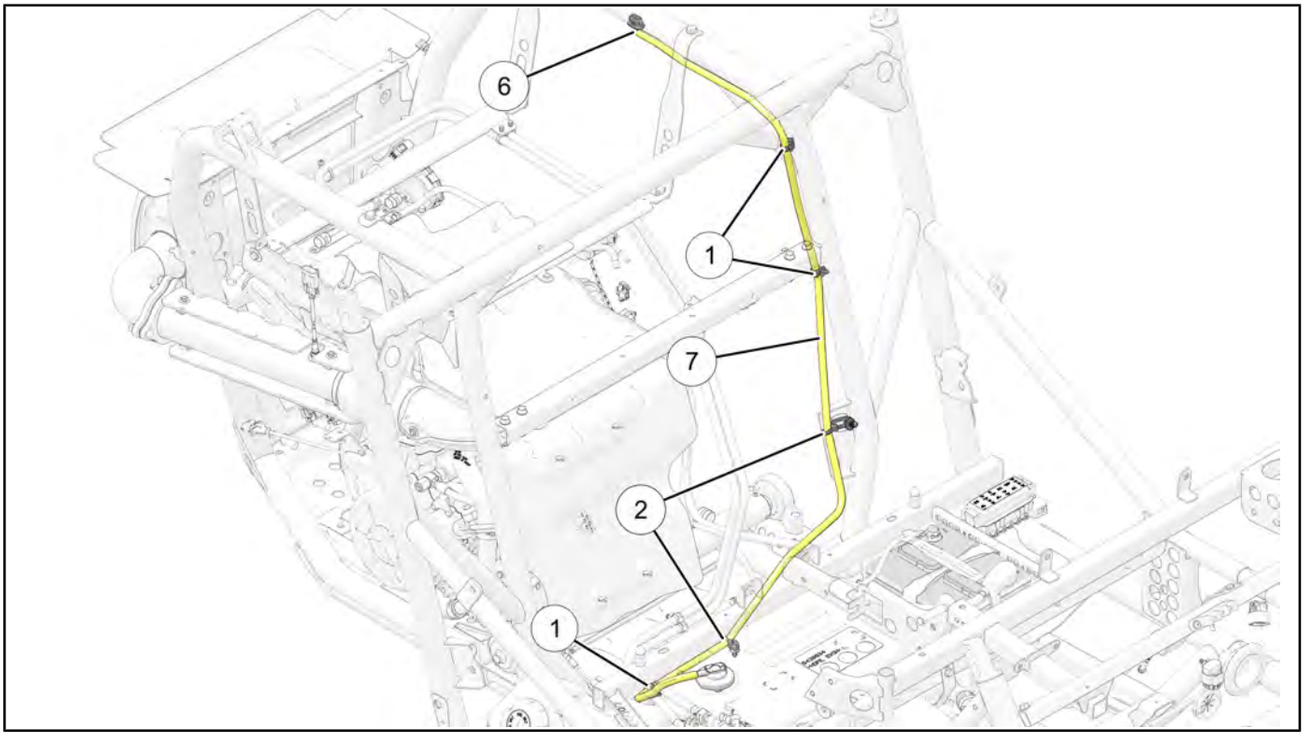
① Fuel Return Line	④ Zip Tie
② Fuel Supply Line	⑤ Retaining Clips *(attached to cargo box support brackets)*
③ Retaining Clips *(attached to intake manifold brackets)*	⑥ Retaining Clips *(attached to electric water pump bracket)*

1. Place a shop towel around the fuel line to catch any dripping fuel.
2. If removing either end of supply line ①, pull open tabs while moving the clip out to release the line.



3. If removing either end of return line ②, pull open tabs while moving the clip out to release the line.
4. Release the fuel line from the applicable retaining clips. See image/table above.
5. Remove the fuel line from the vehicle.
6. To install the line, verify the connections are clean and free of debris.
7. Place the fuel line back over the fitting and slide the connector locking mechanism back into place. Verify the connector tabs snap back into place.
8. Be sure fuel line is routed and retained properly. See image/table above from applicable retention points.
9. Turn the key on to prime the system. Check for leaking at both ends of the fuel lines.

FUEL VENT LINE ROUTING

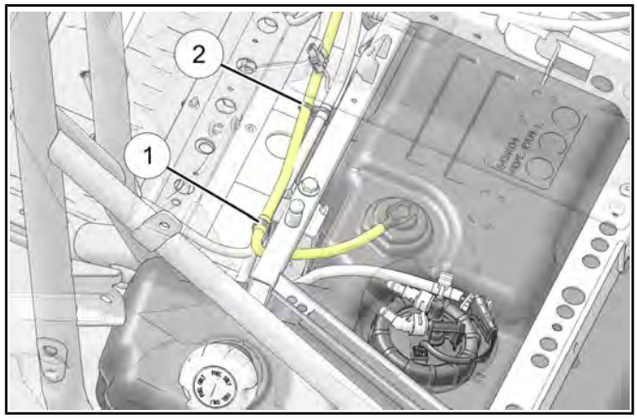


① Hinge Clip	⑥ Vent Line Termination Fitting
② Panduit Strap	⑦ Fuel Vent Line (**180 cm**)

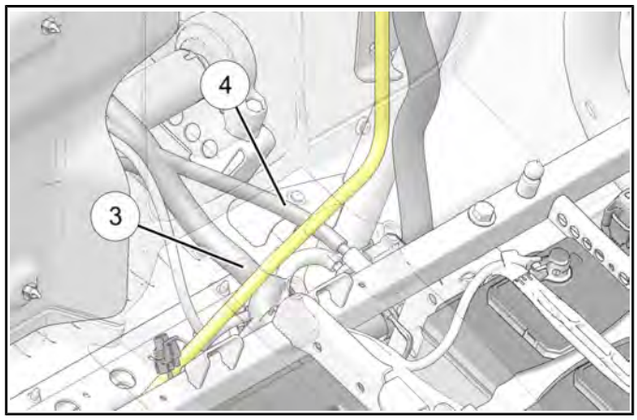
NOTICE
Be sure the vent line is routed properly and secured with cable tie(s). Check the fuel tank vent line for signs of wear, deterioration or damage. Replace vent line if necessary.

Symptoms of a restricted fuel tank vent include the following:	Collapsing fuel tank
	Engine miss or hesitation
	Loss of engine performance
	High exhaust temperatures.

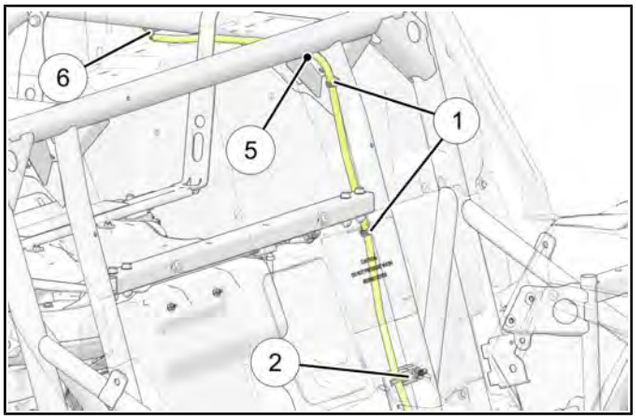
1. Retain the fuel vent line behind the fuel tank with a hinge clip ① and a panduit strap ②.



2. Route the fuel vent line OVER the electrical harness ③ and OVER the starter solenoid cables ④.

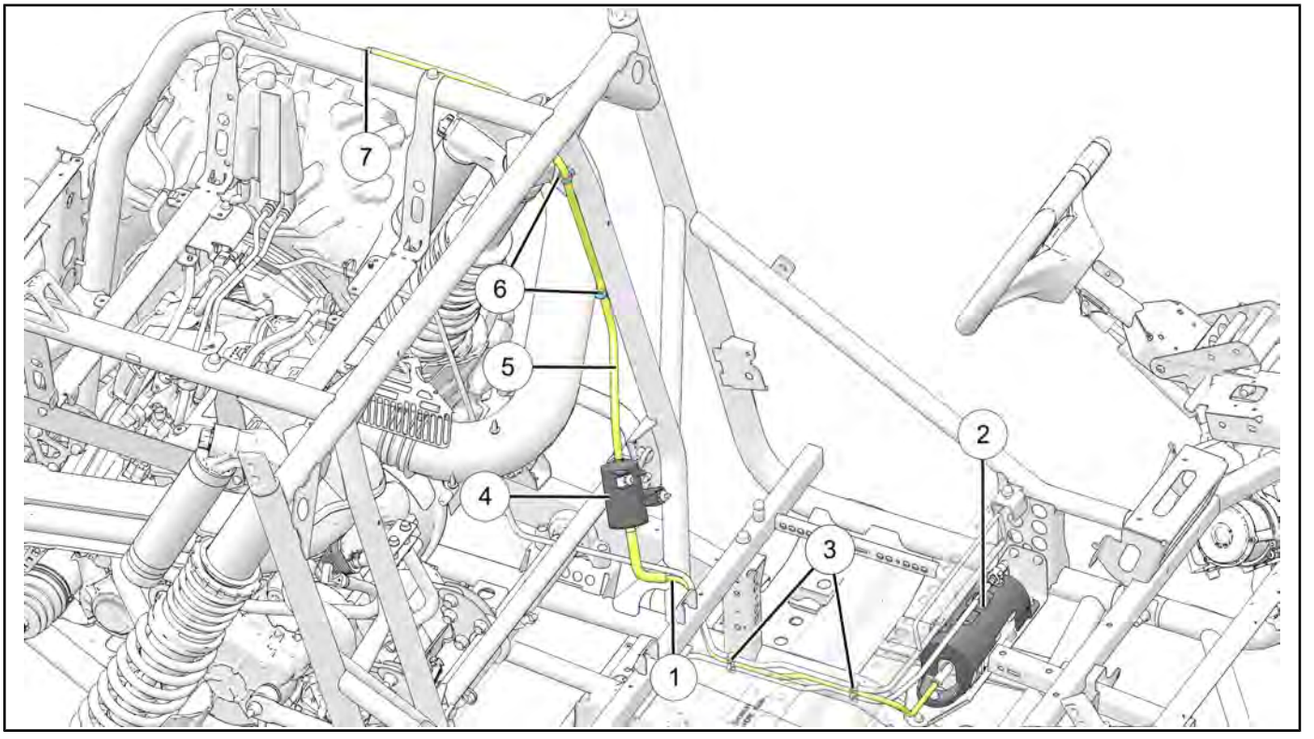


3. Route the fuel vent line through the panduit strap ② to the right side of the access panel. Retain the vent line in the two hinge clips ① on the frame.
4. Feed the vent line through the shock mount bracket opening ⑤ and attach the vent line to the fitting in the frame ⑥.



5

FUEL VENT LINE ROUTING (EVAP MODELS)



① Fuel Vent Line (Canister to Filter)	⑤ Fuel Vent Line (90 cm)
② Carbon Canister	⑥ Hinge Clip
③ Triple Clip	⑦ Vent Line Fitting
④ Carbon Canister Filter	

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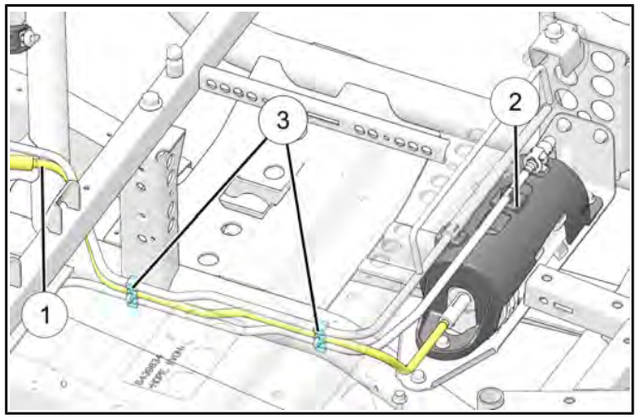
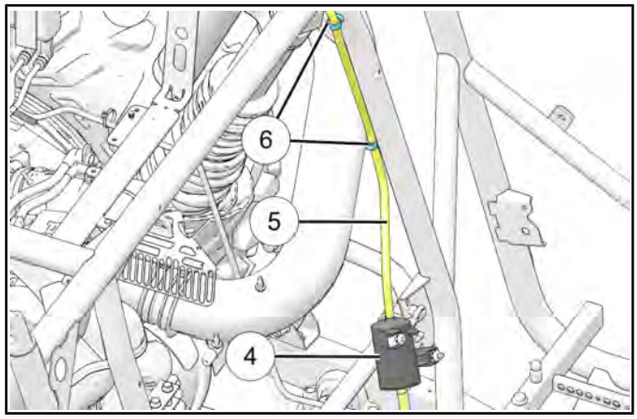
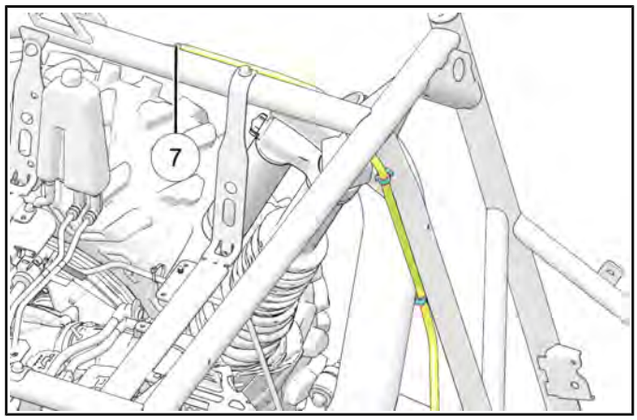
1. From the carbon canister ②, route vent line ① under the purge line and connect to two triple clips ③.



2. Route vent line behind the close-off panel and attach to the carbon canister filter ④.
3. From the carbon canister filter, route vent line ⑤ up the vertical shock support tube and attach to two hinge clips ⑥.

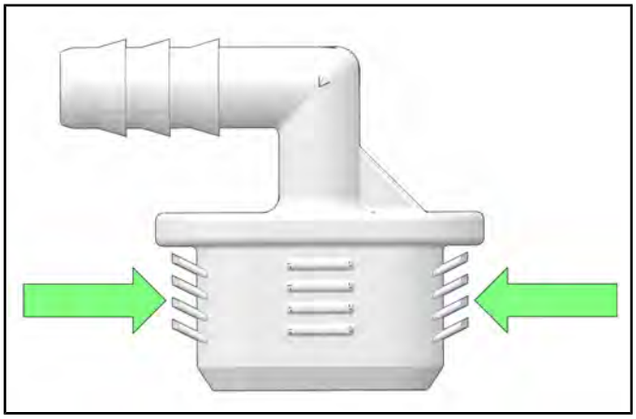


4. Route vent line rearwards and attach to the vent line fitting ⑦ in the frame.



VENT LINE TERMINATION FITTING

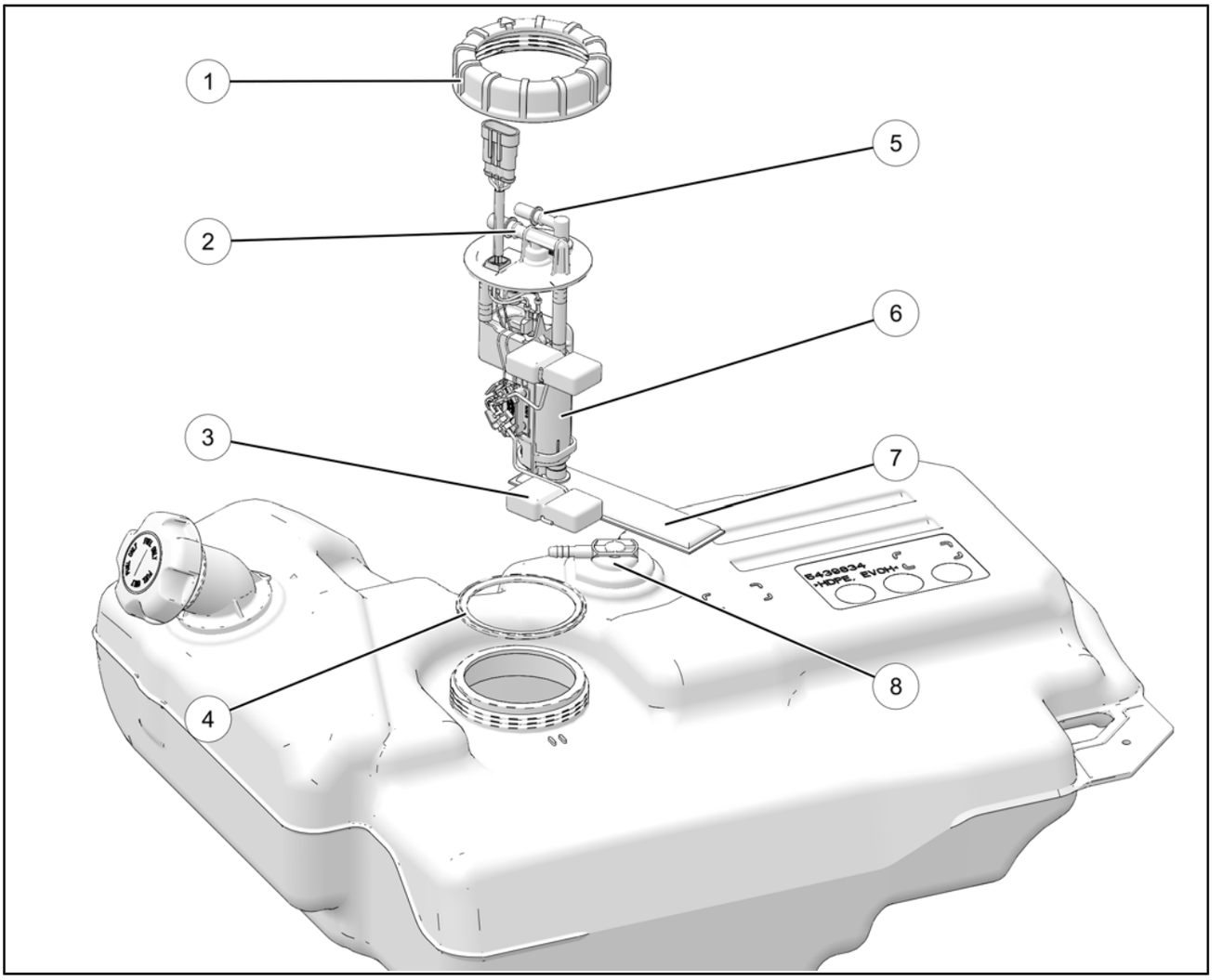
This fitting should be inspected and tested using a Mity Vac™ to ensure proper venting. Connect the Mity Vac to the fitting and give it 5 pumps. The gauge should return to 0 immediately or there is an obstruction.



NOTICE
If the vent line fitting is removed from the frame, it must be replaced. The ears on the clip (*arrows*) will not hold properly once it is removed.

FUEL TANK / PUMP

FUEL TANK ASSEMBLY VIEW



① PFA Nut **70 ft-lbs (95 Nm)**	⑤ Fuel Return
② Fuel Supply	⑥ Fuel Pump
③ Fuel Sender Float	⑦ Fuel Pickup Filter (not serviceable)
④ PFA Gasket	⑧ Fuel Tank Vent

FUEL TANK VACUUM TEST (EVAP MODELS)

1. Turn vehicle off and remove fuel cap.
2. Install a commercially available fuel cap equipped with a vent hose.
3. Install a vacuum gauge onto the fuel cap vent hose.
4. With key on engine on, measure the amount of vacuum in the fuel tank.

MEASUREMENT
Fuel Tank Vacuum: **0 - 0.73 psi (0 - 5 kPa)**

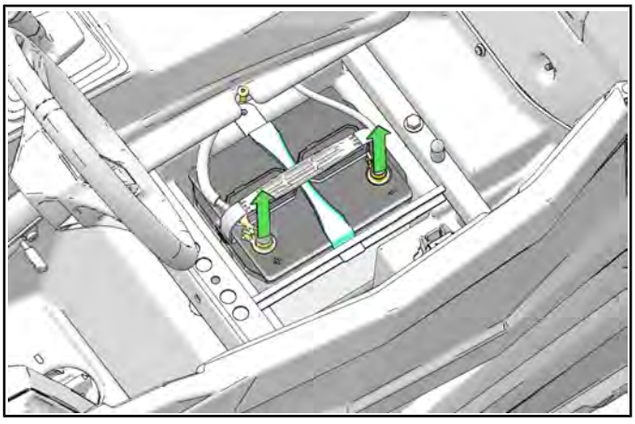
5. If more than 0.73 psi (5 kPa) of vacuum is observed, contact Polaris Technical Service for further instruction.

FUEL TANK REMOVAL

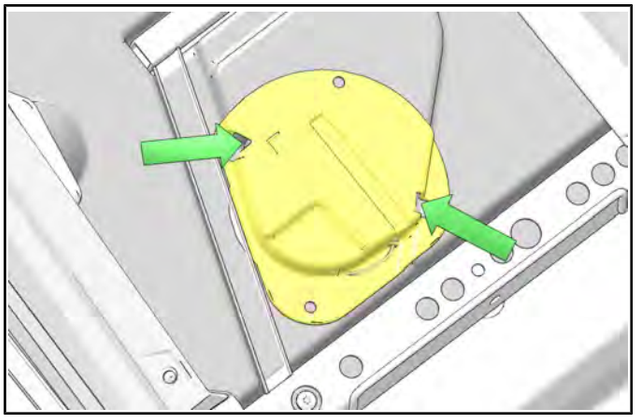
NOTICE
Syphon as much fuel from the tank as possible before attempting to remove it from the vehicle.

⚠ WARNING
Always wear safety goggles when working with high pressure or flammable fluids. Failure to do so could result in serious injury or complications.

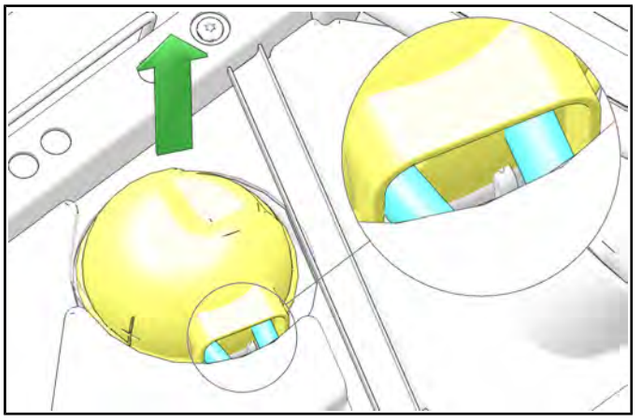
1. Remove the driver and passenger seats.
2. Disconnect the negative and positive battery cables from the battery, located under the driver's seat.



3. Remove the battery bracket fastener and remove the battery from the vehicle.
4. Remove the plastic fuel pump access cover by disengaging both tabs.



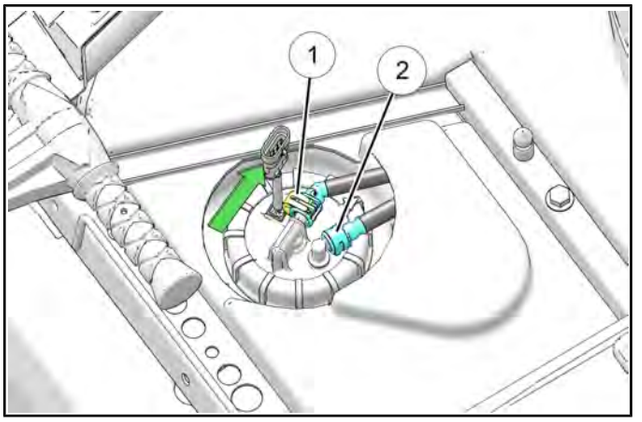
5. Carefully free the edges of the cover from the pump nut and lift up to remove the fuel lines from the cover opening.



NOTICE
Be gentle when lifting up on the fuel pump cover as the fuel pump electrical harness is connected and routed through the "+" shaped pass-through of the fuel pump cover next to the fuel line opening.

6. Disconnect the fuel pump electrical harness. The connector can be removed from the cover or can remain routed through the "+" shaped pass-through of the fuel pump cover and moved to the side.

7. While holding a shop towel over the fuel line connectors, disconnect the fuel supply line ① and return line ② from the pump.



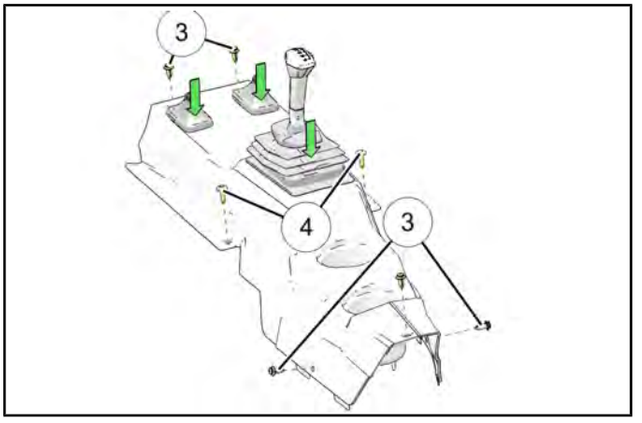
NOTICE

There is no return line on EVAP models.

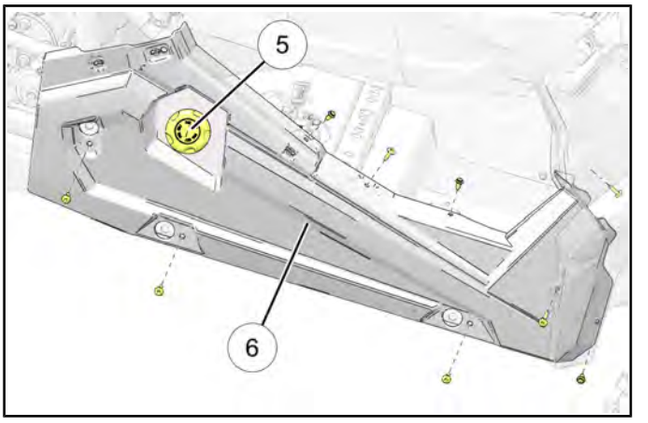
NOTICE

A small amount of fuel may come out of the fuel lines or pump fitting. Properly drain fuel into a suitable container.

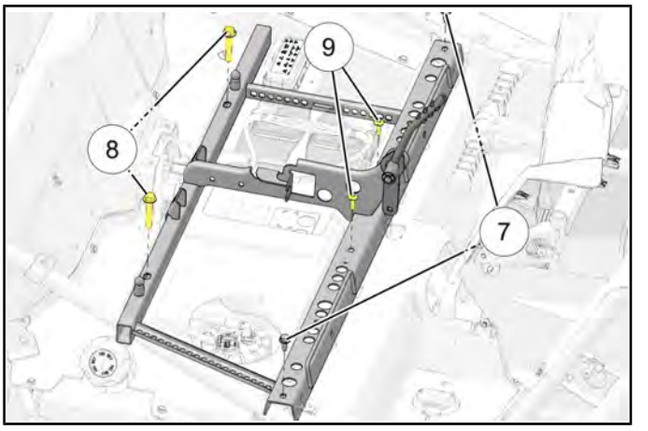
8. Remove the plastic rivets ③ and Torx screws ④ retaining the center console. Remove the console from the vehicle.



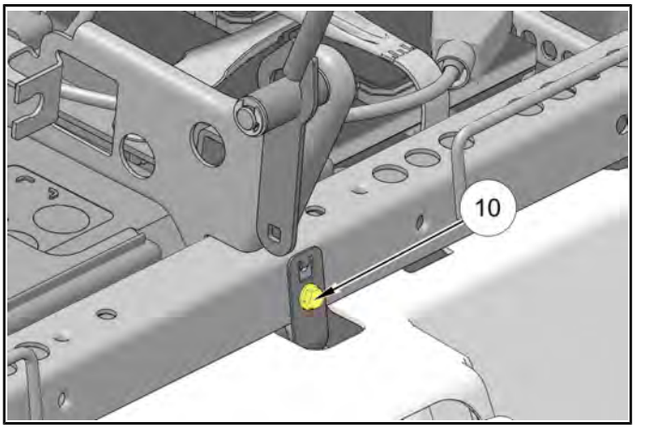
9. Remove the shift linkage from the shifter. Loosen the outer jam nut and remove the shift cable from the bracket.
10. Remove the push rivets and Torx screws retaining the rear fender flair and rear fender. Remove those panels from the vehicle.
11. Remove the fuel cap ⑤. Remove the push rivets and Torx screws retaining the passenger side rocker panel ⑥. Remove the fender and rocker panel from the vehicle. Install the fuel cap back on the fuel tank.



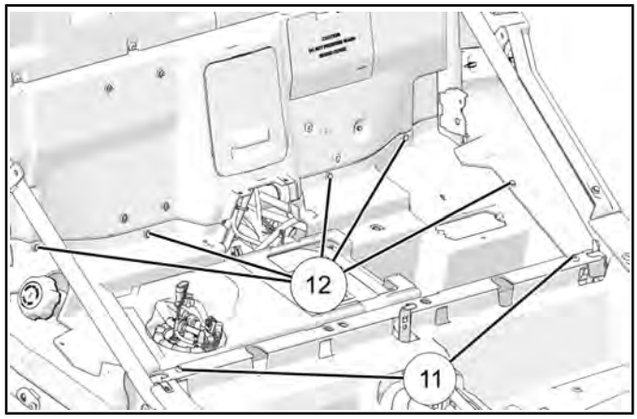
12. Remove the two bolts ⑦ and two T40 Torx screws ⑨ retaining the front of the seat base frame and two rear bolts ⑧. Remove the seat base assembly from the vehicle.



13. Remove the T-40 Torx screw ⑩ retaining the fuel tank strap to the seat base frame. The strap does not need to be removed from the vehicle.

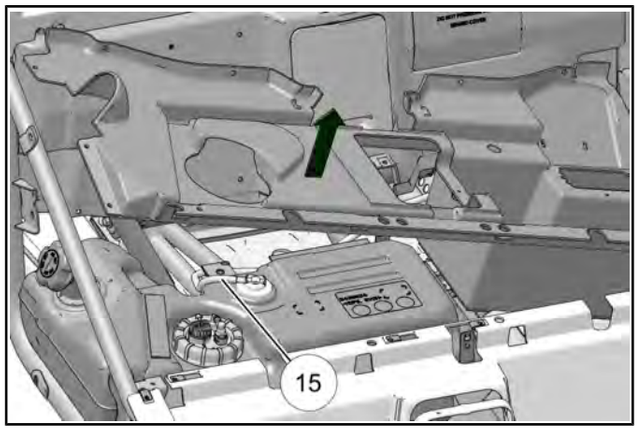


14. Remove the Torx screws ⑪ and plastic rivets ⑫ retaining the block-off panel using a T40 Torx driver.



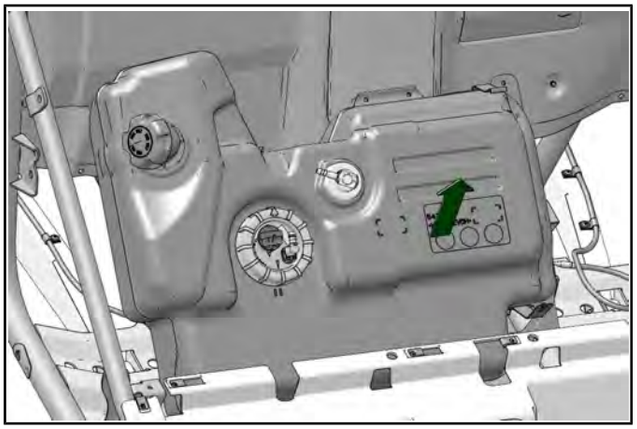
15. Remove the cover panel and remove the fuel tank vent line from the tank fitting.

NOTICE
Carefully bend back the cover panel by the fuel fill neck. Do not bend the plastic so far as to crack the panel or permanently deform the plastic.



16. Cut the three zip ties retaining the wiring to the edges of the fuel tank.

17. Lift the rear of the fuel tank up first. Carefully pull the fuel tank out of the vehicle.



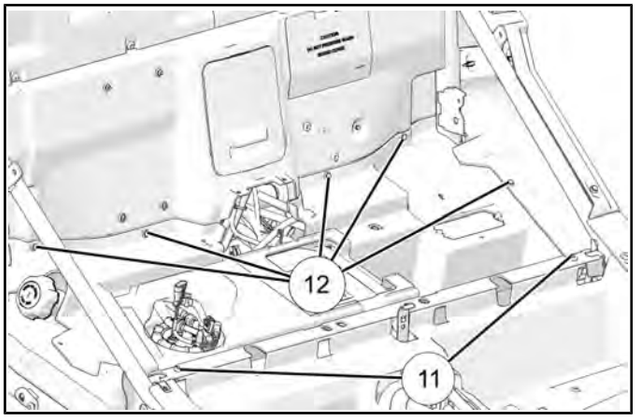
FUEL TANK INSTALLATION

1. Carefully lower the front of the fuel tank down. Be careful to avoid pinching any of the wiring by the middle of the vehicle.

IMPORTANT
Ensure the fuel tank strap is below the fuel tank.

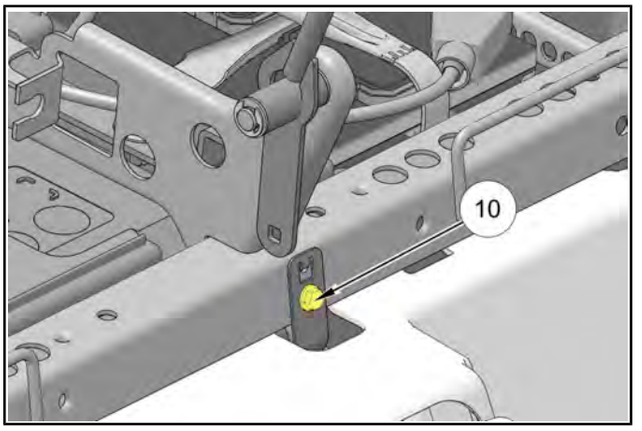
2. Install three new zip ties retaining the wiring to the edges of the fuel tank.
3. Install the fuel tank vent line to the tank fitting. Install the cover panel above the fuel tank.
4. Install the Torx screws ⑪ and plastic rivets ⑫ retaining the block-off panel using a T40 Torx driver. Torque fasteners to specification.

TORQUE
Block-off Panel Screws: **8 ft-lbs (11 Nm)**



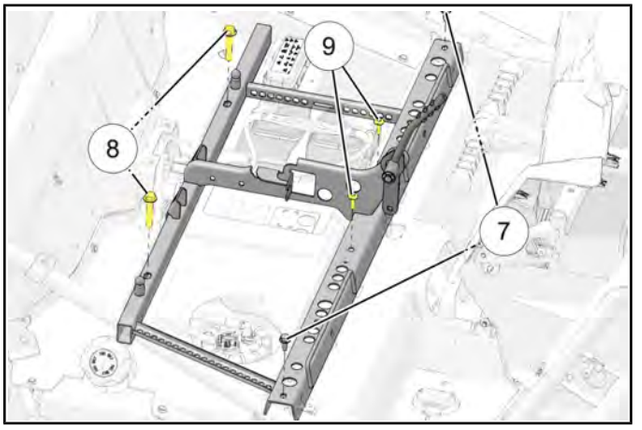
5. Install the T-40 Torx screw ⑩ retaining the fuel tank strap to the seat base frame. Torque fastener to specification.

TORQUE
Fuel Tank Strap Fastener: **8 ft-lbs (11 Nm)**



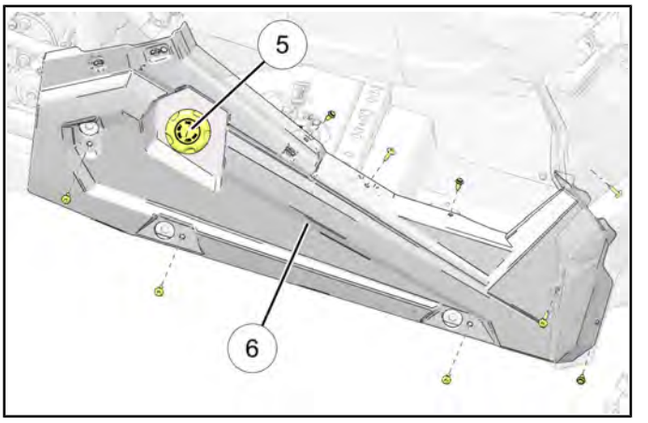
6. Install the seat base assembly into the vehicle. Install the two bolts ⑦ and two T40 Torx screws ⑨ retaining the front of the seat base frame and two rear bolts ⑧. Torque fasteners to specification.

TORQUE
Seat Frame Fasteners: M8 Bolts: **14 ft-lb (19 Nm)** M10 Bolts: **30 ft-lb (41 Nm)**



7. Install the push rivets and Torx screws retaining the passenger side rocker panel ⑥. Torque fasteners to specification.

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



8. Install the push rivets and Torx screws retaining the rear fender flair and rear fender. Torque fasteners to specification.

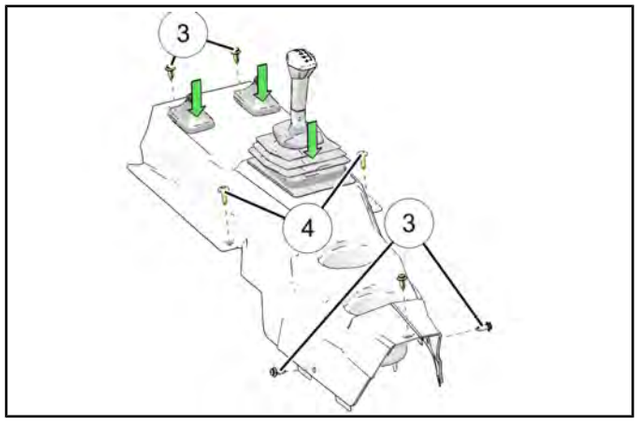
TORQUE
Body Screws: **8 ft-lb (11 Nm)**

9. Install the shift linkage to the shifter. Install the shift cable to the shifter bracket and tighten the outer jam nut. Torque jam nut to specification.

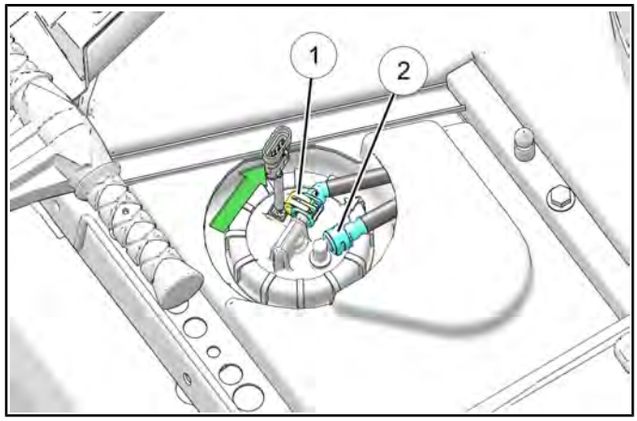
TORQUE
Shift Cable Jam Nut: **16 ft-lb (22 Nm)**

10. Install the plastic rivets ③ and Torx screws ④ retaining the center console. Torque fasteners to specification.

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

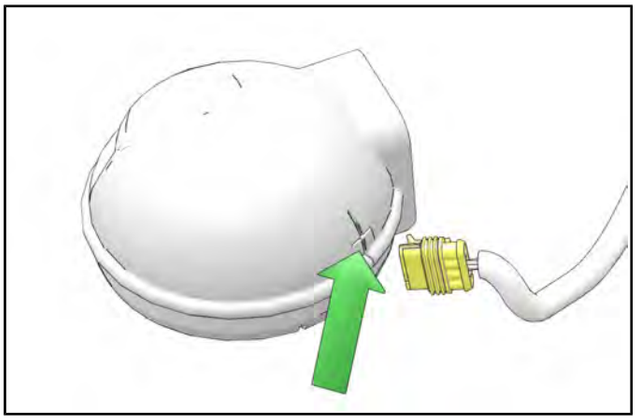


11. Connect the fuel supply line ① and return line ② to the fuel pump.



NOTICE
There is no return line on EVAP models.

12. If the fuel pump cover was fully removed, push the chassis side fuel pump electrical connector through the “+” shaped pass-through of the fuel pump cover next to the fuel line opening.

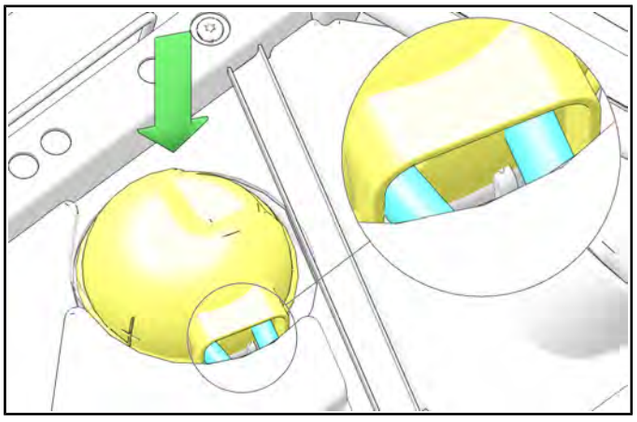


13. Connect the fuel pump electrical harness.

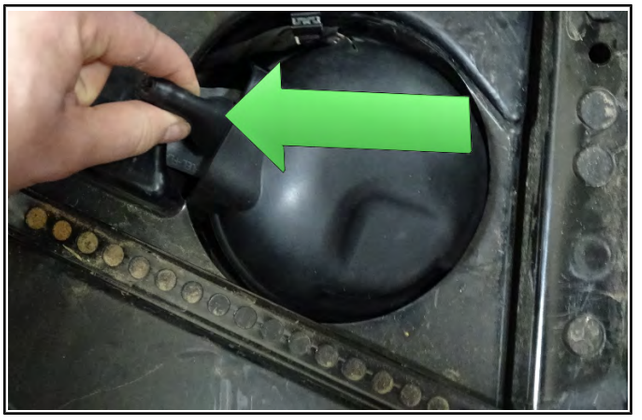
CAUTION
The harness protection tape must be pushed all the way through the cap opening. If the wires are not protected from the cap by the harness protection tape, they will wear through over time.

NOTICE
The connectors will be housed in the cap when properly installed. Do NOT pull the pump flying lead connector through the “+” cutout.

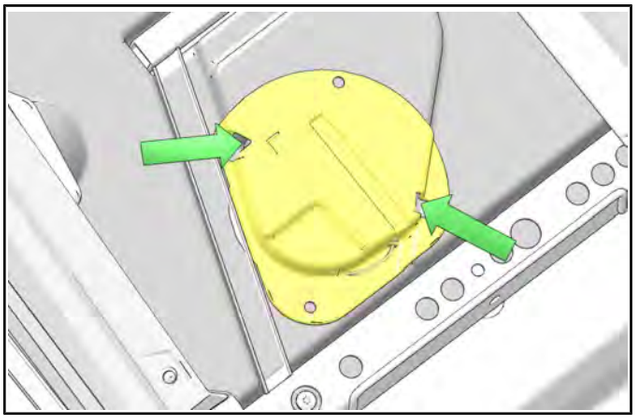
14. Orient the fuel pump cover so that the fuel lines pass through the opening, and push down around the edges to ensure the cover is fully engaged around the pump nut.



15. Fold over the cap's flap as pictured, and push it between the fuel lines until the lip at the bottom of the flap tucks under the pump nut lip.



16. Install the plastic fuel pump access cover in the orientation shown until you feel both tabs click into place.



NOTICE

Ensure both tabs of the plastic fuel pump access cover are fully engaged.

17. Install the battery into the vehicle. Torque fasteners to specification.

TORQUE
Battery Bracket Fastener: **24 in-lbs (3 Nm)** Battery Terminal Fasteners: **60 in-lbs (7 Nm)**

18. Install the seats.

FUEL TANK REMOVAL (XP4)

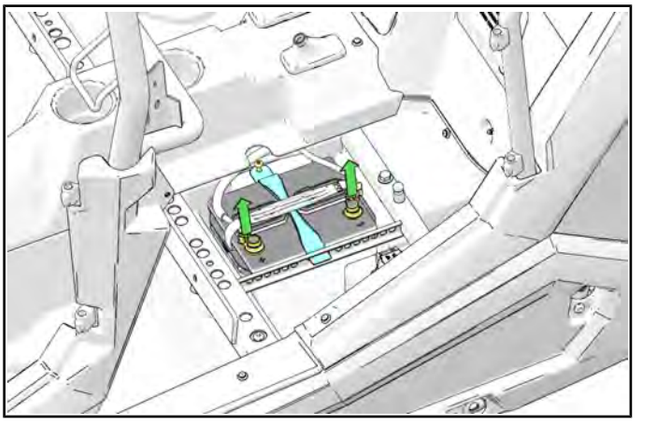
NOTICE

Syphon as much fuel from the tank as possible before attempting to remove it from the vehicle.

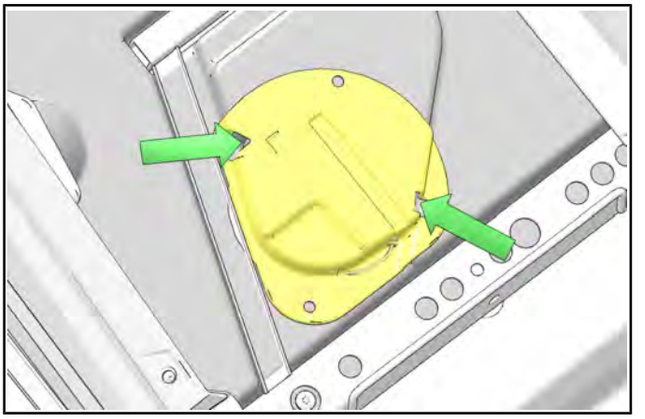
⚠ WARNING

Always wear safety goggles when working with high pressure or flammable fluids. Failure to do so could result in serious injury or complications.

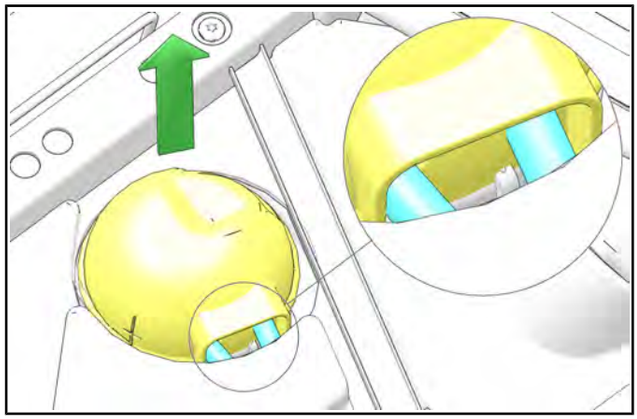
1. Remove the driver and passenger seats.
2. Loosen the clamp fasteners and remove the negative and positive battery cables from the battery, located under the left rear passenger's seat.



3. Remove the battery bracket fastener and remove the battery from the vehicle.
4. Remove the plastic fuel pump access cover by disengaging both tabs.

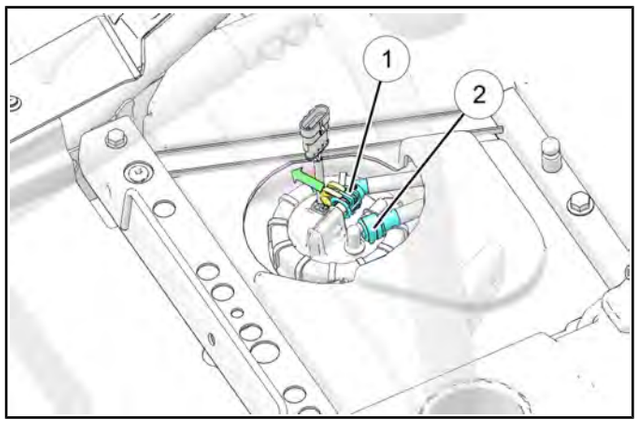


5. Carefully free the edges of the fuel pump cover from the pump nut and lift up to remove the fuel lines from the cover opening.



NOTICE
Be gentle when lifting up on the fuel pump cover as the fuel pump electrical harness is connected and routed through the “+” shaped pass-through of the fuel pump cover next to the fuel line opening.

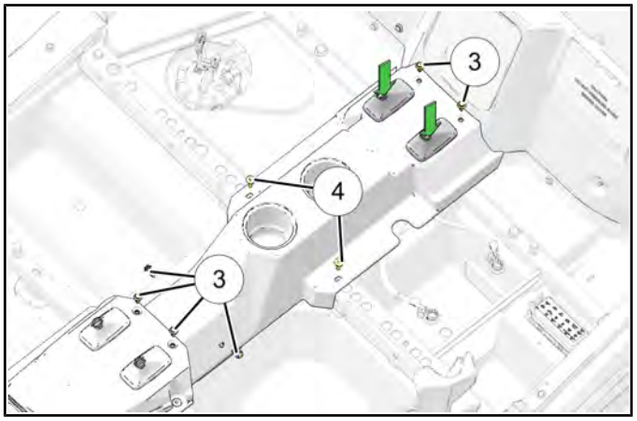
6. Disconnect the fuel pump electrical harness. The connector can be removed from the cover or can remain routed through the “+” shaped pass-through of the fuel pump cover and moved to the side.
7. While holding a shop towel over the fuel line connectors, disconnect the fuel supply line ① and return line ② from the pump.



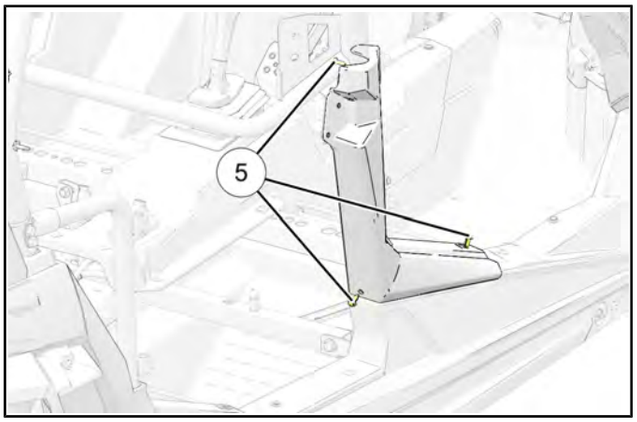
NOTICE
There is no return line on EVAP models.

NOTICE
A small amount of fuel may come out of the fuel lines or pump fitting. Properly drain fuel into a suitable container.

8. Remove the plastic rivets ③ and Torx screws ④ retaining the rear center console. Disconnect the 12v powerpoint going to the rear center console and remove the console from the vehicle.

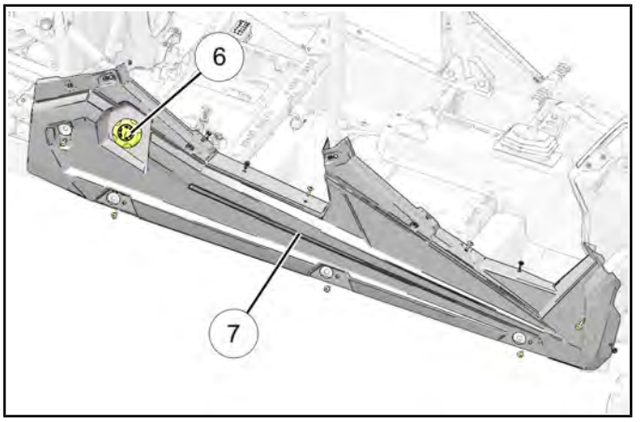


9. Remove the push rivets and Torx screws retaining the rear fender flair and rear fender. Remove those panels from the vehicle.
10. Remove the fasteners ⑤ retaining the B-Pillar cover.

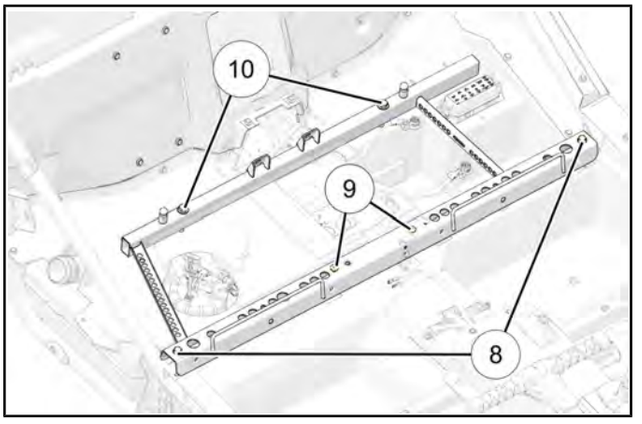


5

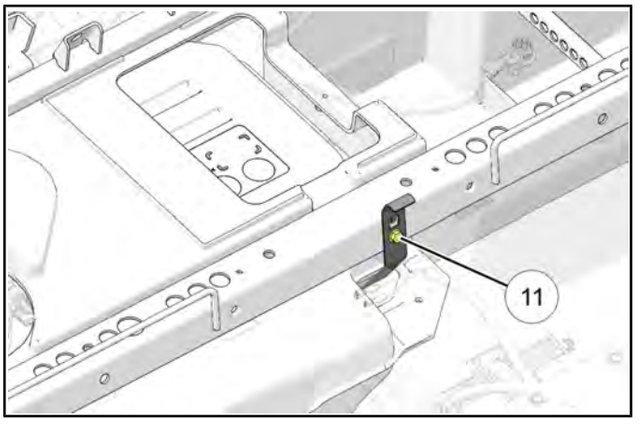
11. Remove the fuel cap ⑥. Remove the push rivets and Torx screws retaining the right rear passenger rocker panel ⑦. Remove the rear fender and rocker panel from the vehicle. Install the fuel cap back on the fuel tank.



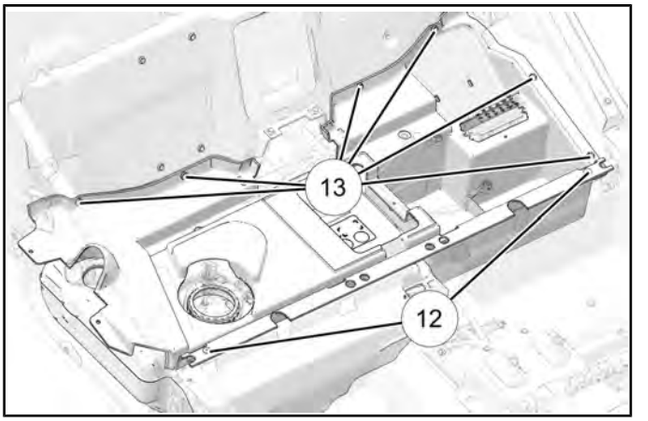
12. Remove the two bolts ⑧ and two T40 Torx screws ⑨ retaining the front of the seat base frame and two rear bolts ⑩.



13. Remove fastener ⑪ retaining the fuel tank strap to the seat base frame. The strap does not need to be removed from the vehicle. Remove the seat base assembly from the vehicle.

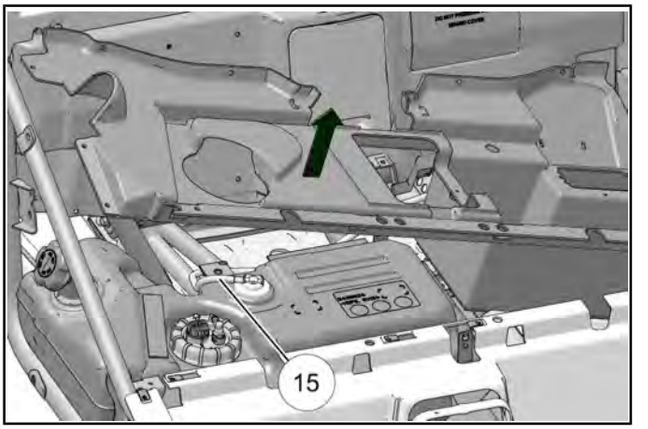


14. Remove the Torx screws ⑫ and plastic rivets ⑬ retaining the block-off panel using a T40 Torx driver.



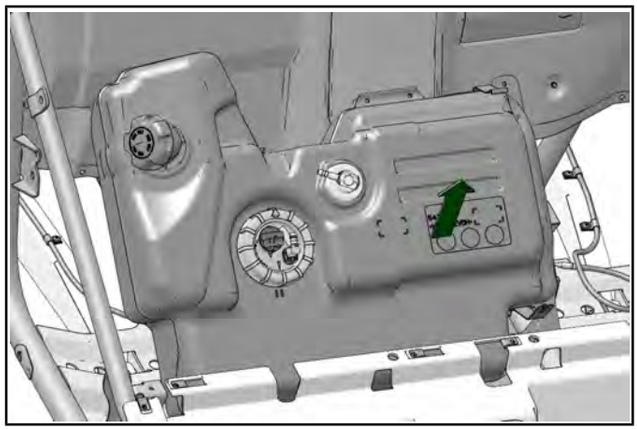
15. Remove the cover panel and remove the fuel tank vent line ⑮ from the tank fitting.

NOTICE
Carefully bend back the cover panel by the fuel fill neck. Do not bend the plastic so far as to crack the panel or permanently deform the plastic.



16. Cut the three zip ties retaining the wiring to the edges of the fuel tank.

17. Lift the rear of the fuel tank up first. Carefully pull the fuel tank out of the vehicle.



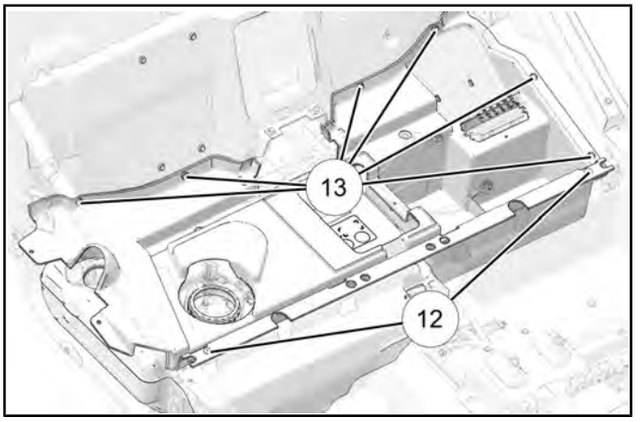
FUEL TANK INSTALLATION (XP4)

1. Carefully lower the front of the fuel tank down. Be careful to avoid pinching any of the wiring by the middle of the vehicle.

IMPORTANT
Ensure the fuel tank strap is below the fuel tank.

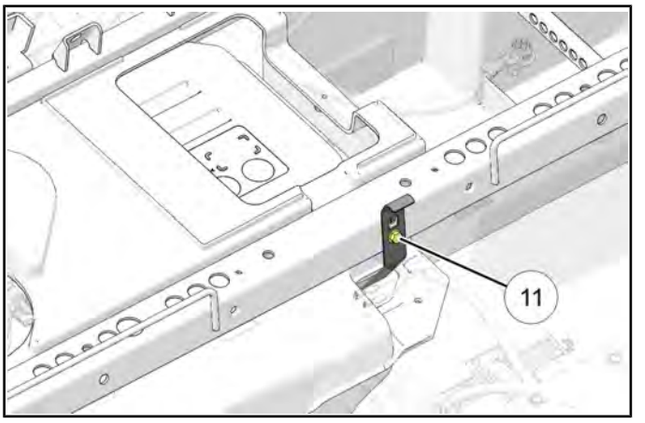
2. Install three new zip ties retaining the wiring to the edges of the fuel tank.
3. Install the fuel tank vent line to the tank fitting. Install the cover panel above the fuel tank.
4. Install the Torx screws ⑫ and plastic rivets ⑬ retaining the block-off panel using a T40 Torx driver. Torque fasteners to specification.

TORQUE
Block-off Panel Screws: **8 ft-lbs (11 Nm)**



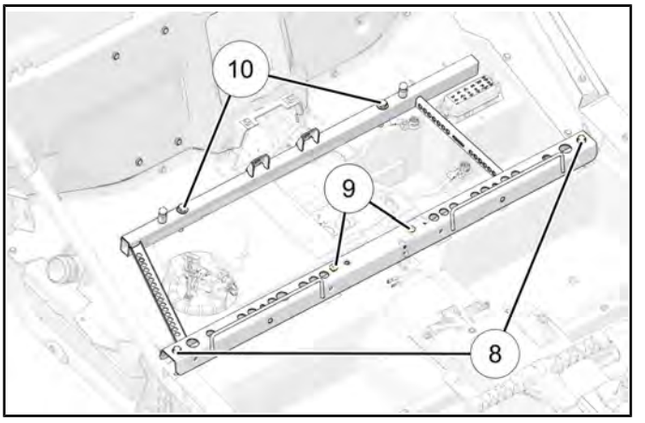
5. Install the T-40 Torx screw ⑪ retaining the fuel tank strap to the seat base frame. Torque fastener to specification.

TORQUE
Fuel Tank Strap Fastener: **8 ft-lbs (11 Nm)**



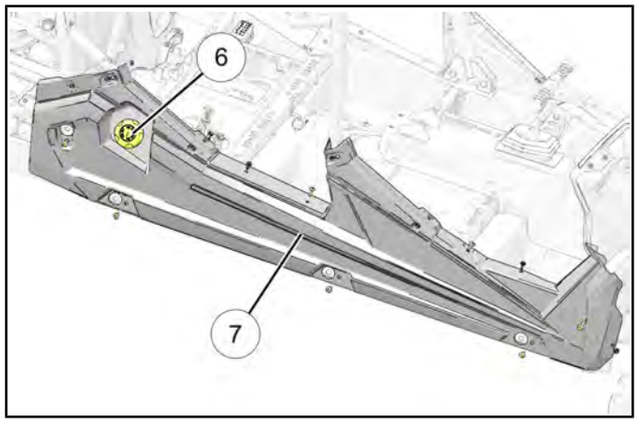
6. Install the seat base assembly into the vehicle. Install the two bolts ⑧ and two T40 Torx screws ⑨ retaining the front of the seat base frame and two rear bolts ⑩. Torque fasteners to specification.

TORQUE
Seat Frame Fasteners: M8 Bolts: **14 ft-lb (19 Nm)** M10 Bolts: **30 ft-lb (41 Nm)**

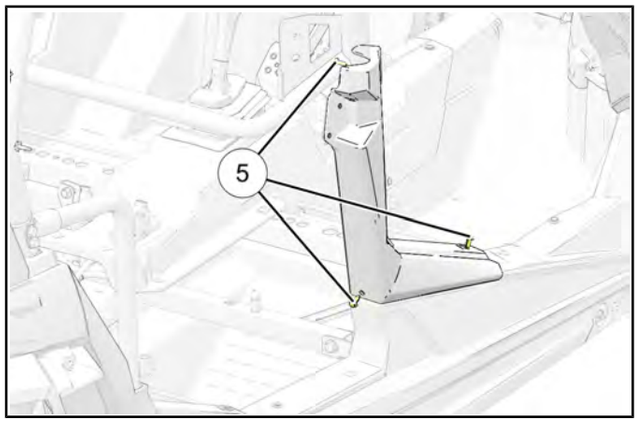


7. Install the push rivets and Torx screws retaining the passenger side rocker panel ⑦. Install fuel cap ⑥. Torque fasteners to specification.

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



8. Install the fasteners ⑤ retaining the B-Pillar cover.

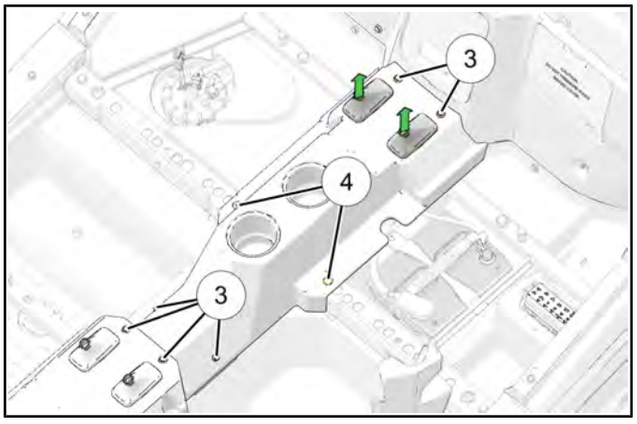


9. Install the push rivets and Torx screws retaining the rear fender flair and rear fender. Torque fasteners to specification.

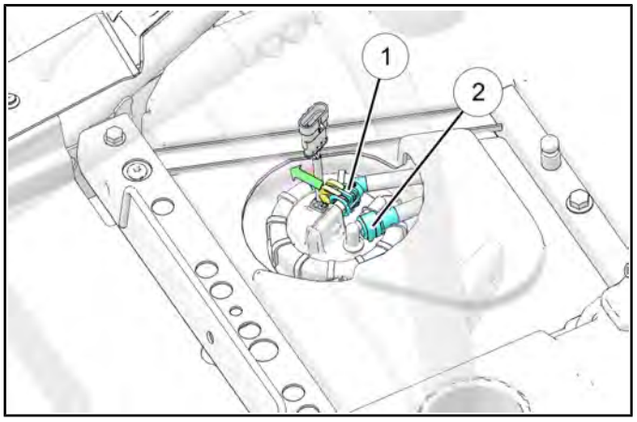
TORQUE
Body Screws: **8 ft-lb (11 Nm)**

10. Pull the seat belt latch grommets through the rear center console. Insert the rear center console under the back of the front center console. Install the plastic rivets ③ and Torx screws ④ retaining the center console. Torque fasteners to specification.

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

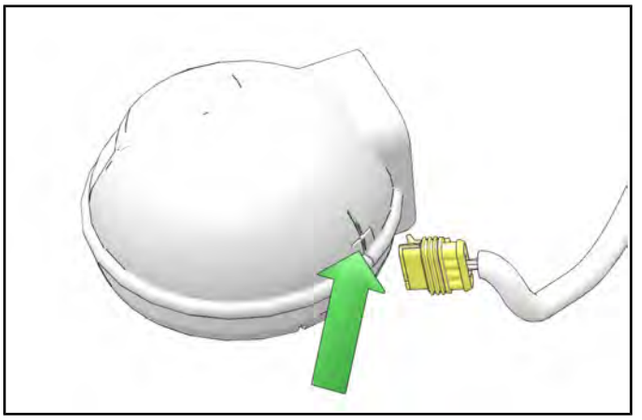


11. Connect the fuel supply line ① and return line ② to the fuel pump.



NOTICE
There is no return line on EVAP models.

12. If the fuel pump cover was fully removed, push the chassis side fuel pump electrical connector through the “+” shaped pass-through of the fuel pump cover next to the fuel line opening.



13. Connect the fuel pump electrical harness.

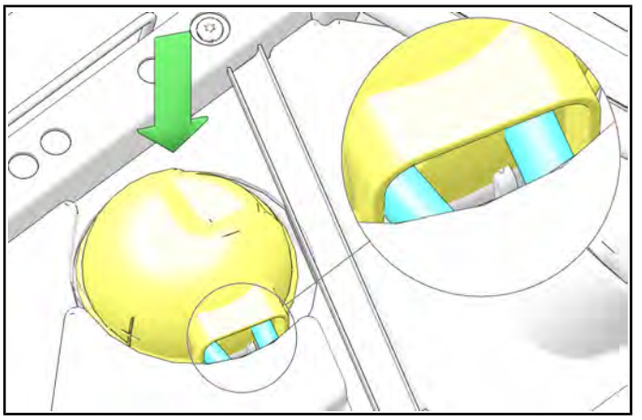
CAUTION

The harness protection tape must be pushed all the way through the cap opening. If the wires are not protected from the cap by the harness protection tape, they will wear through over time.

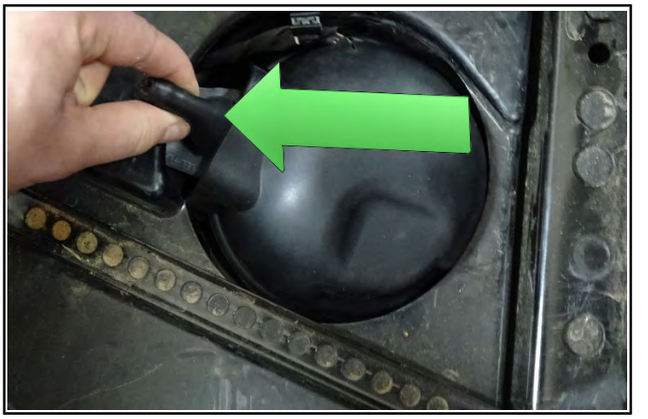
NOTICE

The connectors will be housed in the cap when properly installed. Do NOT pull the pump flying lead connector through the “+” cutout.

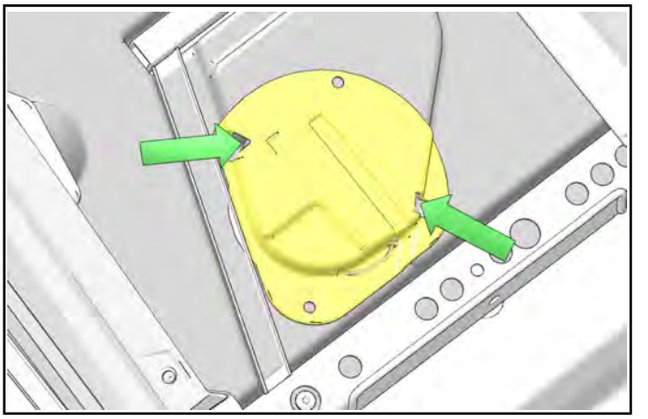
14. Orient the fuel pump cover so that the fuel lines pass through the opening, and push down around the edges to ensure the cover is fully engaged around the pump nut.



15. Fold over the cap’s flap as pictured, and push it between the fuel lines until the lip at the bottom of the flap tucks under the pump nut lip.



16. Install the plastic fuel pump access cover in the orientation shown until you feel both tabs click into place.



NOTICE

Ensure both tabs of the plastic fuel pump access cover are fully engaged.

17. Install the battery into the vehicle. Torque fasteners to specification.

TORQUE

Battery Bracket Fastener:
24 in-lbs (3 Nm)

Battery Terminal Fasteners:
60 in-lbs (7 Nm)

18. Install the seats.

FUEL PUMP OPERATION OVERVIEW

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.

As boost pressure increases, fuel pressure increases due to the manifold pressure controlled fuel regulator. It is NORMAL to see fuel pressure fluctuations as the throttle varies.

FUEL PRESSURE TEST

NOTICE

This test applies to non-EVAP models only.

IMPORTANT

As boost pressure increases, fuel pressure increases due to the manifold pressure controlled fuel regulator. It is NORMAL to see fuel pressure fluctuations as the throttle varies.

If a fuel delivery problem is suspected, make certain the fuel pump pickup filter in the tank is not plugged, that the fuel pump relay is being activated by 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

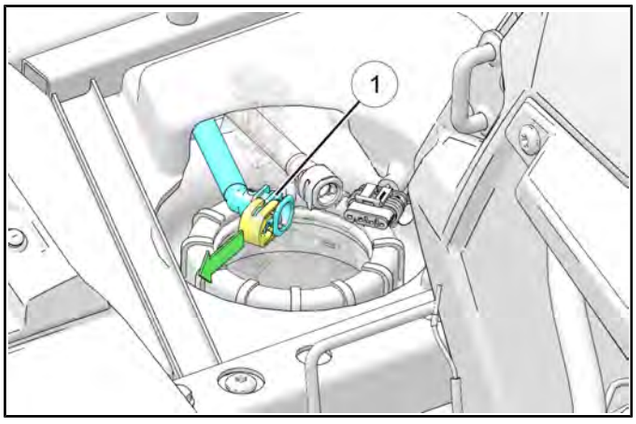
Fuel is extremely flammable and may cause severe burns, injury, or death.
Do not use any device that produces a flame or electrical devices that may spark around fuel or fuel vapors.

1. Remove the passenger seat from the vehicle.
2. Remove the plastic fuel pump access cover and lift up on the fuel pump cover to gain access to fuel lines.

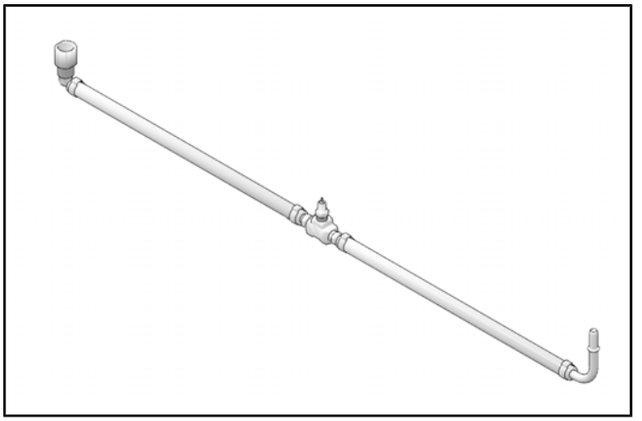
NOTICE

Be gentle when lifting up on the fuel pump cover as the fuel pump electrical harness is connected and routed through the “+” shaped pass-through of the fuel pump cover next to the fuel line opening.

3. Cover the fuel supply line connection at the fuel tank with a shop towel and disconnect the supply line ① from the fuel pump outlet.



4. Install the Fuel Pressure Gauge Adapter in-line between the fuel pump outlet and fuel supply line.



Fuel Pressure Gauge Adapter:
PA-48838

5. Connect the hose from the Fuel Pressure Gauge Kit to the test valve on the Fuel Pressure Gauge Adapter. Route clear hose into a portable gasoline container or the vehicle's fuel tank.

Fuel Pressure Gauge Kit:
PU-43506-A

6. Turn on key switch to activate the pump and check the system pressure on the gauge. If proper system pressure 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 (key on, engine off):
58 ± 2 psi (400 ± 14 kPa)

NOTICE

If the fuel pressure is out of specification, verify voltage to the fuel pump and replace the fuel pump assembly if battery voltage is observed.

As boost pressure increases, fuel pressure increases due to the manifold pressure controlled fuel regulator. It is NORMAL to see fuel pressure fluctuations as the throttle varies. Pressure may briefly drop below 58 PSI (400 kPa) when the throttle is released on a running vehicle.

7. If the pump did not activate , 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.

NOTICE

If the voltage was below 7 VDC, test the battery, ignition switch, relay(s), wiring harness and ECU.

8. 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.

NOTICE

If there was no continuity between the pump terminals, replace the fuel pump assembly.

9. 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.

NOTICE

If the pump starts, repeat steps 3, 4 and 5 to verify correct pressure.

10. If the pump still does not operate, check for correct ECU operation by plugging in a known-good ECU of the same model.
11. If the pump still does not operate, replace the fuel pump.

FUEL PRESSURE TEST (EVAP MODELS)

IMPORTANT

As boost pressure increases, fuel pressure increases due to the manifold pressure controlled fuel regulator. It is NORMAL to see fuel pressure fluctuations as the throttle varies.

⚠ 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.

If a fuel delivery problem is suspected, make certain the fuel pump pickup filter in the tank is not plugged, that the fuel pump relay is being activated by 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.

1. Park vehicle on a flat, level surface.
2. Turn key on with the engine off.
3. Remove hood and connect to Digital Wrench.
4. Navigate to “Special Tests” tab to view Fuel Pressure Sensor readings.

Fuel Pressure (key on, engine off):
75 ± 2 psi (517 ± 14 kPa)

NOTICE

If fuel pressure is out of specification, verify voltage to fuel pump. Replace fuel pump assembly if battery voltage is observed.

5. If the pump did not activate , 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.

NOTICE

If the voltage was below 7 VDC, test the battery, ignition switch, relay(s), wiring harness and ECU.

6. 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.

NOTICE

If there was no continuity between the pump terminals, replace the fuel pump assembly.

7. 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.

NOTICE

If the pump starts, repeat steps 2, 3 and 4 to verify correct pressure.

8. If the pump still does not operate, check for correct ECU operation by plugging in a known-good ECU of the same model.
9. If the pump still does not operate, replace the fuel pump.

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 (right rear on XP4) to access the fuel pump.

⚠ WARNING

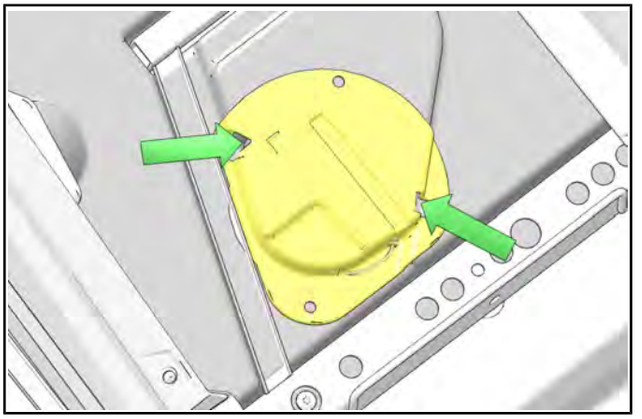
Always wear safety goggles when working with high pressure or flammable fluids. Failure to do so could result in serious injury or complications.

3. Be sure the top of the fuel tank is clean. 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.

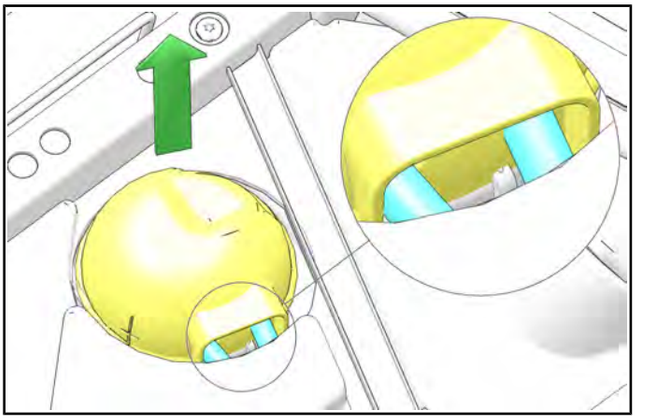
⚠ WARNING

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. Remove the plastic fuel pump access cover by disengaging both tabs.



5. Carefully free the edges of the fuel pump cover from the pump nut and lift up to remove the fuel lines from the cover opening.



NOTICE

Be gentle when lifting up on the fuel pump cover as the fuel pump electrical harness is connected and routed through the “+” shaped pass-through of the fuel pump cover next to the fuel line opening.

6. Disconnect the fuel pump electrical harness. The connector can be removed from the cover or can remain routed through the “+” shaped pass-through of the fuel pump cover and moved to the side.
7. Ensure that static has been discharged by touching a ground source such as the engine or frame.

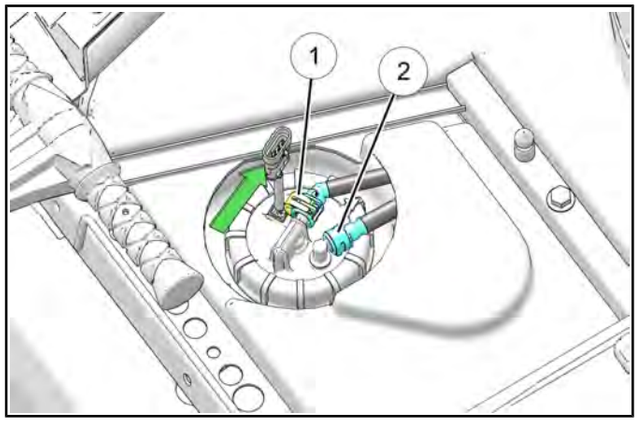
8. While holding a shop towel over the fuel line connectors, disconnect the fuel supply line ① and the fuel return line ② from the pump (see Fuel Line Removal / Installation page 5.13 for specific removal procedure).

⚠ 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.

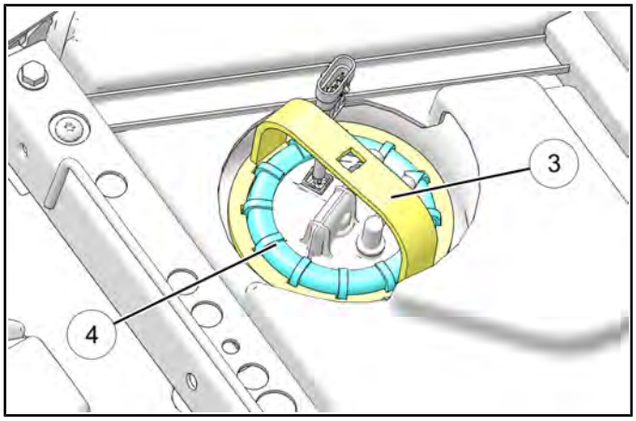
NOTICE

A small amount of fuel may come out of the fuel lines or pump fitting. Properly drain fuel into a suitable container.



9. Disconnect the fuel pump electrical harness.

10. Place the Fuel Pump Service Tool ③ 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.

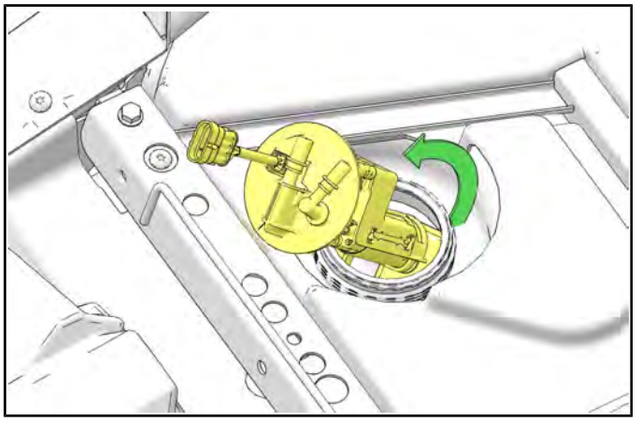


NOTICE

Apply downward force on the fuel pump flange while removing the fuel pump PFA nut.

Fuel Pump Service Tool:
PU-50326

11. 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.



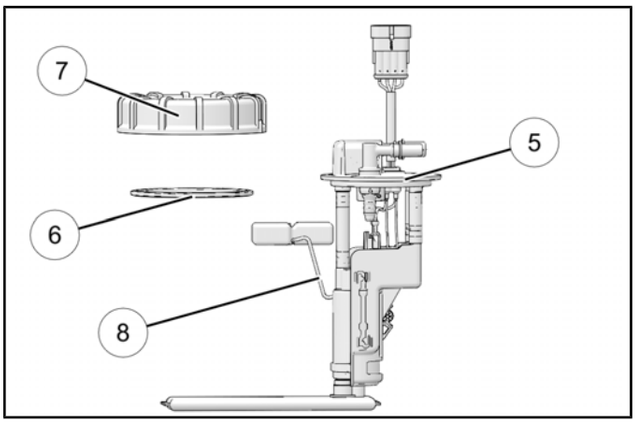
12. Transfer old fuel pump to a suitable container capable of safely holding fuel. The fuel pump will retain some fuel.

13. 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.

NOTICE

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.

14. 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.



15. Use cleaning wipes provided to clean fuel tank surface and threads. Remove all debris, grease and oil. Allow surfaces to dry completely.
16. Install new PFA gasket onto fuel pump assembly using care not to damage gasket or bend float arm.
17. 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.
18. Gently push down on fuel pump flange ensuring flange is centered.
19. Roughly align orientation mark on fuel pump between the orientation marks on fuel tank to ensure float arm does not get bent or snagged.

⚠ WARNING

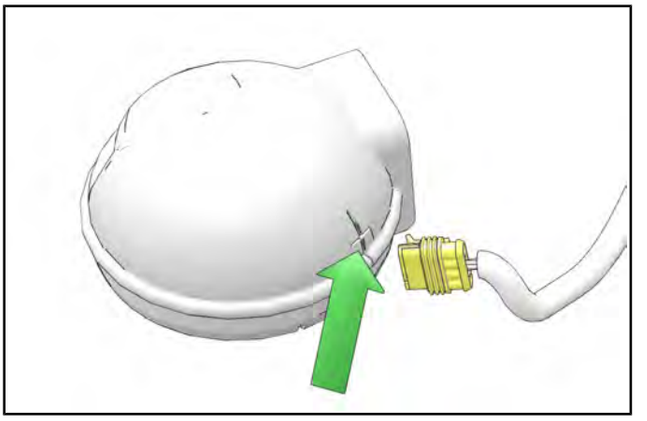
Failure to align the orientation marks may lead to interferences with the fuel level float arm and cause incorrect function.

20. 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.
21. Torque PFA nut to specification using the Fuel Pump Service Tool (PU-50326) and a calibrated torque wrench.

TORQUE

Fuel Pump PFA Nut:
70 ft-lbs (95 Nm)

22. Verify alignment of fuel pump and tank orientation marks.
23. Connect the fuel supply and return lines to the pump.
24. Install the fuel tank vent line onto the tank fitting.
25. If the fuel pump cover was fully removed, push the chassis side fuel pump electrical connector through the “+” shaped pass-through of the fuel pump cover next to the fuel line opening.



26. Connect the fuel pump electrical harness.

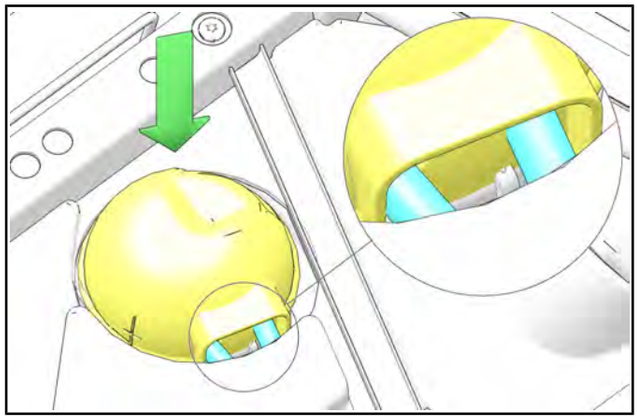
CAUTION

The harness protection tape must be pushed all the way through the cap opening. If the wires are not protected from the cap by the harness protection tape, they will wear through over time.

NOTICE

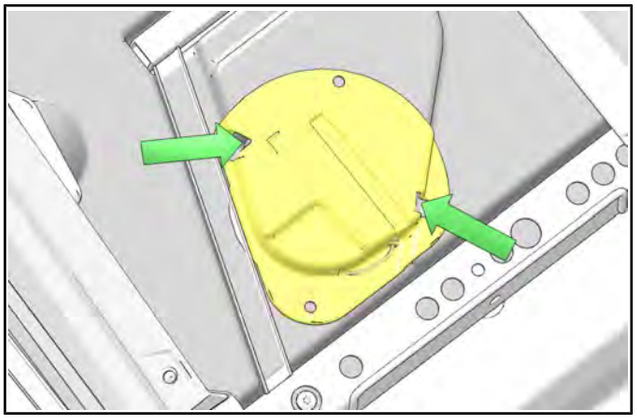
The connectors will be housed in the cap when properly installed. Do NOT pull the pump flying lead connector through the “+” cutout.

27. Orient the fuel pump cover so that the fuel lines pass through the opening, and push down around the edges to ensure the cover is fully engaged around the pump nut.



28. Fold over the cap's flap as pictured, and push it between the fuel lines until the lip at the bottom of the flap tucks under the pump nut lip.

29. Install the plastic fuel pump access cover in the orientation shown until you feel both tabs click into place.

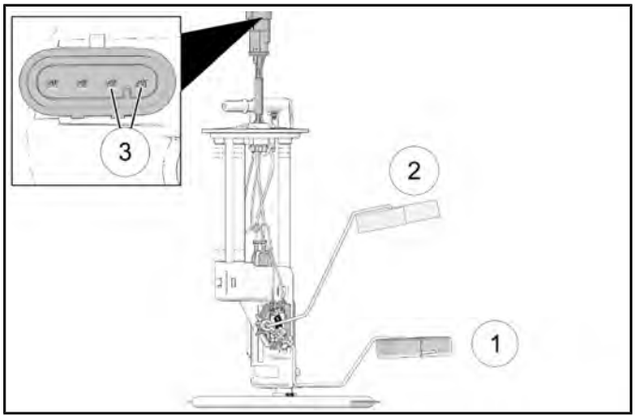


NOTICE
Ensure both tabs of the plastic fuel pump access cover are fully engaged.

30. 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.
31. Install the passenger seat.

FUEL SENDER TEST

1. Remove the fuel pump assembly from the fuel tank. Refer to Fuel Pump Replacement page procedure.
2. Using an Ohm meter, measure the resistance of the fuel sender as shown below.



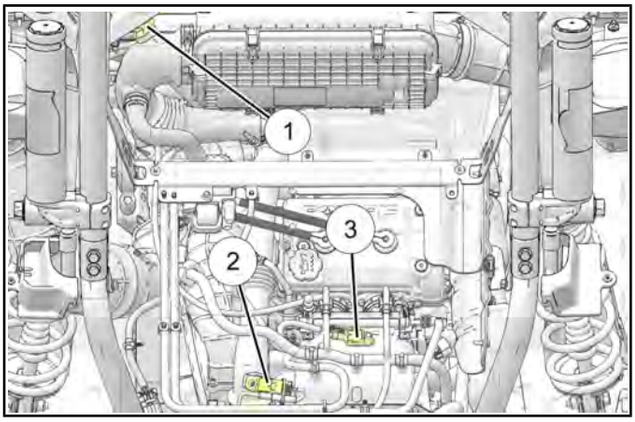
ITE-M	POSITION	READING
①	EMPTY position	**450 Ω ± 5%**
②	FULL position	**100 Ω ± 3%**
③	Measure between the two pins	—

3. Allow the sender float to sit in the **EMPTY position** and compare to specification.
4. Slowly move the sender float to the **FULL position** and compare to specification.
5. If the readings are out of specification, or if the reading is erratic or LCD display “sticks”, check the following before replacing the fuel pump assembly:
   - Loose float
   - Float contact with tank
   - Bent float rod
6. If none of the conditions exist, the fuel sender assembly is faulty. Replace the fuel pump assembly. Refer to Fuel Pump Replacement page procedure.

PRESSURE SENSORS

BAP SENSOR

The Barometric Air Pressure sensor ①, located on the intake duct after the air filter, measures ambient air pressure. The sensor reading is used to detect changes in elevation and for turbo speed limiting for altitude.



BOOST PRESSURE SENSOR

The Boost Pressure Sensor ② is the pressure sensor that is used for boost target control and for turbo speed limiting. The temperature sensor will provide a fallback in case the intake manifold temperature sensor (TMAP) fails.

The TMAP sensor and the Boost Pressure Sensor may be interchanged for testing purposes as the sensors are the same.

FUEL PRESSURE SENSOR (EVAP MODELS)

On EVAP models, the fuel pressure sensor ④ monitors fuel pressure in the fuel supply line and sends pressure data to the ECU. The ECU interprets the fuel pressure data and raises or lowers fuel pressure based manifold pressure.

The ECU also uses the fuel pressure sensor to prevent a rich condition during a purge event.

TMAP SENSOR

The Temperature and Manifold Absolute Pressure sensor (T-MAP) ③ is located on the intake manifold after the throttle body. The sensor is the primary control sensor for the EFI system and it measures the pressure of the air going into each cylinder.

The TMAP sensor and the Boost Pressure Sensor may be interchanged for testing purposes as the sensors are the same.

AIR TEMPERATURE SENSOR DATA

The following table gives an approximate resistance reading of the temperature sensor at the given temperature.

TEMPERATURE	≈ RESISTANCE (Ω)
-40° F (-40° C)	45303
-31° F (-35° C)	34273
-22° F (-30° C)	26108
-13° F (-25° C)	19999
-4° F (-20° C)	15458
5° F (–15° C)	12000
14° F (-10° C)	9395
23° F (-5° C)	7413
32° F (0° C)	5895
41° F (5° C)	4711
50° F (10° C)	3791
59° F (15° C)	3068
68° F (20° C)	2499
77° F (25° C)	2056
86° F (30° C)	1706
95° F (35° C)	1411
104° F (40° C)	1174
113° F (45° C)	987
122° F (50° C)	833
131° F (55° C)	703
140° F (60° C)	595
149° F (65° C)	508
158° F (70° C)	436
167° F (75° C)	374
176° F (80° C)	323
185° F (85° C)	280
194° F (90° C)	243
203° F (95° C)	213
212° F (100° C)	187
221° F (105° C)	164
230° F (110° C)	144
239° F (115° C)	127
248° F (120° C)	113

EFI DIAGNOSTICS

FUEL SYSTEM 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)
- Incorrect fuel pressure signal
- EVAP system leak/blockage

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
- Faulty fuel pump/regulator
- Incorrect fuel pressure signal

Idle Too High (if > 1400 RPM when warm)

- Faulty electrical connection

Idle Too Low (if < 1100 RPM when warm)

- Plugged air filter
- Leaking injector (rich condition)
- Belt dragging
- Throttle stop screw tampering

Erratic Idle

- 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

DIGITAL WRENCH DATA TROUBLESHOOTING

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
Air / Fuel Ratio	Indicator of engine operation. Value typically bounces between lean and rich	Lean	Engine getting too much air / too little fuel
		Rich	Engine getting too little air / too much fuel
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
Boost Pressure	Indicate intake air pressure at the sensor before the throttle body	varies	≈ barometric of manifold pressure at key on
		varies	≈ barometric pressure at idle since no boost is being created until off-idle
Boost Temperature	Temperature of the boost pressure air	varies	this value should be higher than the intake air temperature unless engine is cold
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.

DATA DISPLAY ITEM	DEFINITION	VALUE	VALUE DESCRIPTION
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
		≈ 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
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
Intercooler Pump Driver	Indicates if the electric fuel pump is being triggered on by the ECU	Inactive	ECU is not triggering the pump to run. Seen when key is ON but engine is not running
		Active	Vehicle is running and pump is active
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. *value will be higher on a turbocharged unit*
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

DATA DISPLAY ITEM	DEFINITION	VALUE	VALUE DESCRIPTION
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
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	—

CYLINDER MISFIRE DETECTION

NOTICE
This process only applies to some MY15 and later models. Refer to this procedure only if one of the codes shown below is displayed in Digital Wrench.

The ECU monitors crankshaft speed via the crankshaft position sensor. A misfire will cause a fluctuation in crankshaft speed. A code will set and turn on the check engine light after an engine misfire threshold/rate is detected that is above a pre-determined limit. This threshold varies based on engine speed.

One or more of the following codes will be set if a misfire occurs:

- P0301 (SPN 65591/FMI 7) Misfire Detected, Cylinder 1 (MAG)
- P0302 (SPN 65592/FMI 7) Misfire Detected, Cylinder 2 (PTO)
- P0314 (SPN 65590/FMI 7) Misfire Detected, Cylinder Not Identified

Once a cylinder misfire code is set, the following events will occur:

- Check Engine Light illuminates
- If the cylinder can be detected by the ECU (code P0301 or P0302), the ECU will deactivate the fuel injector for that cylinder. This will remain in effect until the key is cycled off and back on.
- If the cylinder with the misfire cannot be detected (code P0314), the ECU will limit available power by limiting how far the throttle plate opens.

One the key is cycled, the trouble code(s) will show current but there will be no fuel injector deactivation or throttle limitation unless the misfiring continues to occur. The check engine light will remain illuminated until there are 4000 engine revolutions (i.e. 4000 RPM for one minute) without a significant misfire being detected. Once this condition is met, the check engine light will turn off and the code(s) will show as historic.

If a misfire code has been set and there is no observed misfire, cycle the key and allow 4000 engine revolutions to see if the check engine light turns off. If it does not turn off, diagnose by verifying the following items:

- Low battery voltage (loose connection, low charge, bad battery)
- Faulty voltage regulator
- Ignition Coil and connections are good
- Spark plugs wires are secure
- The correct spark plugs are installed and the plugs are not fouled
- Crankshaft Position Sensor tests good
- Wiring to the Crankshaft Position Sensor, ECU and Ignition Coil are not damaged. Chassis ground is clean and tight
- Fuel pressure is within specification
- Fresh/good quality fuel is in the fuel tank
- Engine mechanical is good (leak down, timing)
- Confirm the belt is in good condition, specifically looking for signs of hour-glassing
- Confirm primary clutch operation (worn/incorrect weights, loose spider/jam nut)
- Confirm secondary clutch operation (sliders, rollers, helix)

NOTES

CHAPTER 6
PVT SYSTEM

GENERAL INFORMATION

SPECIAL TOOLS

PART NUMBER	TOOL DESCRIPTION
2871358-B	Drive Clutch Holding Fixture
2872085	Drive Clutch Puller
PU-50578	Spider Jam Nut Socket
PU-51861	Drive Clutch Holding Tool

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

2019 *RZR* XP TURBO CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2018 *RZR* XP Turbo	0-1800 Meters (0-6000 Feet)	W-31-70 (5140832)	Black (7044762)	Black / white lettering (7044369)
	1800-3700 Meters (6000–12000 Feet)	W-31-64 (5141004)		

2019 *RZR* XP 4 TURBO CLUTCH CHART

MODEL	ALTITUDE	SHIFT WEIGHT	DRIVE SPRING	DRIVEN SPRING
2018 *RZR* XP4 Turbo	0-1800 Meters (0-6000 Feet)	W-31-68 (5140800)	Black (7044762)	Black / white lettering (7044369)
	1800-3700 Meters (6000–12000 Feet)	W-31-64 (5141004)		

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.

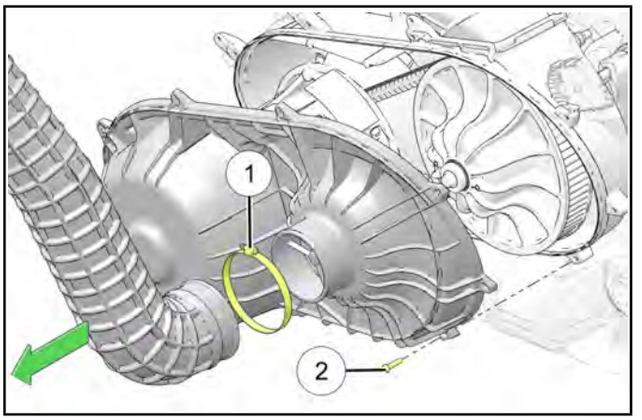
In situations where loads vary (such as uphill and downhill) and throttle settings are constant, the drive and driven clutches are continually shifting to maintain optimum engine RPM. At full throttle a perfectly matched PVT system should hold engine RPM at the peak of the power curve. This RPM should 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.

DRIVE BELT

BELT REMOVAL

NOTICE
Removal of left rear wheel or left rear shock is NOT necessary for belt replacement.

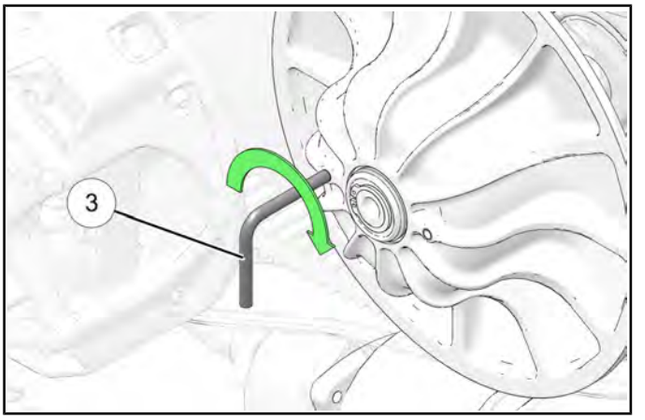
1. Loosen the clamp ① retaining the PVT inlet duct to the PVT cover.



2. Remove the screws ② that retain the outer clutch cover.
3. Maneuver the outer clutch cover outward as shown below to access the drive belt.

NOTICE
Angle the rear of the clutch cover up and use a slight rocking motion to work the clutch free when removing the cover. There will be very little clearance.

4. Mark the drive belt direction of rotation so that it can be installed in the same direction.
5. Insert clutch spreader tool ③ into the driven clutch and turn the tool clockwise to open the sheaves on the driven clutch.



NOTICE
The driven clutch spreader tool is included with the vehicle's tool kit.

6. Walk the belt out of the driven clutch and drive clutch. Remove the belt from the vehicle.

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.

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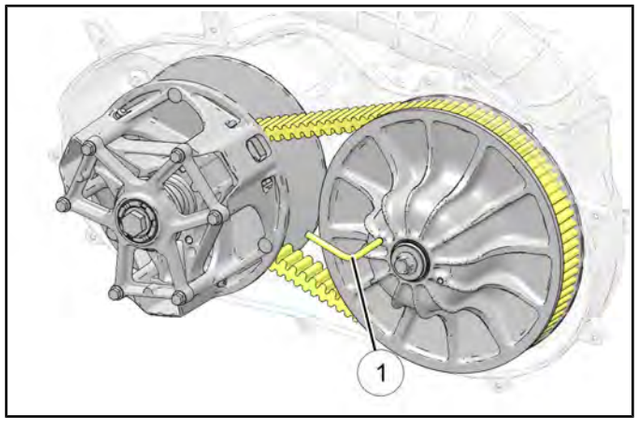
BELT INSTALLATION

NOTICE
The vehicle should be in Park. Be sure to install belt in the same direction as it was removed.

1. With the clutch spreader tool ① installed, loop the belt over the drive clutch and over part of the driven clutch. Be sure to install belt in the direction previously marked.



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 PVT cover and screws. Torque screws to specification.

TORQUE
PVT Cover Screws: **35 in-lb (3 Nm)**

BELT BREAK-IN

A proper break-in of the clutches and drive belt will ensure a longer life and better performance. If a belt fails, always clean any debris from the duct and from the engine compartment.

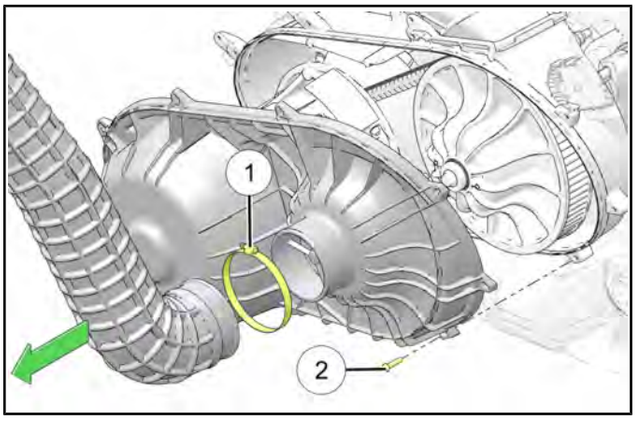
Standard Break-In
Drive at slower speeds for the first 50 miles (80 km) of operation. Carry only light loads. Avoid aggressive acceleration, high-speed operation and prolonged operation at a specific RPM during this period.

Sand/Dune Break-In
Drive in low gear for the first 5 miles (8 km) of operation. Avoid prolonged low speed operation at high throttle. Avoid aggressive acceleration, high-speed operation and prolonged operation at a specific RPM during this period.

DRIVE CLUTCH SERVICE

DRIVE CLUTCH REMOVAL

1. Remove three fasteners retaining the driver's side rear shock guard.
2. Loosen the clamp ① retaining the PVT inlet duct to the PVT cover.

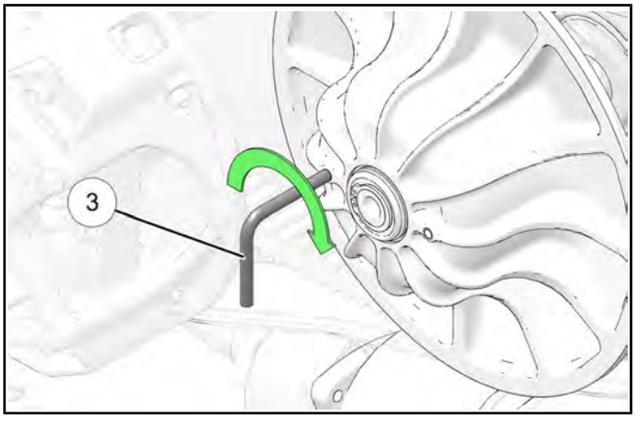


3. Remove the screws ② that retain the outer clutch cover.
4. Maneuver the outer clutch cover outward as shown below to access the drive belt.

NOTICE

Angle the rear of the clutch cover up and use a slight rocking motion to work the clutch free when removing the cover. There will be very little clearance.

5. Mark the drive belt direction of rotation so that it can be installed in the same direction.
6. Insert clutch spreader tool ③ into the driven clutch and turn the tool clockwise to open the sheaves on the driven clutch.



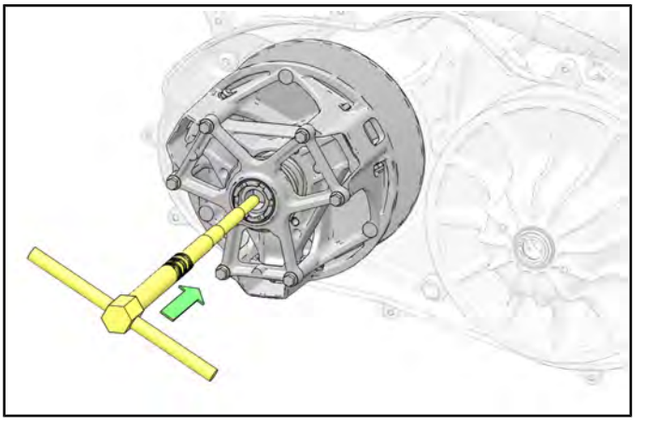
NOTICE

The driven clutch spreader tool is included with the vehicle's tool kit.

7. Walk the belt out of the driven clutch and drive clutch. Remove the belt from the vehicle.
8. Hold the drive clutch using the drive clutch holding tool and remove the drive clutch mounting bolt.

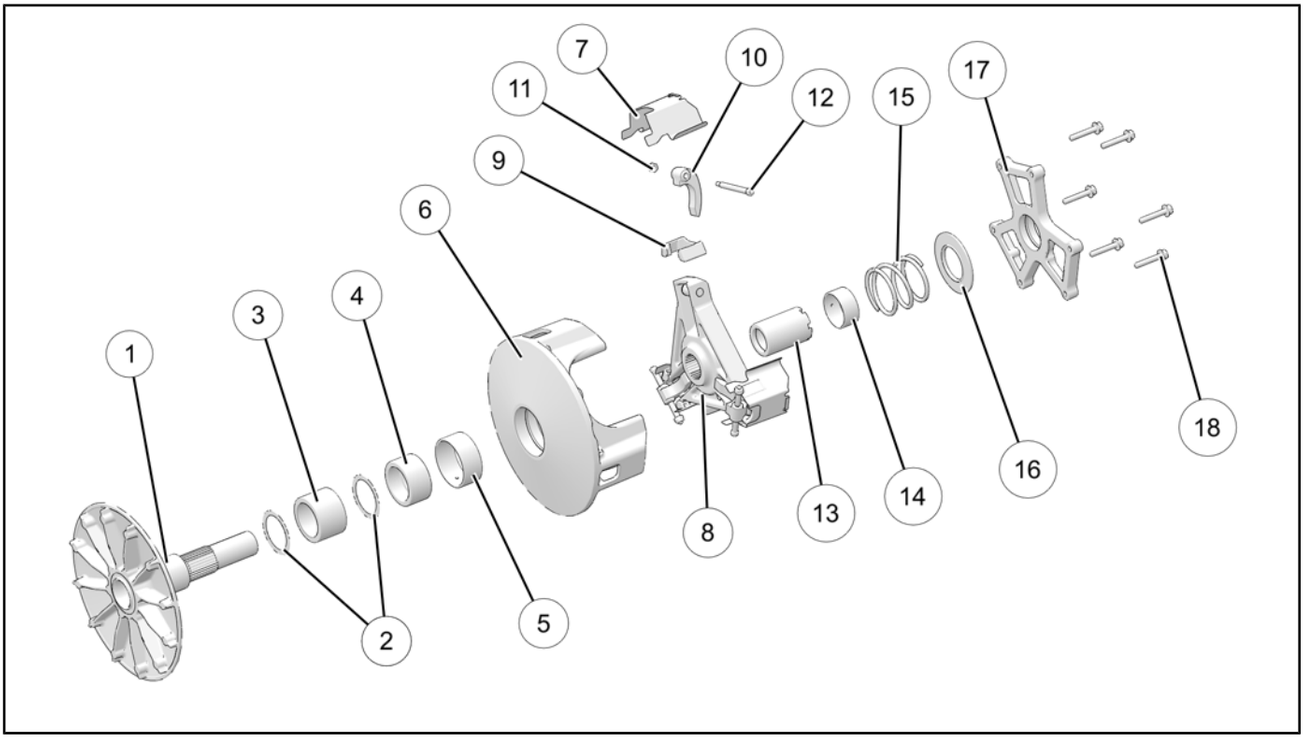
Drive Clutch Holding Tool:
PU-51861

9. Remove the drive clutch using the correct drive clutch puller.



Drive Clutch Puller:
2872085

DRIVE CLUTCH ASSEMBLY VIEW

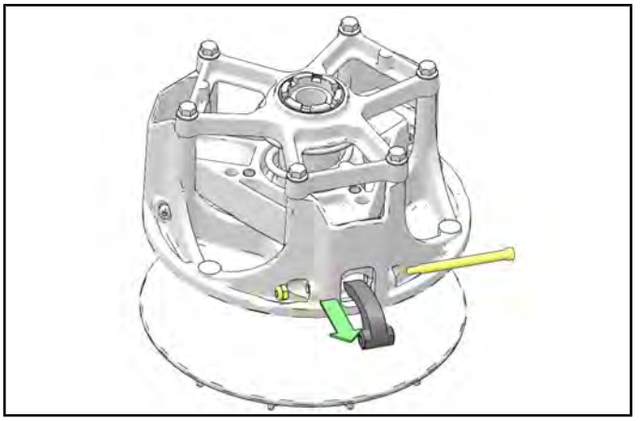


① Stationary Sheave	⑩ Shift Weight
② Washers	⑪ Shift Weight Nut
③ Bearing	⑫ Shift Weight Bolt **20 in-lb (2 Nm)**
④ Spacer	⑬ Spider Sleeve Nut **300 ft-lb (407 Nm)**
⑤ Bushing	⑭ Cover Bushing
⑥ Moveable Sheave	⑮ Clutch Spring
⑦ Slider Plates	⑯ Spring Spacer
⑧ Spider	⑰ Cover
⑨ Slider	⑱ Cover Bolts **9 ft-lb (12 Nm)**

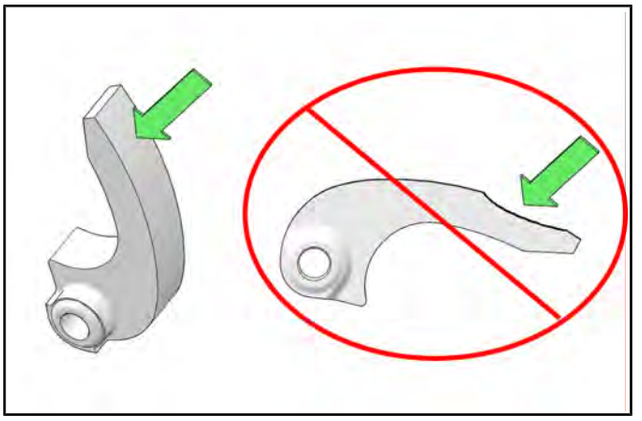
DRIVE CLUTCH DISASSEMBLY / INSPECTION

SHIFT WEIGHT INSPECTION

- Remove the fasteners retaining the shift weights.



- Inspect the contact surface of the weights. Some wear is normal but if the weights start cupping on the contact surface, then they should be replaced.

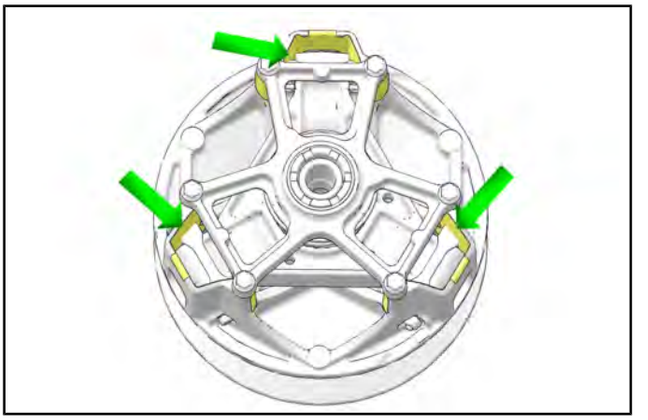


- Install weights and torque fasteners to specification.

TORQUE
Shift Weight Fasteners: **20 in-lb (2 Nm)**

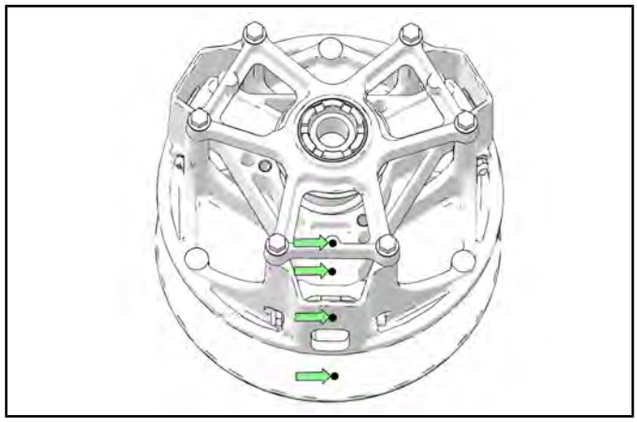
SLIDER PLATE INSPECTION

Inspect the contact surface of the three slider plates. Some wear is normal but if the slider plates start to groove, then they should be replaced.



DRIVE CLUTCH DISASSEMBLY

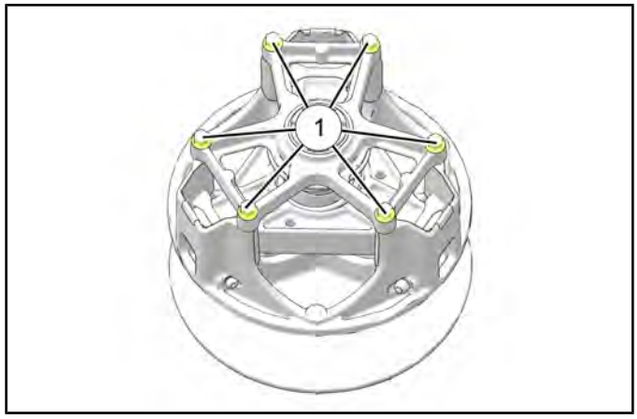
1. Before taking the clutch apart, be sure to mark the stationary sheave, moveable sheave, spider and cover with a reference mark.



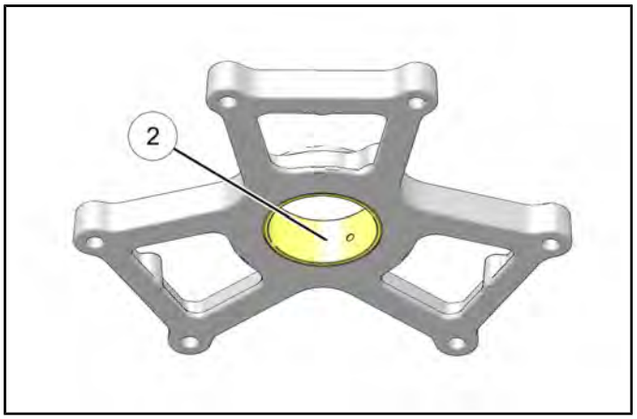
IMPORTANT

Failure to assemble the clutch exactly how it was taken apart will cause the clutch to be out of balance and require clutch replacement.

2. Place the drive clutch in a clutch compression tool.
3. Remove the six fasteners ① retaining the drive clutch cover.



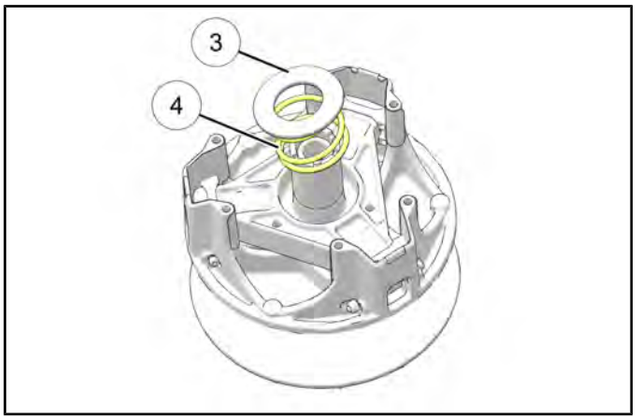
4. Loosen and remove the clutch compression tool.
5. Inspect the cover bushing ② for wear. If more than half of the anti-friction coating is worn off, replace the bushing.



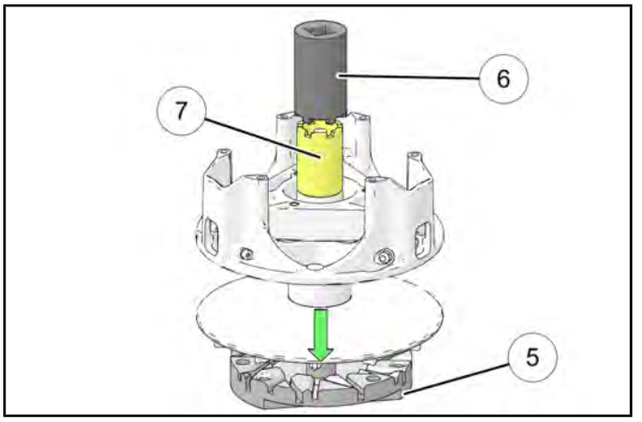
CAUTION

When replacing the bushing, apply Loctite 620 to the entire outer surface of the new bushing before installing into the cover. It is critical to ensure no Loctite is left on the inner diameter of the bushing. Allow a full 24 hours for Loctite to cure prior to assembling cover to the clutch.

6. Remove the spring spacer ③ and the spring ④.



7. Place the drive clutch holding tool ⑤ in a vise and install the drive clutch on the tool.



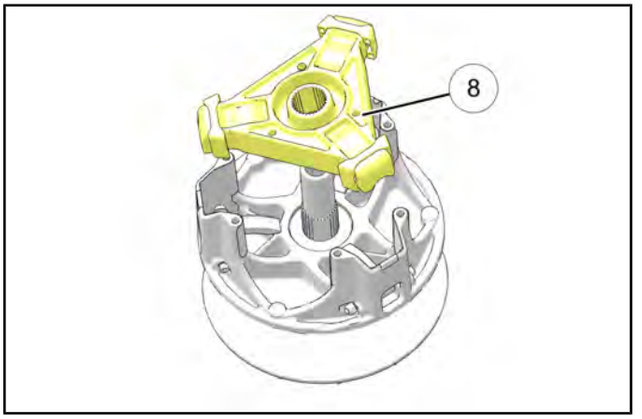
Drive Clutch Holding Fixture: **2871358-B**

8. Install the clutch spider nut tool ⑥ on the spider nut sleeve ⑦ and remove the sleeve.

Spider Nut Removal tool: **PU-50578**

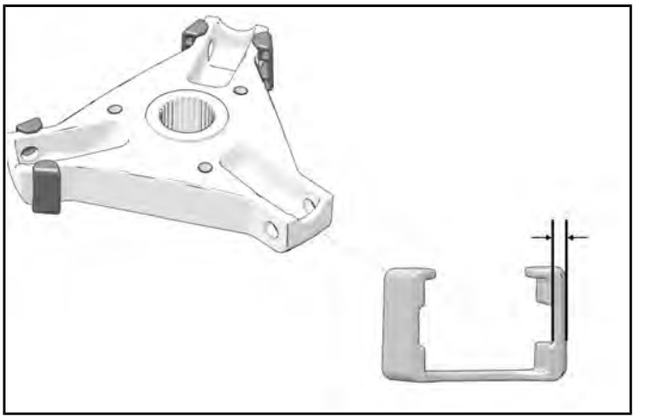
NOTICE
The spider nut sleeve is torqued to **300 ft-lb (407 Nm)** A large breaker bar will be required to remove the sleeve.

9. Lift up on the spider ⑧ to remove it from the clutch.



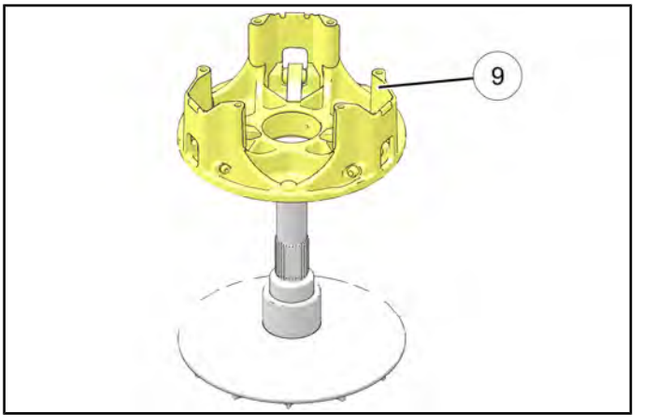
NOTICE
The spider is splined to the stationary sheave. A light rocking action will free the spider from the splines. A commercially available 3-jaw puller may also be used to help with spider removal.

10. Remove the three sliders from the spider and measure the thickness on both ends. Replace the sliders if worn beyond the service limit.

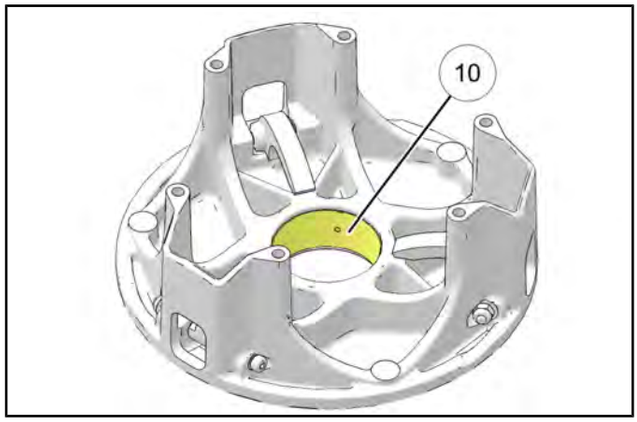


MEASUREMENT
Drive Clutch Sliders: **Service Limit: 0.075″ (1.905 mm)**

11. Lift the moveable sheave ⑨ to remove it from the shaft.



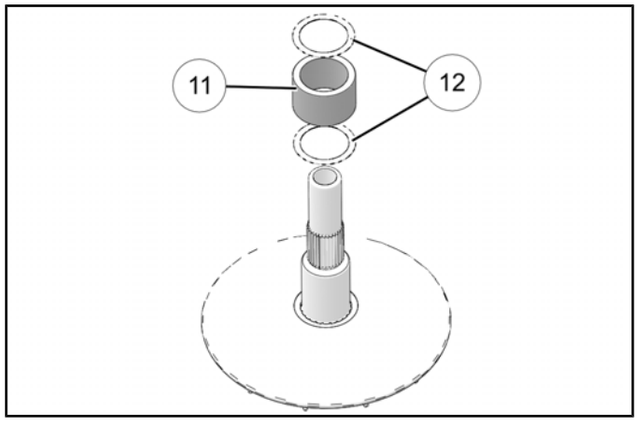
12. Inspect the moveable sheave bearing ⑩ for wear. If more than half of the anti-friction coating is worn off, replace the bushing.



CAUTION

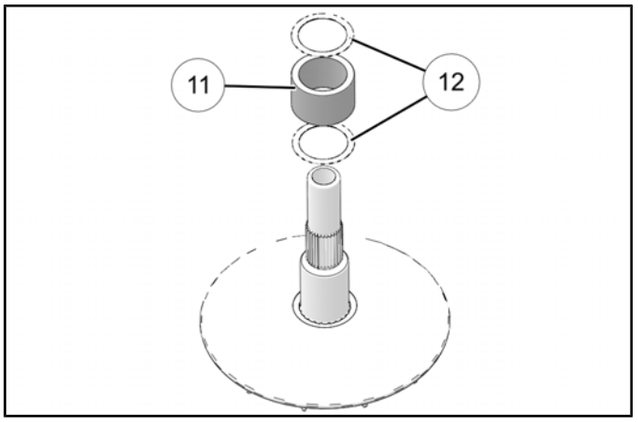
When replacing the bushing, apply Loctite 620 to the entire outer surface of the new bushing before installing into the sheave. It is critical to ensure no Loctite is left on the inner diameter of the bushing. Allow a full 24 hours for Loctite to cure prior to assembling the clutch.

13. Remove the roller bearing ⑪ and the bushings ⑫ on both sides of the bearing. If the outer surface is worn off the bushings, they should be replaced.

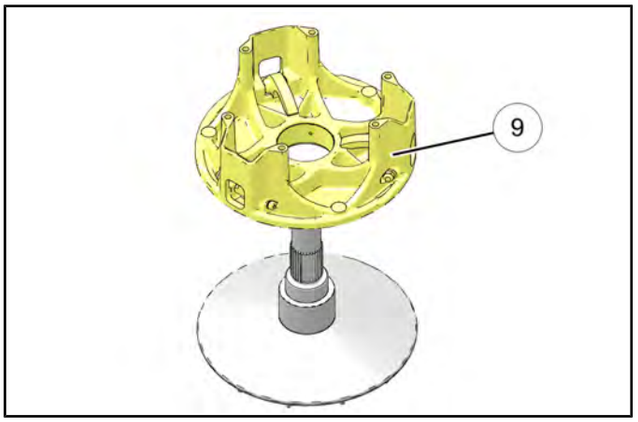


DRIVE CLUTCH ASSEMBLY

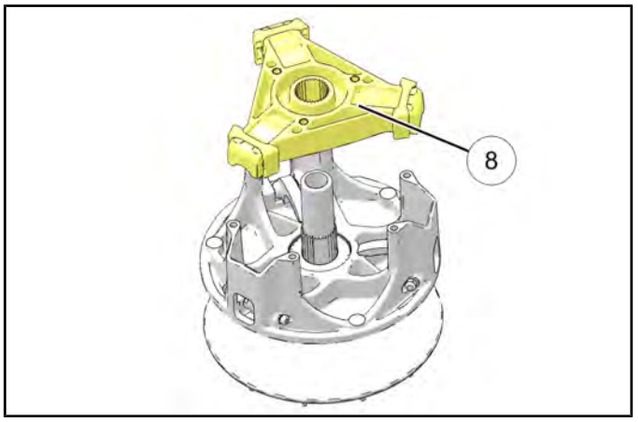
1. Install the roller bearing ⑪ between the bushings ⑫ and install on the clutch shaft.



2. Install the moveable sheave ⑨ onto the shaft.



3. Install the spider ⑧ onto the clutch shaft.

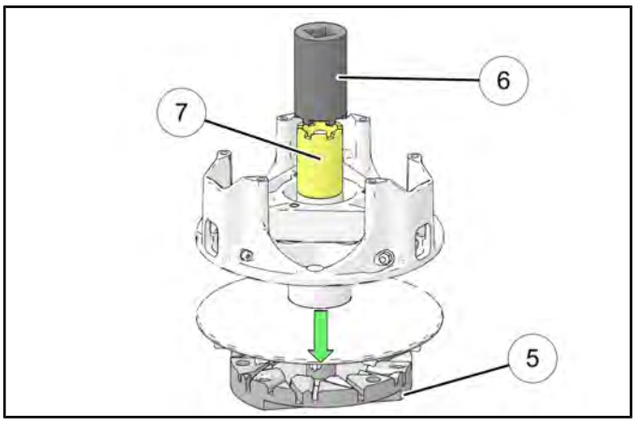


6

4. Place the drive clutch holding tool ⑤ in a vise and install the drive clutch on the tool. Install the clutch spider nut tool ⑥ on the spider nut sleeve ⑦ and torque the nut to specification.

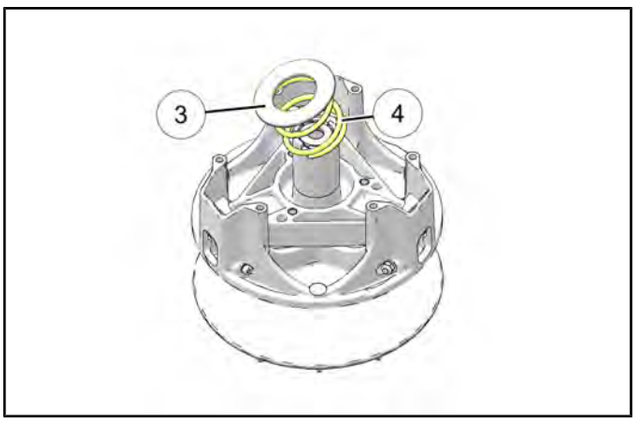
Spider Nut Removal tool: **PU-50578**

TORQUE
Spider Nut: **300 ft-lb (407 Nm)**



Drive Clutch Holding Fixture: **2871358-B**

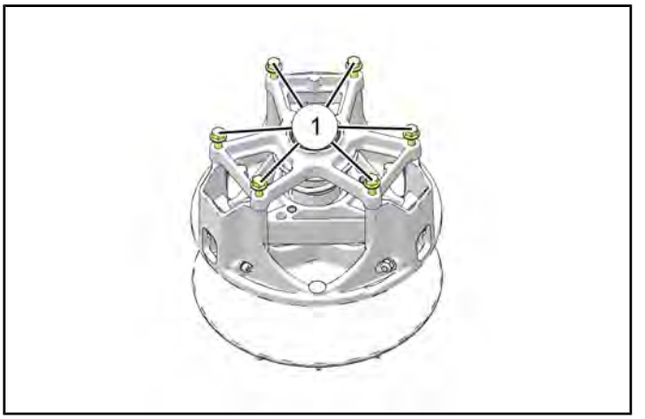
5. Install the spring ④ and the spring spacer ③.



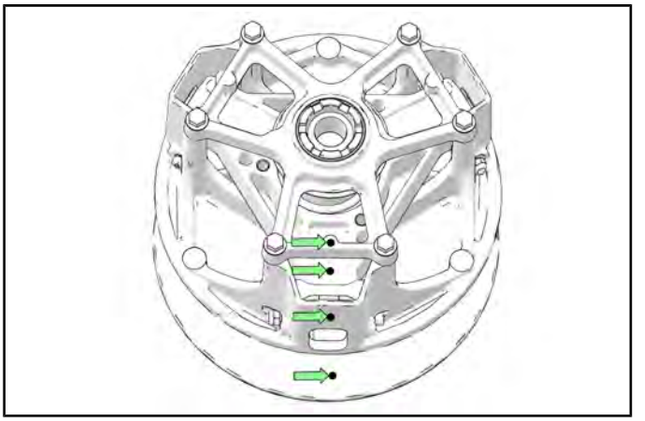
6. Place the drive clutch in a clutch compression tool.

7. Install the six fasteners ① retaining the drive clutch cover. Torque fasteners to specification.

TORQUE
Drive Clutch Cover Fasteners: **9 ft-lb (12 Nm)**



8. Once the clutch is fully assembled, ensure the reference marks you made on the stationary sheave, moveable sheave, spider and cover are properly aligned.



IMPORTANT
Failure to assemble the clutch exactly how it was taken apart will cause the clutch to be out of balance and require clutch replacement.

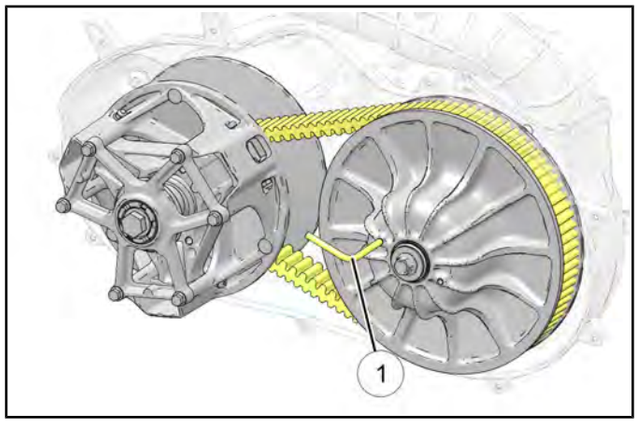
DRIVE CLUTCH INSTALLATION

1. Clean drive clutch and crankshaft tapers with solvent. Allow the tapers to completely dry before installing drive clutch.
2. Install the drive clutch on the crankshaft. Hold the clutch using the Drive Clutch Holding Tool. Torque retaining bolt to specification.

Drive Clutch Holding Tool: **PU-51861**

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

3.
4. With the clutch spreader tool ① installed, loop the belt over the drive clutch and over part of the driven clutch. Be sure to install belt in the direction previously marked.



5. Rotate the driven clutch and walk the belt into the clutch.
6. Remove the clutch spreader tool from driven clutch.
7. Rotate / spin the driven clutch and belt approximately 5-7 times to properly seat the belt in the driven clutch.
8. Install the PVT cover and screws. Torque screws to specification.

TORQUE
PVT Cover Screws: **35 in-lb (3 Nm)**

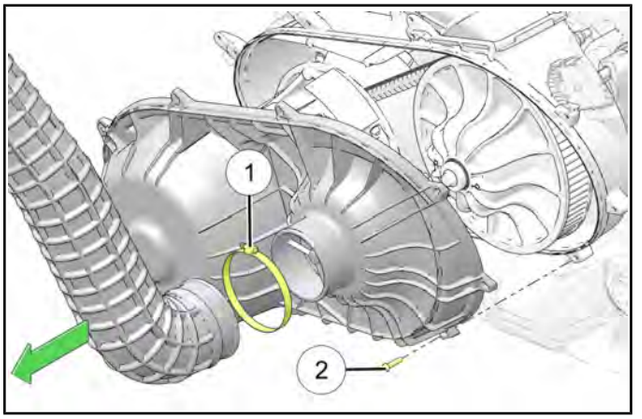
9. Install the driver's rear shock guard. Torque fasteners to specification.

TORQUE
Shock Guard Fasteners: **14 in-lbs (2 Nm)**

DRIVEN CLUTCH SERVICE

DRIVEN CLUTCH REMOVAL

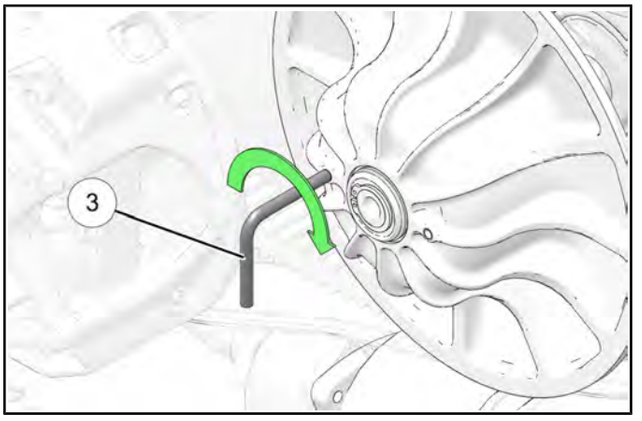
1. Loosen the clamp ① retaining the PVT inlet duct to the PVT cover.



2. Remove the screws ② that retain the outer clutch cover.
3. Maneuver the outer clutch cover outward as shown below to access the drive belt.

NOTICE
Angle the rear of the clutch cover up and use a slight rocking motion to work the clutch free when removing the cover. There will be very little clearance.

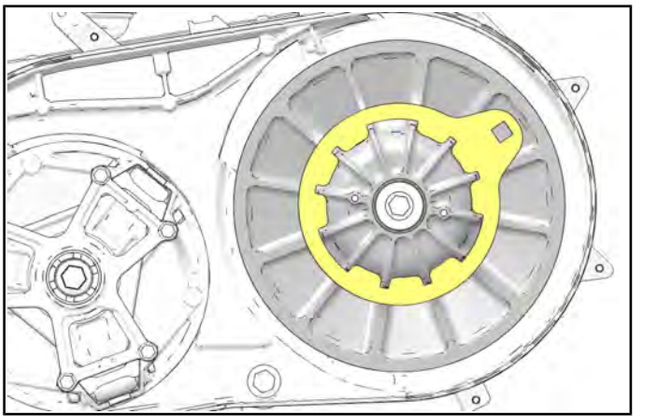
4. Mark the drive belt direction of rotation so that it can be installed in the same direction.
5. Insert clutch spreader tool ③ into the driven clutch and turn the tool clockwise to open the sheaves on the driven clutch.



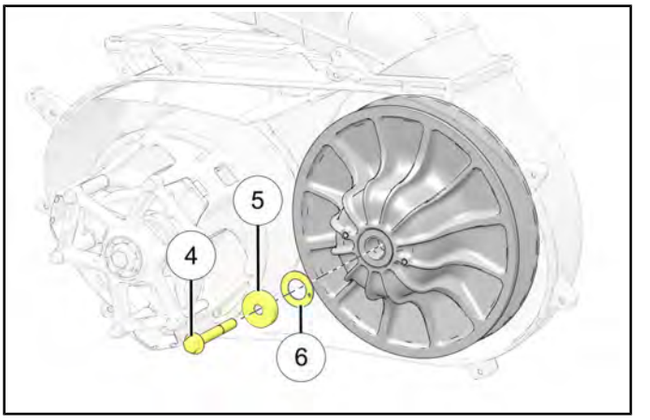
NOTICE
The driven clutch spreader tool is included with the vehicle's tool kit.

6. Walk the belt out of the driven clutch and drive clutch. Remove the belt from the vehicle.
7. Remove the driven clutch retaining bolt ④.

NOTICE
To aid in removal of the retaining bolt, use driven clutch holding tool (PU-52645) to hold the clutch in place while removing the fastener.

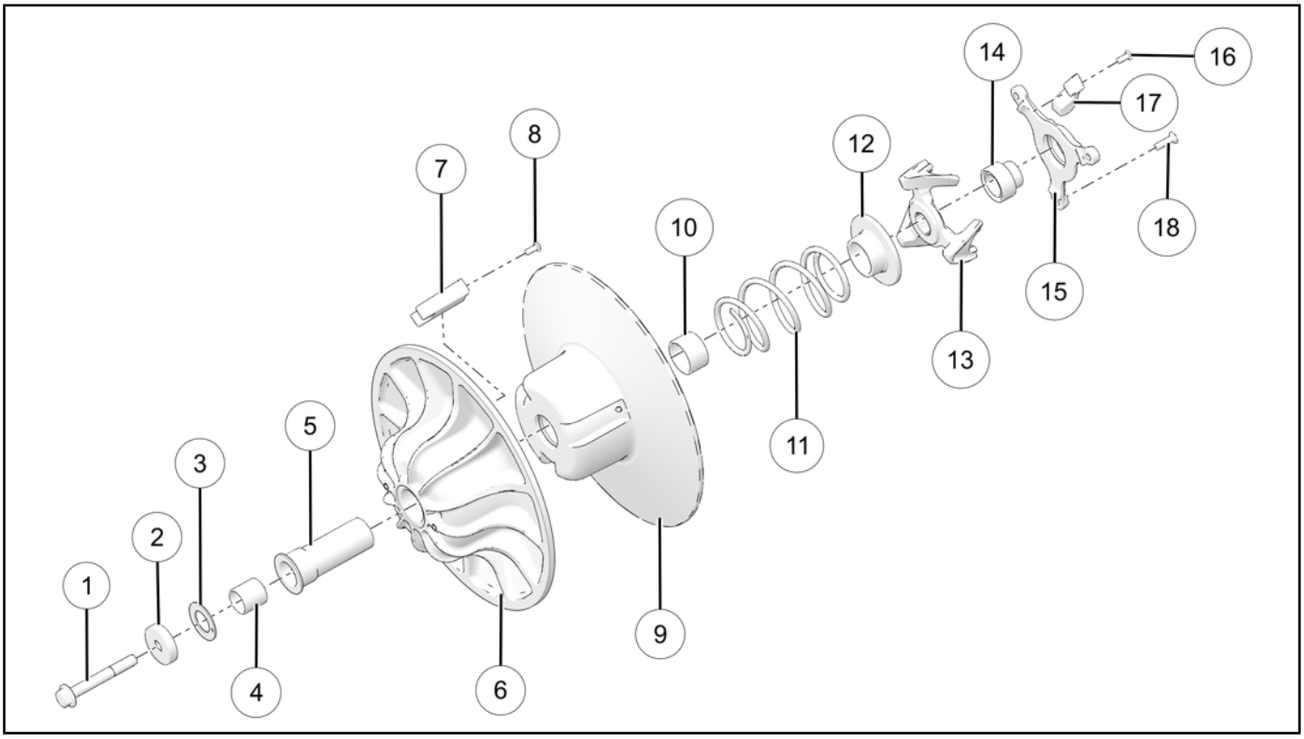


8. Remove the cup washer ⑤ and thrust bearing ⑥.



9. Remove the driven clutch from the transmission input shaft by holding both sheaves together and pulling straight off.

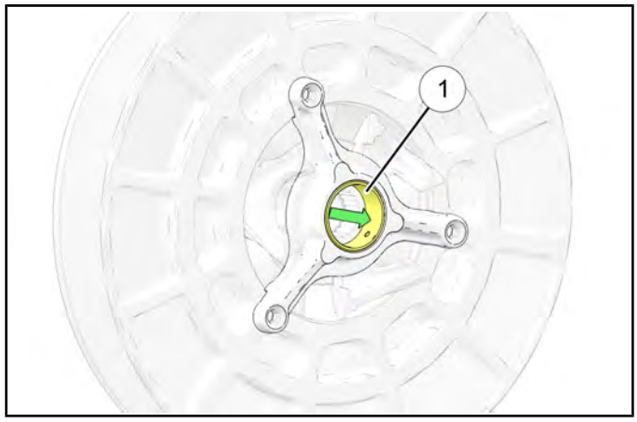
DRIVEN CLUTCH ASSEMBLY VIEW



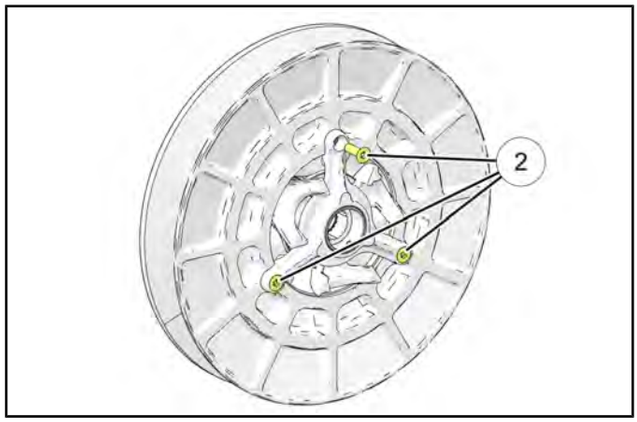
① Driven Clutch Retaining Bolt **10 ft-lbs + 90° (14 Nm + 90°)**	⑩ Driven Clutch Bearing
② Cup Washer	⑪ Clutch Spring
③ Thrust Washer	⑫ Spring Retainer
④ Driven Clutch Bearing	⑬ Helix
⑤ Driven Clutch Post	⑭ Helix Cover Bearing
⑥ Stationary Sheave	⑮ Helix Cover
⑦ Slider	⑯ Button Screw **35 in-lb (4 Nm)**
⑧ Slider Screw	⑰ Helix Button
⑨ Moveable Sheave	⑱ Cover Screw **12 ft-lbs (16 Nm)**

DRIVEN CLUTCH DISASSEMBLY / INSPECTION

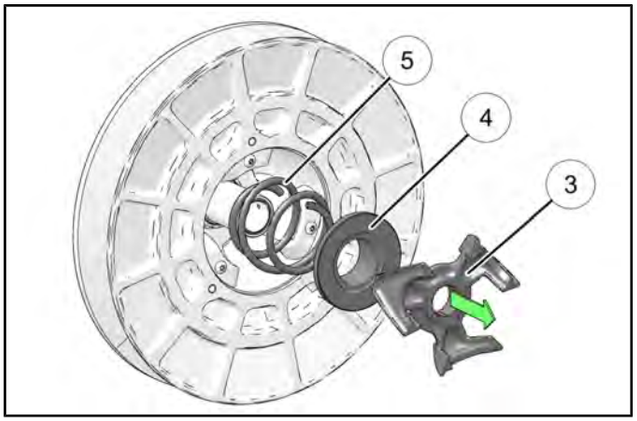
1. Inspect the bearing ① on the helix cover. The bearing should not have deep scratches or show excessive wear.



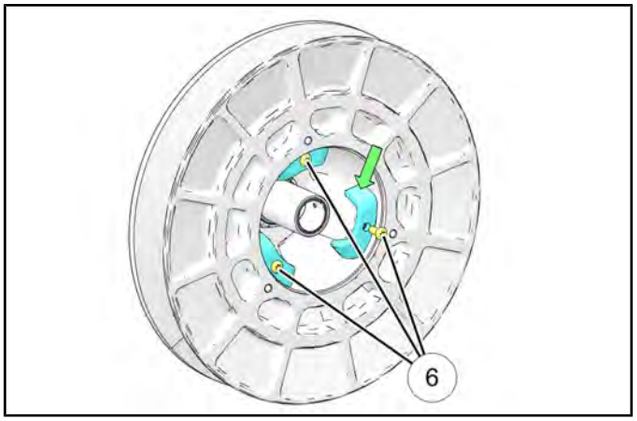
2. Before taking the clutch apart, be sure to mark the stationary sheave, moveable sheave, helix and cover with a reference mark.
3. Place the driven clutch in a clutch compression tool.
4. Remove the three fasteners ② retaining the driven clutch cover.



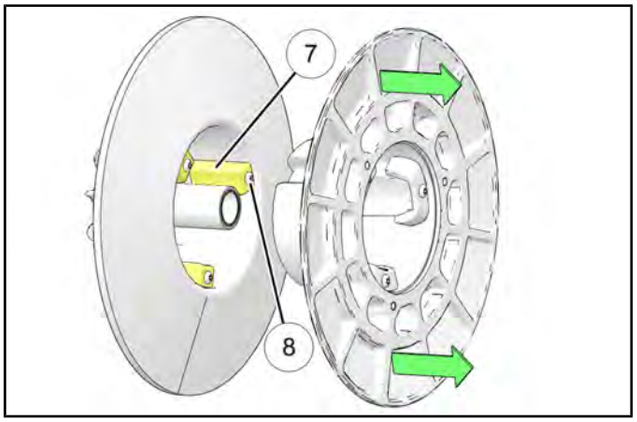
5. Lift and remove the helix ③, limiter spacer ④ and spring ⑤ from the driven clutch.



6. Inspect the buttons surface for wear / cracking. If replacement is required, remove the fasteners ⑥ retaining the buttons to the driven clutch.



7. Separate the moveable sheave from the stationary sheave.



8. Inspect the sliders ⑦ in the stationary sheave for wear and cracking. If replacement is required, remove the fasteners ⑧ retaining the sliders to the sheave.

DRIVEN CLUTCH ASSEMBLY

1. If necessary, replace sliders. Torque fasteners to specification.

TORQUE
Slider Fasteners: **35 in-lb (4 Nm)**

2. Line up the reference marks on the moveable and stationary sheaves and slide the sheaves together.
3. If necessary, replace the buttons on the stationary sheave. Torque fasteners to specification.

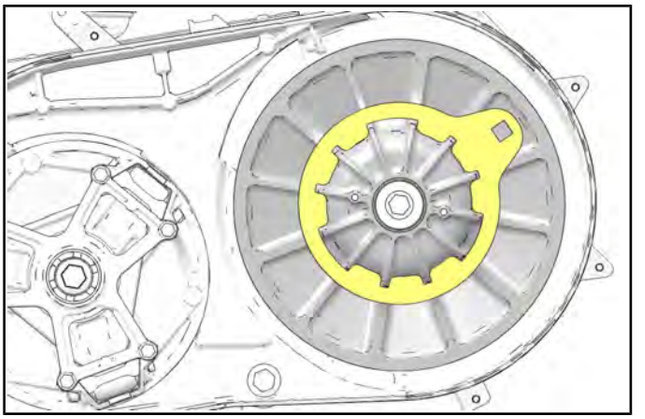
TORQUE
Button Fasteners: **35 in-lb (4 Nm)**

4. Install the spring, limiter spacer and the helix.
5. Place the driven clutch in a universal clutch compression tool.
6. Install the helix cover. Torque fasteners to specification.

TORQUE
Helix Cover Fasteners: **12 ft-lbs (16 Nm)**

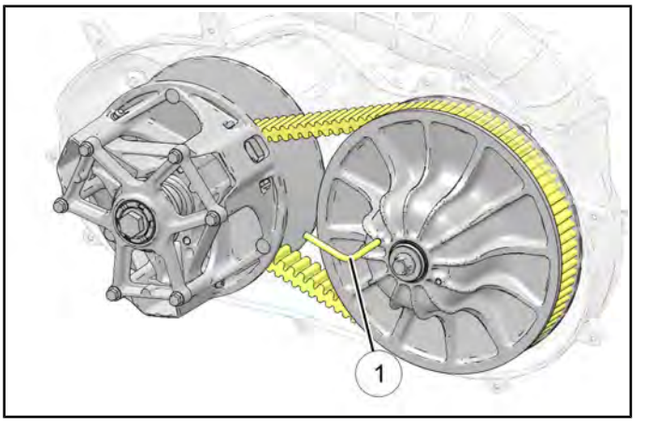
DRIVEN CLUTCH INSTALLATION

1. Install the driven clutch on the transmission input shaft. Install the thrust bearing, and cup washer.
2. Install the driven clutch retaining bolt. Torque bolt to specification. Use driven clutch holding tool (PU-52645) to hold the driven clutch in place while torquing the fastener.



TORQUE
Driven Clutch Retaining Bolt: **10 ft-lbs + 90° (14 Nm + 90°)**

3. With the clutch spreader tool ① installed, loop the belt over the drive clutch and over part of the driven clutch. Be sure to install belt in the direction previously marked.



4. Rotate the driven clutch and walk the belt into the clutch.
5. Remove the clutch spreader tool from driven clutch.
6. Rotate / spin the driven clutch and belt approximately 5-7 times to properly seat the belt in the driven clutch.

7. Install the PVT cover and screws. Torque screws to specification.

TORQUE
PVT Cover Screws: **35 in-lb (3 Nm)**

TROUBLESHOOTING

TROUBLESHOOTING

SITUATION	PROBABLE CAUSE	REMEDY
Engine RPM below specified operating range, although engine is properly tuned.	Worn 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 worn out or broken.	Replace spring; refer to proper installation location.
	Worn driven clutch sliders	Disassemble driven clutch; inspect sliders for wear.
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 sliders.
		Inspect helix.
		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 helix/roller wear
	Converter sheaves greasy; belt slipping.	Clean sheaves with denatured alcohol or brake cleaner, install new belt.
Harsh drive clutch engagement.	Drive belt worn too narrow.	Replace belt.
	Wrong drive clutch spring installed	Replace spring with correct one
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.

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.

NOTES

CHAPTER 7
TRANSMISSION

7

GENERAL INFORMATION

SPECIAL TOOLS

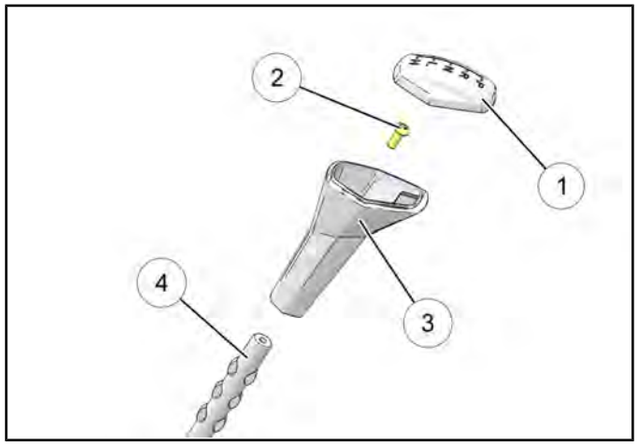
PART NUMBER	TOOL DESCRIPTION
PU-51862	Snorkel Tube Tool

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

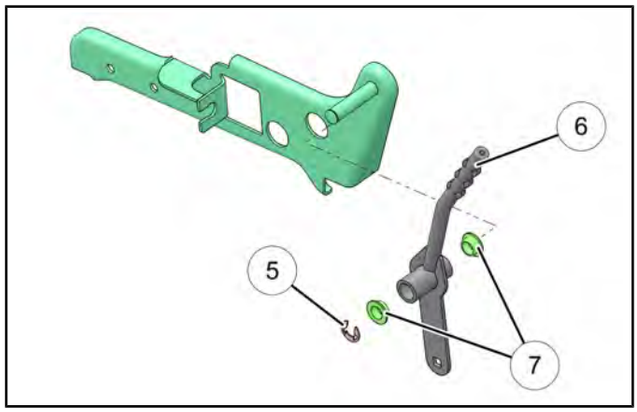
SHIFT LEVER / CABLE

SHIFT LEVER REMOVAL

1. Remove the shift knob cover ①, retaining screw ② and shift knob ③ from the shift lever ④.



2. Remove the fasteners retaining the center console (see Body / Frame chapter). Remove the console from the vehicle.
3. Remove the clip and washer retaining the shift cable to the shift lever and disconnect the cable end from the lever.
4. Remove the retaining ring ⑤ and slide the shift lever ⑥ off the mounting bracket and out from the frame.



5. 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

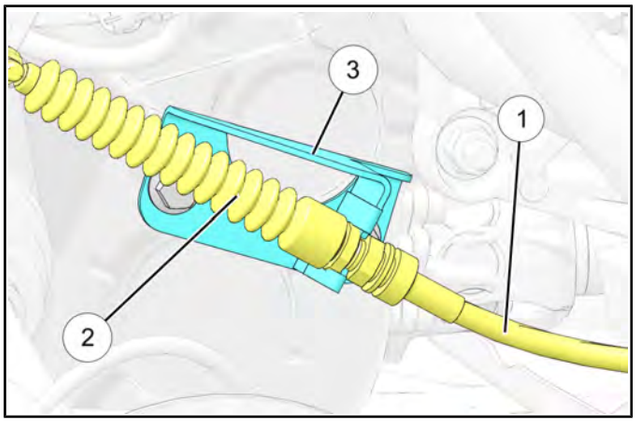
Shift cable adjustment may be necessary if symptoms include:

- 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

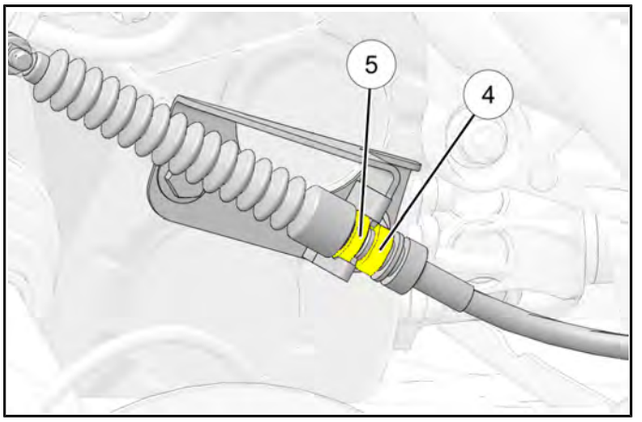
Inspect shift cable, clevis pins, and pivot bushings and replace if worn or damaged.

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 about the same amount of cable travel when shifting slightly past HIGH gear than when shifting to PARK.
5. Thread the upper or lower jam nut as required to obtain proper cable adjustment.

NOTICE
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.

TORQUE
Shift Cable Jam Nuts: **16 ft-lb (22 Nm)**

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.

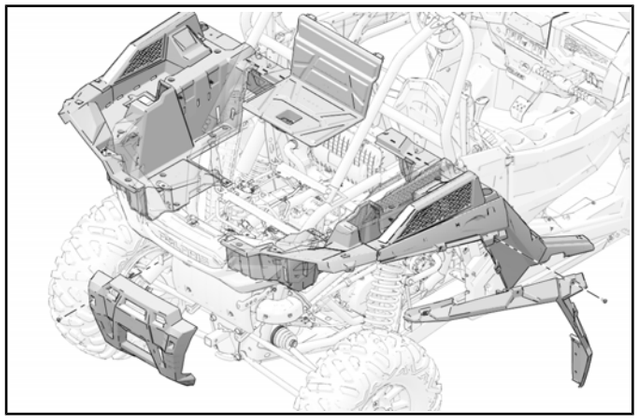
TRANSMISSION SERVICE

TRANSMISSION REMOVAL

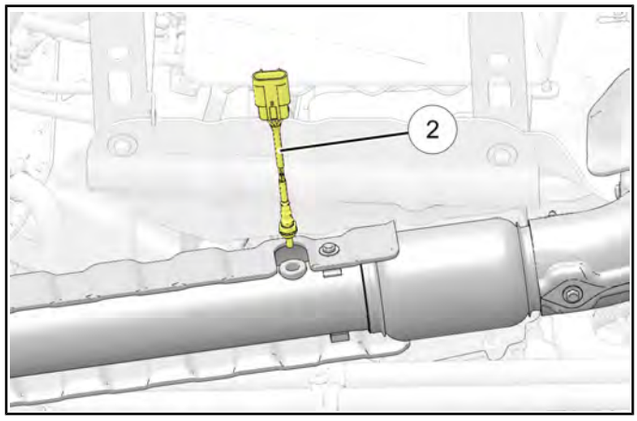
⚠ CAUTION

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

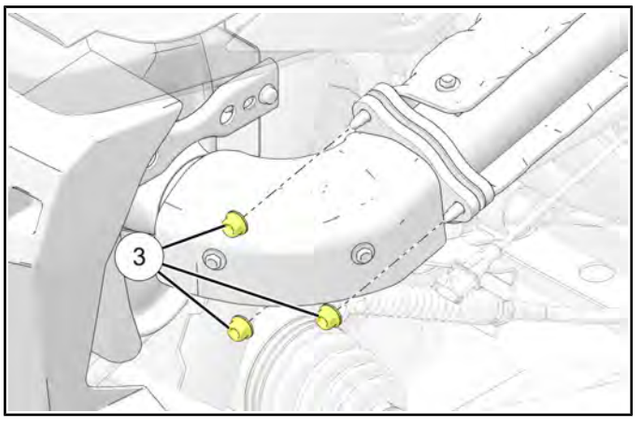
1. Disconnect the battery.
2. If internal transmission repair is required, drain the transmission lubricant (see Chapter 2 – Transmission Oil Change page 2.48.
3. Remove rear fender flairs and fenders.



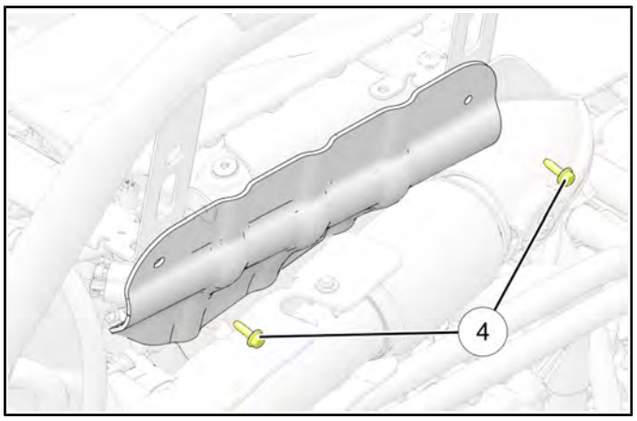
4. Remove rear fascia.
5. Remove rear cab frame.
6. Remove cargo box.
7. Remove cargo box brackets. exhaust shields on passenger side, wire/hose clamps ① on driver's side.
8. Disconnect and remove the oxygen sensor ②.



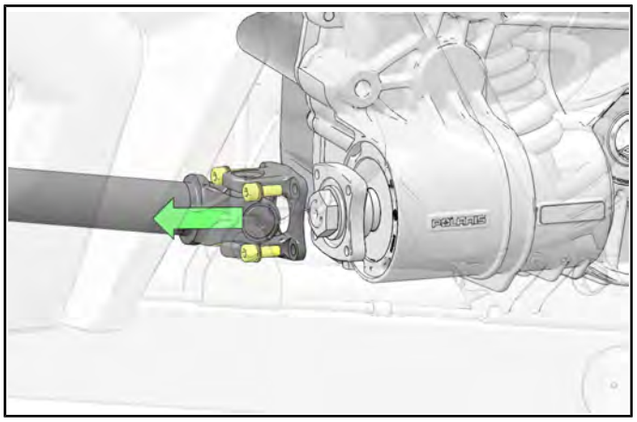
9. Remove the three fasteners ③ retaining the muffler to the exhaust pipe.



10. Remove two fasteners ④ retaining the engine heat shield above O2 sensor.

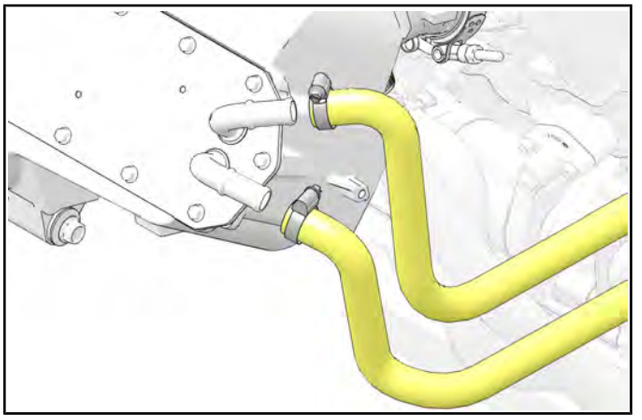


11. Disconnect the four fasteners retaining the prop shaft to the transmission output shaft.

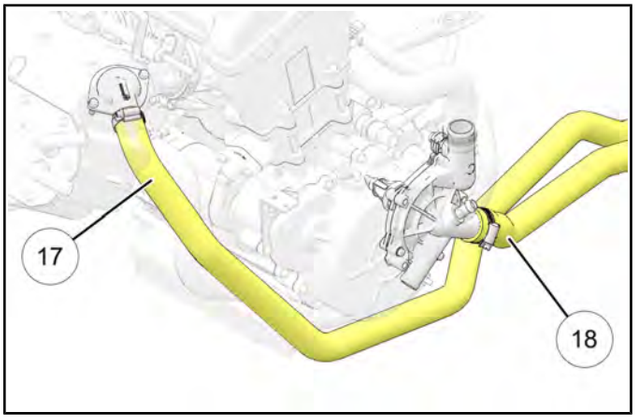


12. Remove both rear half shafts. See Rear Drive Shaft Removal page 8.12

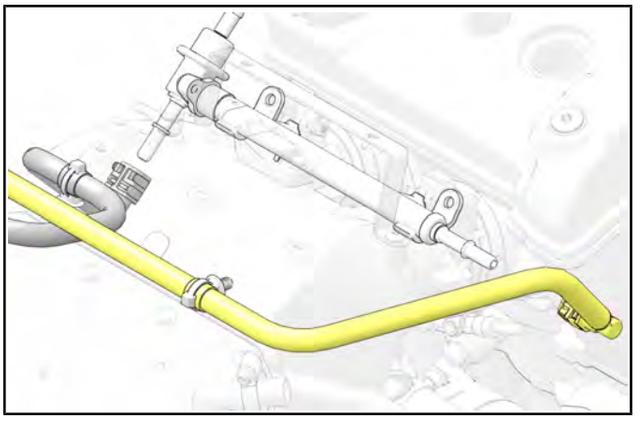
13. Remove two hoses going to the charge air cooler and move the hoses towards the front of the vehicle.



14. Remove the thermostat housing hose ⑰ and the water pump hose ⑱.

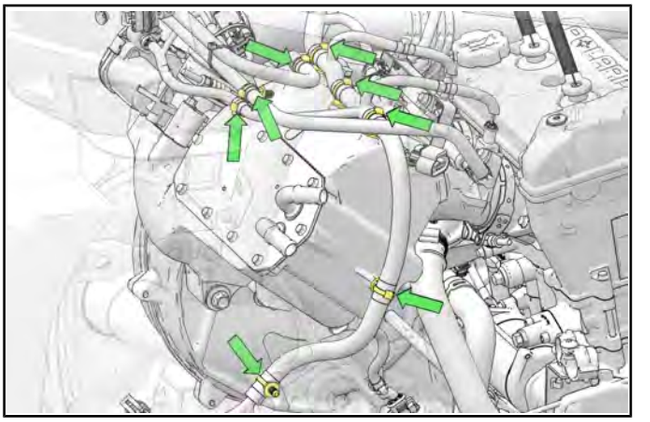


15. Disconnect stator harness and disconnect the harness retainer from the engine mount.
16. Disconnect the fuel supply and return hoses at the fuel rail.

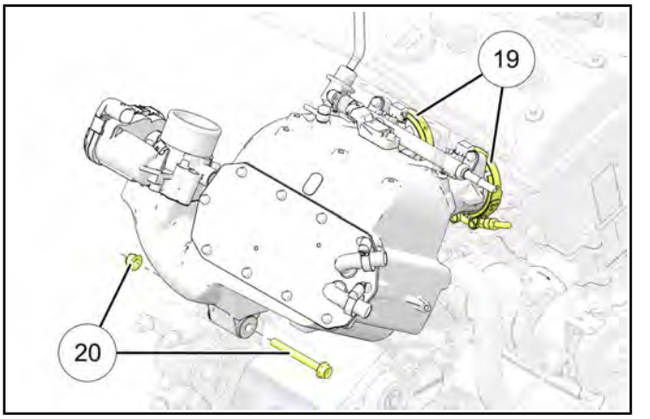


17. Disconnect TBAP, both TMAP sensors, CPS, coolant temp sensor, Trans switch, speed sensor, injectors, ETC.

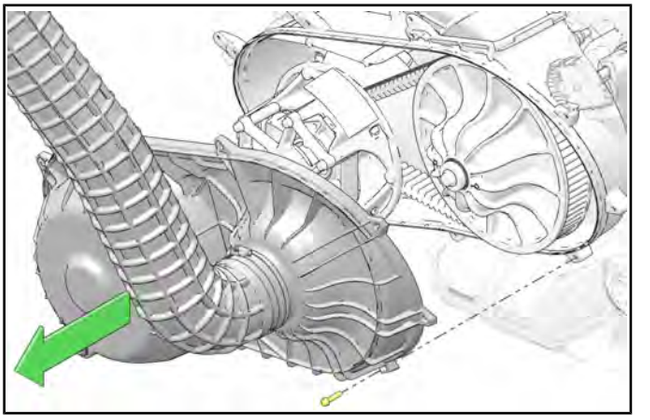
18. Remove zip ties retaining fuel lines and harnesses to intake manifold.



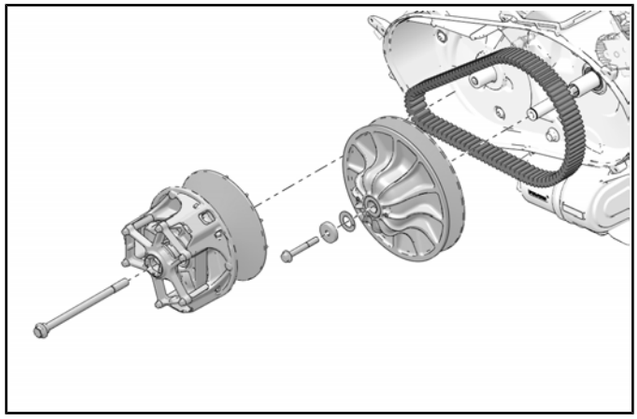
19. Loosen and remove clamps ⑲ retaining intake manifold to engine. Remove lower manifold mounting bolt ⑳ (to trans mount bracket).



20. Remove intake manifold and throttle body as assembly.
21. Disconnect the starter wiring.
22. Remove PVT hoses and cover.

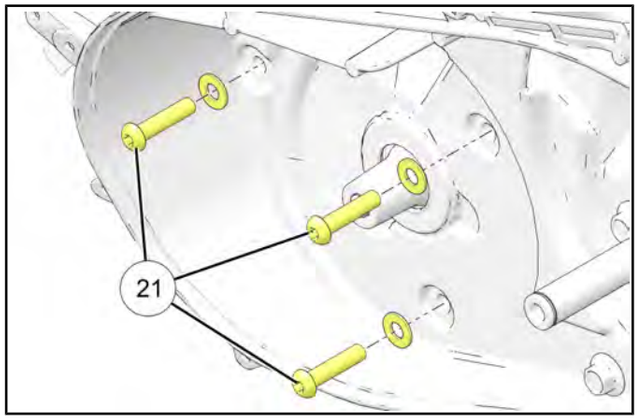


23. Remove secondary clutch, belt, and primary clutch.

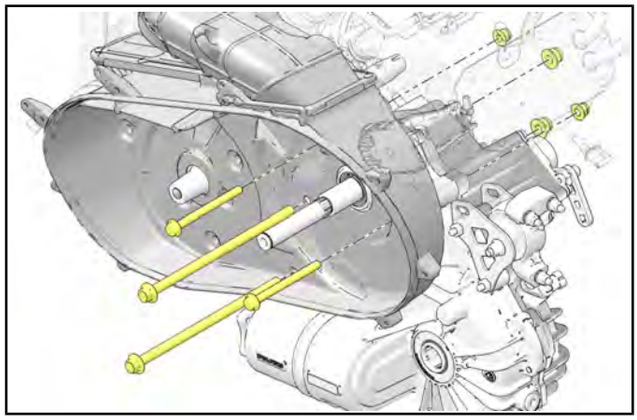


24. Support the bottom side of the engine with wood blocks or from the top side with an engine lift.

25. Remover three bolts ㉑ retaining inner cover to engine.

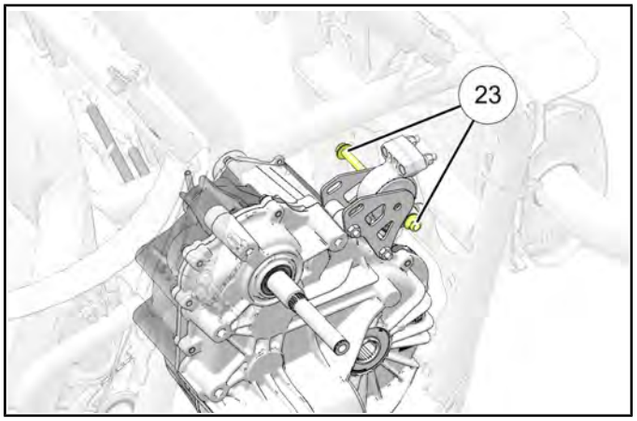


26. Remove inner fasteners retaining inner cover to transmission.

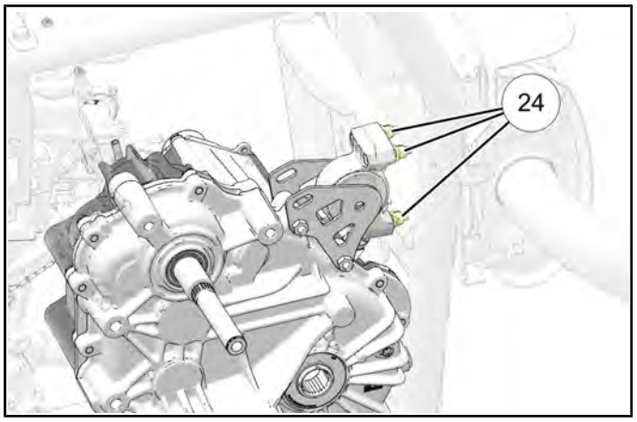


27. Remove fasteners retaining inner cover to engine/trans joint. Discard PVT inner cover o-ring around the crankshaft snout.

28. Remove the rear transmission isolator fasteners ㉓.



29. Remove the three fasteners ㉔ retaining the rear isolator to the frame bracket.



30. Remove the transmission out the driver's side of the vehicle.

TRANSMISSION INSTALLATION

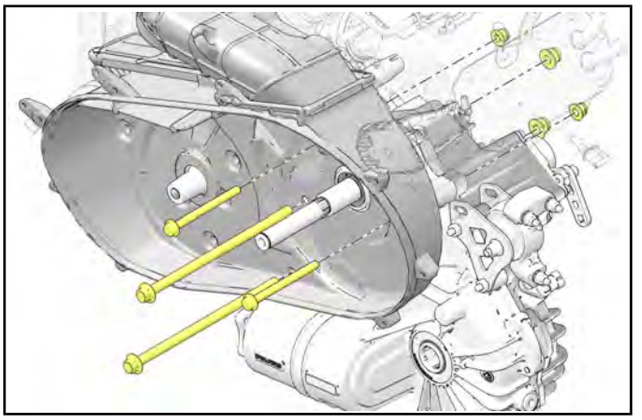
1. Install transmission into the chassis through the driver's side.
2. Install rear transmission mount to the frame bracket. Torque fasteners to specification.

TORQUE
Rear Transmission Mount Fasteners: **22 ft-lb (30 Nm)**

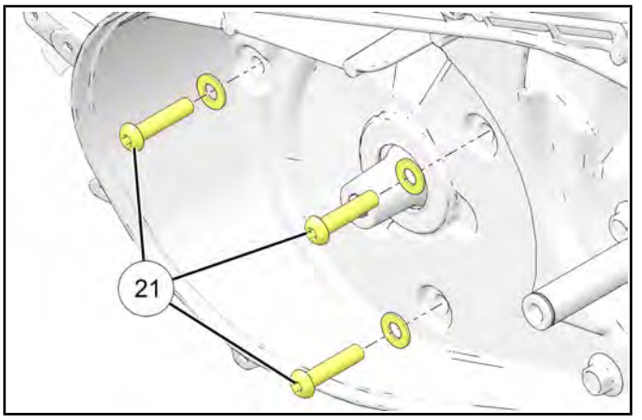
3. Install transmission isolator bolt through the transmission bracket and isolator. Torque fasteners to specification.

TORQUE
Rear Transmission Isolator Fasteners: **33 ft-lb (45 Nm)**

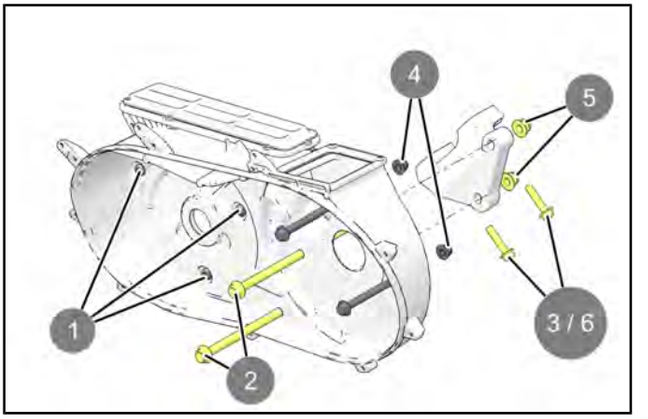
4. Install new seal around crankshaft snout prior to installing PVT inner cover. Loosely install fasteners retaining inner cover to the transmission and engine/trans joint.



5. Loosely install three bolts ㉑ retaining inner cover to engine.



6. Torque PVT inner cover fasteners in sequence to specification.



TORQUE
PVT Inner Cover Fasteners: **Step 1: Torque to 37 ft-lbs (50 Nm).** **Step 2: Install through-bolts by adjusting the transmission accordingly.** **Step 3: If previously removed, loosely install bolts by hand.** **Step 4: Torque to 37 ft-lbs (50 Nm).** **Step 5: Torque to 50 ft-lbs (68 Nm).** **Step 6: If previously removed, torque to 37 ft-lbs (50 Nm).**

7. Install the primary clutch, belt and secondary clutch. Install snap ring on transmission input shaft before installing secondary clutch mounting bolt. Torque fasteners to specification.

TORQUE
Primary Clutch Bolt: **96 ft-lb (130 Nm)** Secondary Clutch Bolt: **70 ft-lbs (95 Nm)**

8. Install PVT hoses and outer PVT cover. Torque fasteners to specification.

TORQUE
Hose Clamps: **35 in-lb (4 Nm)** Outer PVT Cover Fasteners: **35 in-lb (3 Nm)**

9. Connect the starter wiring. Torque fasteners to specification.

TORQUE
Starter Cable Nuts: **30 in-lb (3 Nm)**

10. Install throttle body / intake manifold assembly. Tighten clamps retaining intake manifold to engine. Install lower manifold mounting bolt (to trans mount bracket). Torque fasteners to specification.

TORQUE
Intake Manifold Clamps: **6 ft-lb (8 Nm)** Lower Intake Manifold Mounting Fasteners: **20 ft-lb (27 Nm)**

11. Install two fasteners retaining the engine heat shield above O2 sensor. Torque heat shield fasteners to specification.

TORQUE
Heat Shield Fasteners: **8 ft-lb (11 Nm)**

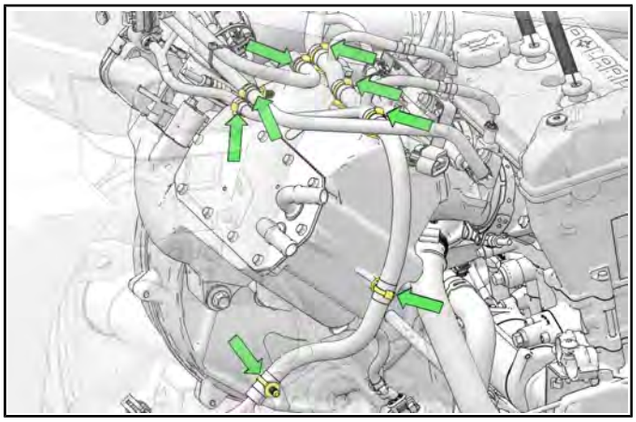
12. Install the three fasteners retaining the muffler to the exhaust pipe. Torque fasteners to specification.

TORQUE
Exhaust Pipe to Muffler Fasteners: **26 ft-lb (35 Nm)**

13. Connect O2 sensor harness.
14. Install the shock access panel. Torque fastener to specification.

TORQUE
Shock Access Panel: **35 in-lb (4 Nm)**

15. Install zip ties retaining fuel lines and harnesses to intake manifold.



16. Connect harness going to TBAP, both TMAP sensors, CPS, coolant temp sensor, Trans switch, speed sensor, injectors, ETC.
17. Connect the fuel supply and return hoses at the fuel rail.
18. Install the two hoses going to charge air cooler.
19. Install air box and engine air intake. Torque fasteners to specification.

TORQUE
Air Box Mounting Fasteners: **8 ft-lb (11 Nm)** Intake Clamps: **49 in-lb (6 Nm)**

20. Install cargo box brackets, exhaust shields on passenger side and wire/hose clamps on driver's side. Torque fasteners to specification.

TORQUE
Cargo Box Bracket Fasteners: **8 ft-lb (11 Nm)**

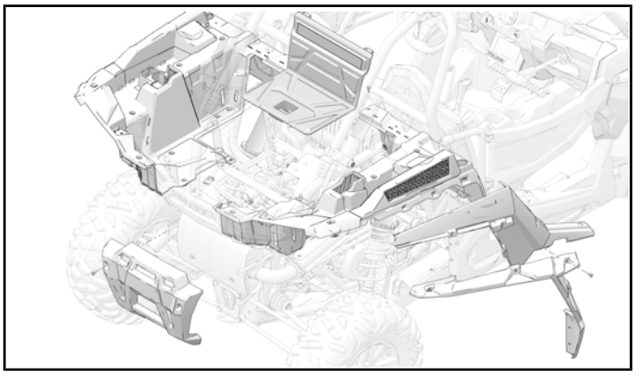
21. Install cargo box. Torque fasteners to specification.

TORQUE
Cargo Box Fasteners: **8 ft-lb (11 Nm)**

22. Install rear cab frame. Torque fasteners to specification.

TORQUE
Cab Frame Fasteners: **40 ft-lb (54 Nm)**

23. Install rear fascia. Torque fasteners to specification.



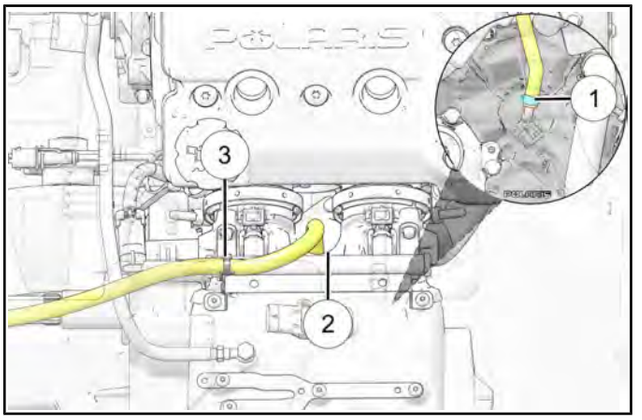
TORQUE
Rear Fascia Fasteners: **8 ft-lb (11 Nm)**

24. Install rear fenders and fender flairs.
25. Fill coolant reservoir. Bleed system as required. See and Cooling System Bleeding page 2.40.
26. Check and fill engine oil as required. See Engine Oil Level page 2.29.
27. Connect the battery. Torque fasteners to specification.

TORQUE
Battery Fasteners: **60 in-lbs (7 Nm)**

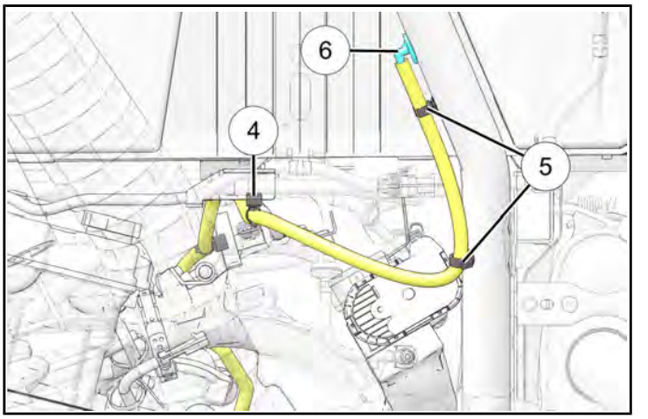
TRANSMISSION VENT LINE ROUTING

The transmission vent line connects to a nipple ① on the side of the transmission near the transmission switch. The vent line routes up through the gap ② between the MAG and PTO intake runners, and secured to the injector harness mounting bracket with a hinge clip ③.



For vehicles equipped with EVAP, the line runs out the left side of the vehicle, OVER the EVAP line, and connected to the purge mounting bracket with a hinge clip ④.

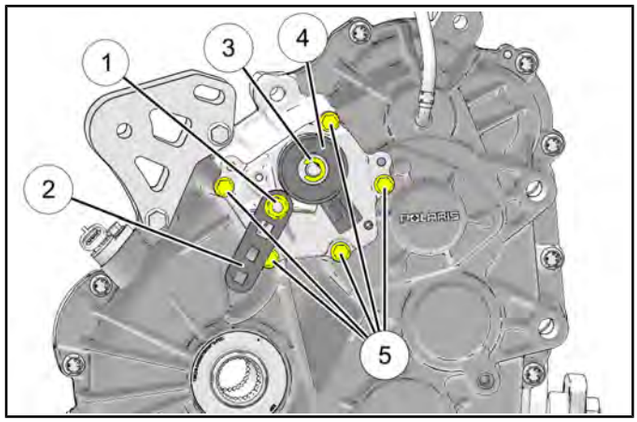
The line routes out and attaches to the rear vertical support tube with two hinge clips ⑤ and then terminates into the rear vertical support tube using a termination fitting ⑥.



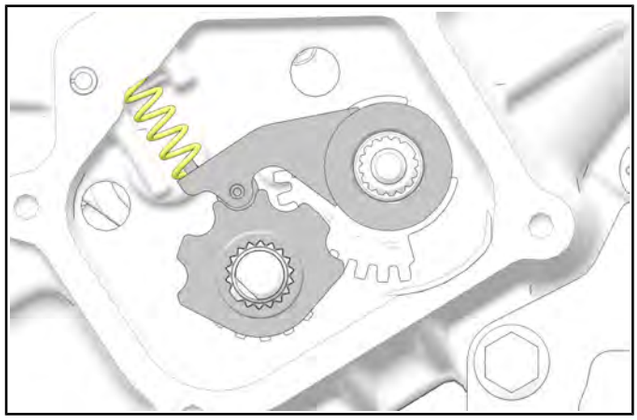
TRANSMISSION DISASSEMBLY

NOTICE
Refer to the exploded view at the end of this chapter as a reference.

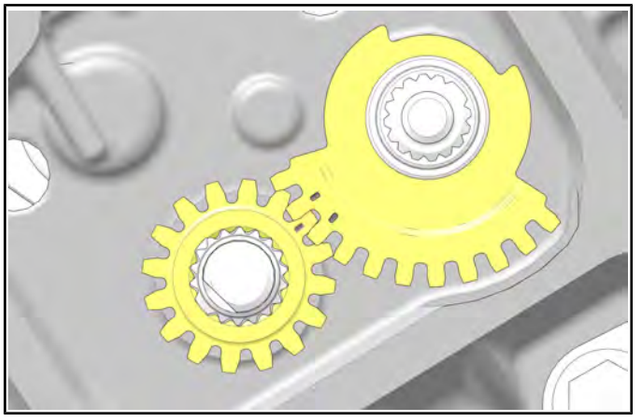
1. Place transmission in high gear.
2. Drain and properly dispose of transmission fluid.
3. Remove bell crank nut ① and bell crank ②.



4. Remove E-clip ③ retaining the spring washer, washer and gear selector switch ④.
5. Remove sector cover bolts ⑤ and remove the cover.
6. Remove detent spring, detent pawl and detent star. Note the master spline on the detent star and the shift shaft.

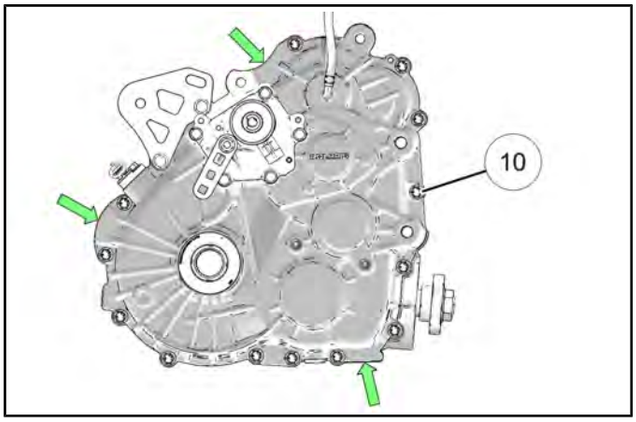


7. Remove the two sector gears.



NOTICE
Note the timing marks on the shift gears for reassembly purposes.

8. Remove transmission case bolts ⑩.

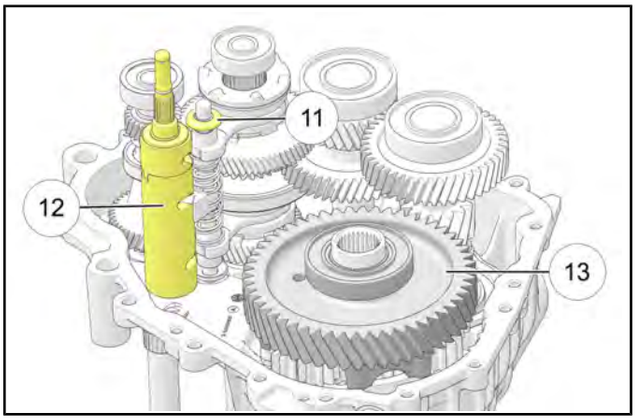


9. Using the three designated pry points shown in the image, separate the transmission case halves.

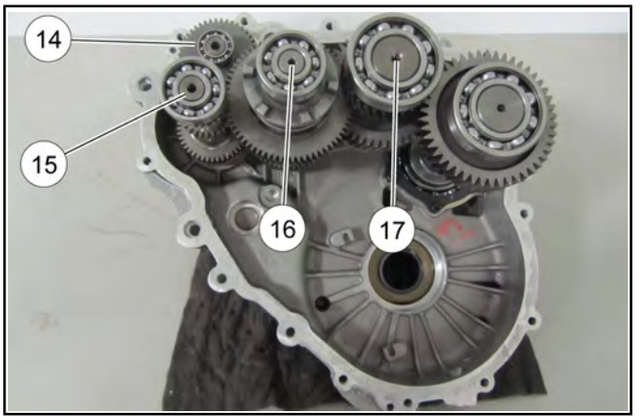
CAUTION
Do not pry on the transmission case mating surfaces or the transmission cases will be damaged and leak oil after it is reassembled.

7

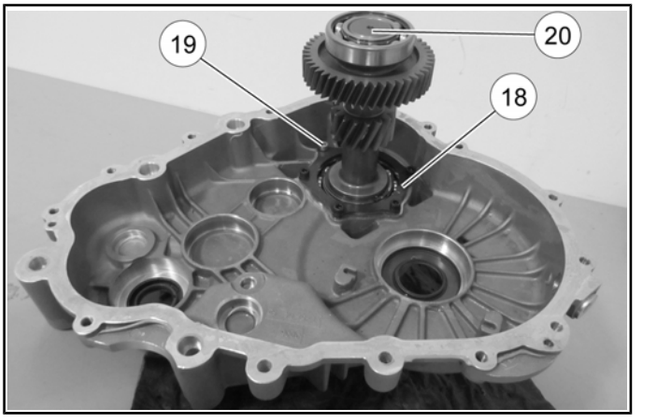
10. Lift up on the shift shaft rail ⑪ and move the rail assembly rearward to allow the shift fork pins to be removed from the shift drum ⑫. Remove the shift drum from the transmission housing.



11. Remove the shift shaft and forks as an assembly.
12. Remove the rear output shaft assembly ⑬ by lifting underneath the gear or by tapping the shaft from the opposite side.
13. Remove the idler gear assembly ⑭.



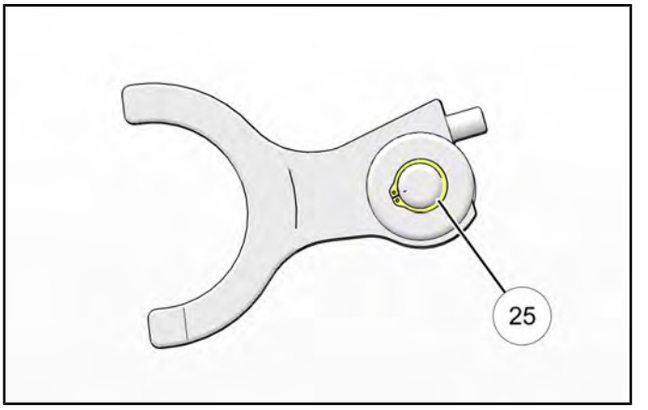
14. Remove the input shaft assembly ⑮.
15. Remove the reverse shaft assembly ⑯.
16. Remove the idler shaft assembly ⑰.
17. Remove the six screws retaining the pinion shaft plate ⑱.



NOTICE

One screw is longer ⑲ and than the others and must be put back in the correct location.

18. Remove the pinion shaft assembly ⑳.
19. Inspect all gear and shaft assemblies for damage.
20. Check the bearings for damage and that they are easy to turn. Replace any questionable bearings.
21. To disassemble the shift shaft rail remove the snap ring ㉕ from the end of the shift rail on either side.



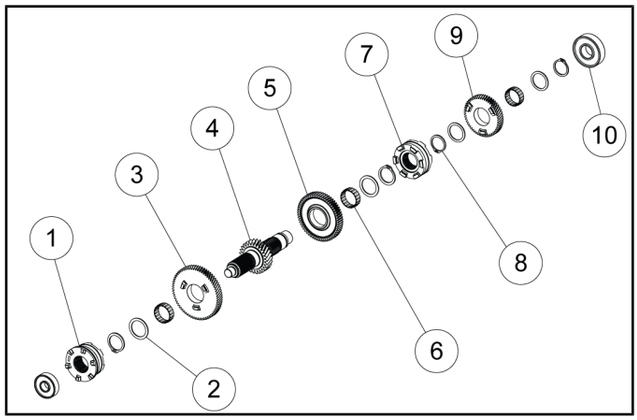
⚠ CAUTION

Use caution when disassembling the shift rail. The compressed springs on the shift rail may pop off causing injury.

22. Remove all seals from the gearcase halves and clean the cases in preparation for assembly.

GEAR CLUSTER DISASSEMBLY

1. 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.



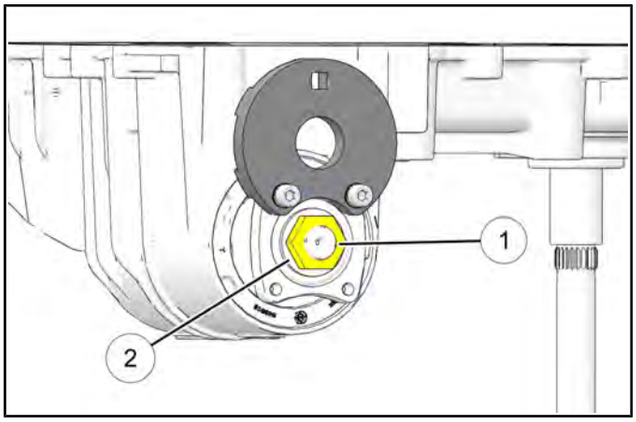
① Park/Low Shift Dog	⑥ Needle Bearing
② Thrust Washer	⑦ Reverse/High Shift Dog
③ Low Gear	⑧ Snap Ring
④ Reverse Shaft	⑨ High Gear
⑤ Reverse Gear	⑩ Bearing

2. Remove the Reverse/High shift dog.
3. Remove the snap ring, washer, needle bearing, and reverse gear from the reverse shaft.
4. If necessary, disassemble the other end of the reverse shaft. Remove the bearing , Park/Low shift dog, retaining ring, washer, low gear and needle bearing from the reverse shaft.

SNORKEL TUBE REMOVAL / DISASSEMBLY

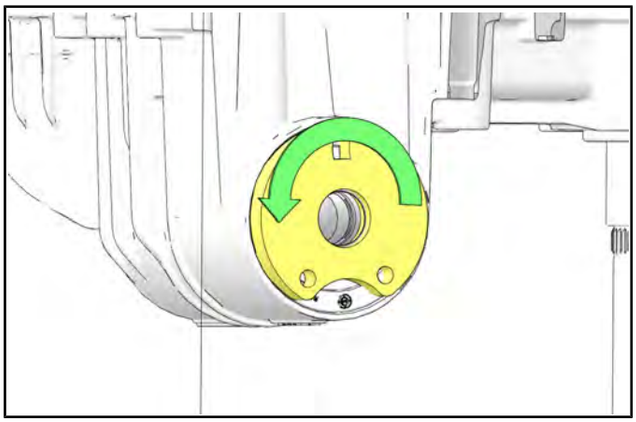
CAUTION
The pinion shaft must be removed prior to removing the snorkel tube assembly. Failure to remove pinion shaft will result in damage to the snorkel tube or LH gearcase.

1. Using the Snorkel Tube Tool and two of the coupler bolts to hold the coupler, remove the front output shaft coupler nut ① and washers ②.



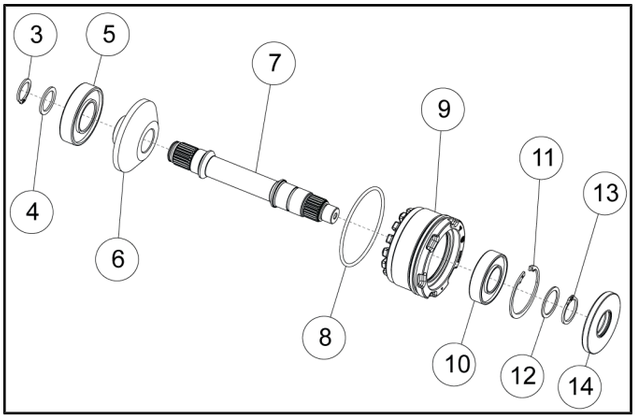
Snorkel Tube Tool: **PU-51862**

2. Use the snorkel tube tool to remove the snorkel tube and front output shaft as an assembly.



7

3. Extract the snorkel shaft seal ⑭ from the snorkel tube ⑨ by drilling a small pilot hole and threading a screw in to slowly pull the seal out.

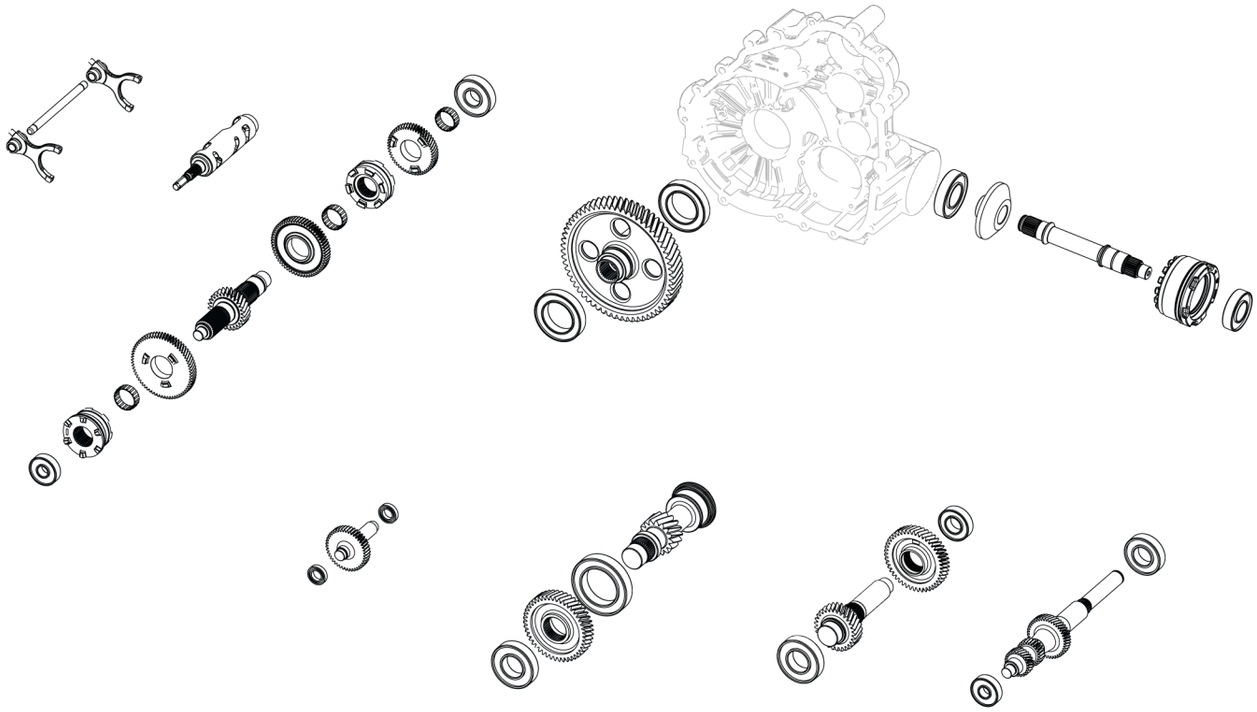


③ Snap Ring	⑨ Snorkel Tube
④ Thrust Washer	⑩ Bearing
⑤ Bearing	⑪ Snap Ring
⑥ Ring Gear	⑫ Thrust Washer
⑦ Front Output Shaft	⑬ Snap Ring
⑧ O-Ring	⑭ Seal

4. Once the three snap rings ③⑪&⑬ are removed, use an arbor press to remove the snorkel tube and other components from the shaft.

CAUTION
Support the end face of the gear teeth when pushing the shaft through or damage to the gear teeth may occur.

GEAR, SHAFT, BEARING INSPECTION



Inspect all of the gears, shafts, and bearings shown for excessive wear or damage.

IMPORTANT
If gear replacement is required, also replace the corresponding gear and/or gear shaft.

TRANSMISSION ASSEMBLY / SNORKEL GEAR BACKLASH

SNORKEL GEAR BACKLASH

1. Reassemble the snorkel tube and snorkel shaft.

NOTICE
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.

2. Apply a small amount of white lithium grease or Anti-Seize on the threads of the snorkel tube. Install front output shaft/snorkel tube into the gearcase using the Snorkel Tube Tool. Bottom out the snorkel tube to the transmission case.

Snorkel Tube Tool: **PU-51862**

3. Install the pinion shaft assembly. Be sure to properly mesh the snorkel shaft bevel gear with the pinion shaft bevel gear.

NOTICE
Do not install the long bolt at this time or you will not be able to see the windows on the snorkel tube to properly set backlash.

4. Apply Loctite® 242™ to the threads of the bearing cover retaining screws. Install the screws and torque to specification.

TORQUE
Bearing Cover Retaining Screws: **10 ft-lb (14 Nm)**

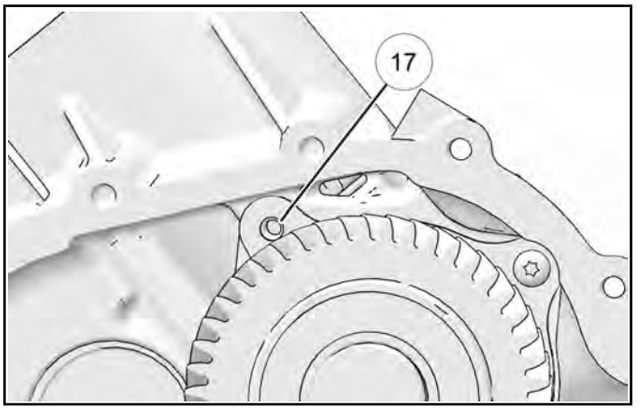
5. Install the RH case half and install three case screws to properly hold the case and shaft in the proper location.

IMPORTANT
Installing the case halves together ensures the pinion shaft is squarely aligned. Failure to perform this step will lead to incorrect backlash being set.

6. Rotate the snorkel tube *counterclockwise* using the snorkel tool until the snorkel gear and pinion gear have ‘zero’ backlash.

NOTICE
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.

7. Look down into the transmission housing to see the snorkel locking screw hole opening ⑰ to reference your starting point.



NOTICE
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.

8. 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.
9. 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).
10. 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.

TORQUE
Snorkel Locking Screw: **10 ft-lb (14 Nm)**

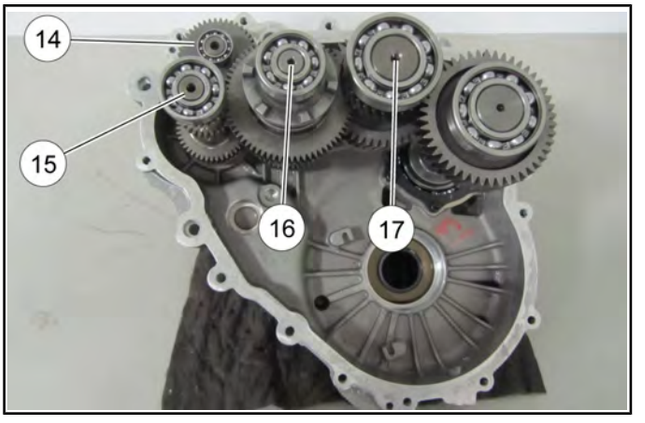
TRANSMISSION ASSEMBLY

NOTICE
The snorkel shaft and pinion shaft must be installed prior to transmission assembly. The snorkel shaft cannot be installed after assembling the transmission.

IMPORTANT
Thoroughly clean the mating surfaces of the transmission case halves so they are free of 3 Bond sealant. Failure to properly clean the surfaces may lead to transmission case leaks.

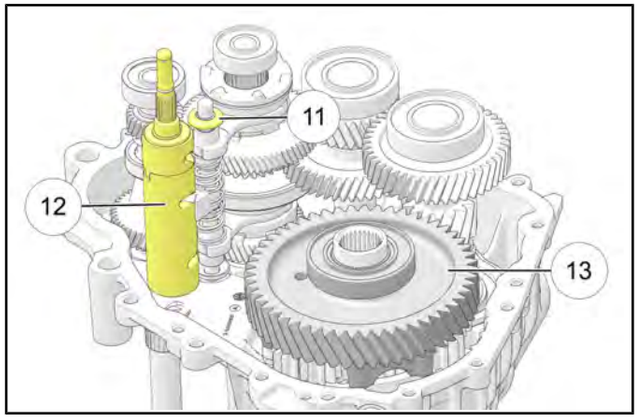
NOTICE
Refer to the exploded view at the end of this chapter as a reference.

1. Install the idler shaft ⑰ and reverse shaft ⑯ together into the case.



2. Install the transmission input shaft ⑮ into the case.
3. Install idler gear assembly⑭.

4. Install rear output shaft assembly ⑬.



5. Assemble the shift shaft rail if previously disassembled.

NOTICE

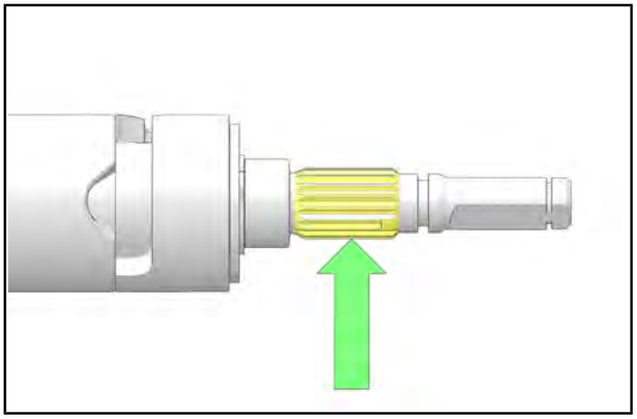
Both shift forks need to be oriented the same way, so that the shift fork pins are both offset to the same side of the rail.

6. Install the shift shaft rail ⑪ and shift forks into the transmission housing as an assembly. Be sure the shift forks are engaged into the engagement dogs.

NOTICE

Shift fork pins should be offset towards the input shaft as shown.

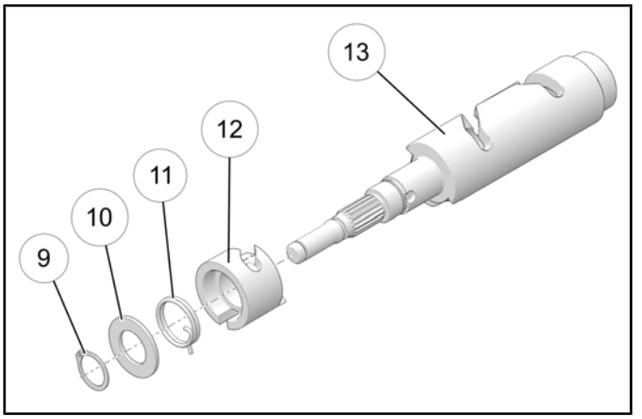
7. Inspect the shift drum for any damage or wear. Inspect the splines of the shift drum.



8. 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.

7

9. The shift drum has several components listed below. The orientation of the torsion spring ⑪ is important when rebuilding the shift drum. After assembly of cam ⑫, torsion spring ⑪, washer ⑩, and retaining ring ⑨, while holding the drum, the cam should be twisted by hand to load the torsion spring and ensure it moves freely. Twist the cam away from it's free state position and make sure it snaps back into it's free state.



CAUTION

Make sure torsion spring is installed correctly and the cam snaps back into it's free state. If the torsion spring is left out, or installed incorrectly, the shift into PARK may not engage completely.

ITEM	DESCRIPTION
⑨	Retaining Clip
⑩	Washer
⑪	Torsion Spring
⑫	Cam
⑬	Drum

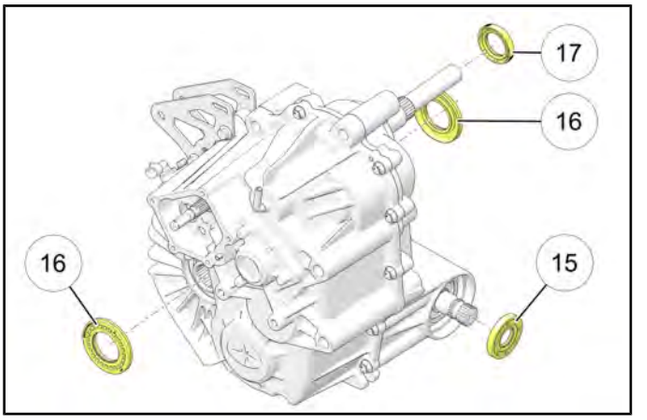
10. Apply a continuous bead of Crankcase 3 Bond Sealant (PN **2871557**) to left-hand transmission mating surface.
11. Install the transmission case cover and retaining bolts. Torque bolts to specification.

TORQUE
Transmission Case Bolts: **20 ft-lbs (27 Nm)**

NOTICE

If using NEW left hand gearcase, holes are "not threaded" for self tapping screws to form threads.

12. Install new seals into the transmission case halves.
    - The snorkel shaft seal ⑮, should be pressed in until it seats against the housing counter-bore.
    - The input shaft seal ⑯, should be pressed in until it seats just past the housing (1.0-1.5 mm from outer face of bore).
    - The rear output shaft seals ⑰, can be installed using a standard bushing installation tool. Seals should be installed just past the case lead-in chamfer (.082" or 2.1 mm from outer face of bore).

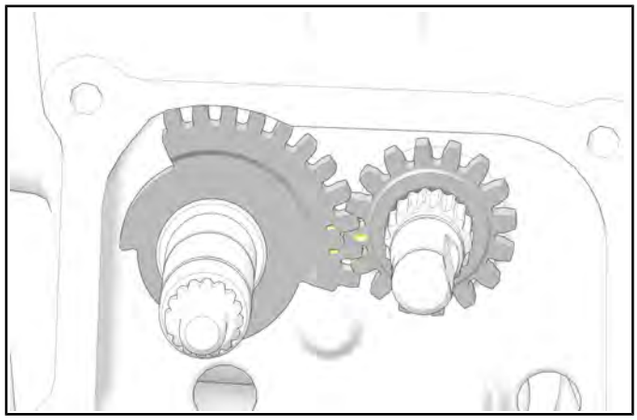


NOTICE

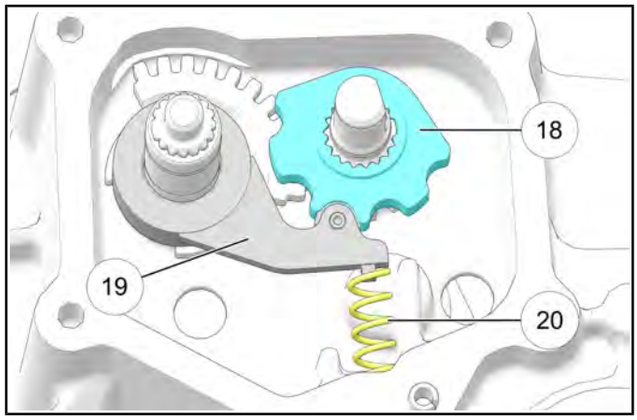
Inspect new seals to ensure they are properly greased, and are free of contaminants prior to installation.

13. Thoroughly clean the shift shaft housing.

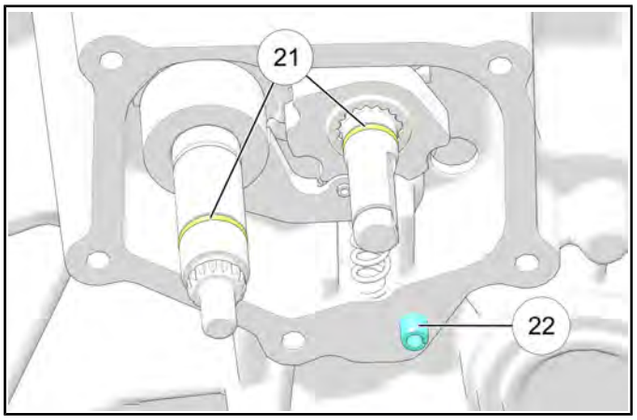
14. Install the sector gear (16T) onto the shift drum shaft. Install the shift shaft assembly and sector gear (11T) into the bushing pocket on the left side. Align the timing marks on the gears as shown.



15. Install the detent star ⑱ onto the shift drum shaft. Be sure to install the detent star with the shorter raised edge facing outward, longer raised edge facing inward, and skip-tooth aligned.
16. Install the detent pawl ⑲ onto the shift shaft and carefully install the compression spring ⑳. Install the o-ring onto the shift shaft.



17. Install a new O-ring ㉑ 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.



18. Clean the transmission and gear sector cover mating surfaces thoroughly.
19. Apply Crankcase Sealant (PN **3233885**) onto the cover and transmission case mating surface.
20. Install the sector cover and align the transmission case dowel with the alignment hole. Install and torque the screws to specification.

TORQUE
Sector Gear Cover Screws: **12 ft-lb (16 Nm)**

21. Install the transmission drain plug and torque to specification.

TORQUE
Fill / Drain Plug: **14 ft-lbs (19 Nm)**

22. Install the bellcrank onto the shift shaft. Note the key splined on the bellcrank and shift shaft. Install the nut and torque to specification.

TORQUE
Bell Crank Nut: **18 ft-lb (24 Nm)**

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

NOTICE
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.

NOTES

CHAPTER 8
FINAL DRIVE

GENERAL INFORMATION

SPECIAL TOOLS

PART NUMBER	DESCRIPTION
2872608	Roll Pin Removal Tool
8700226	CV Boot Clamp Pliers
PU-48951	Axle Boot Clamp Tool

BEARING CARRIER

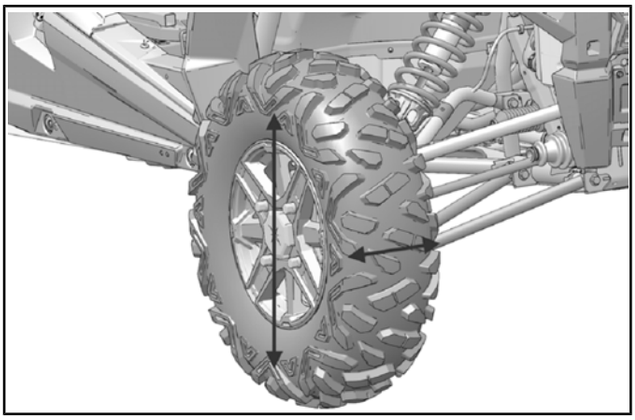
FRONT BEARING CARRIER REMOVAL / INSPECTION

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

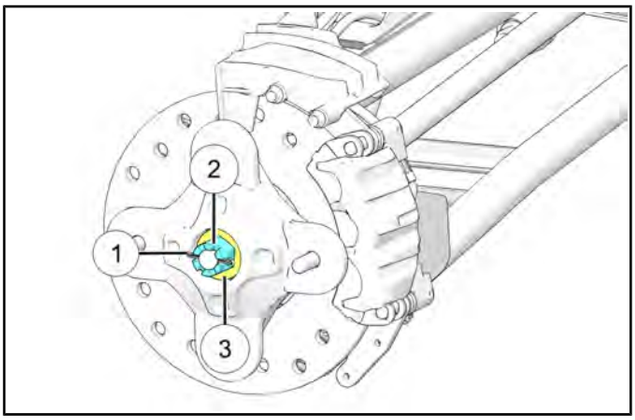
⚠ WARNING

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 cone washer ③ from the front wheel hub assembly.

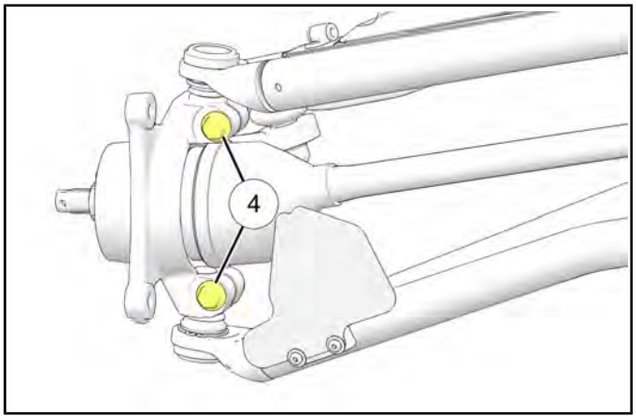


5. Remove the fastener retaining the steering tie rod end to the front bearing carrier.
6. Remove and discard the two front brake caliper mounting bolts and remove the caliper from the brake disc.

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.

NOTICE

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.

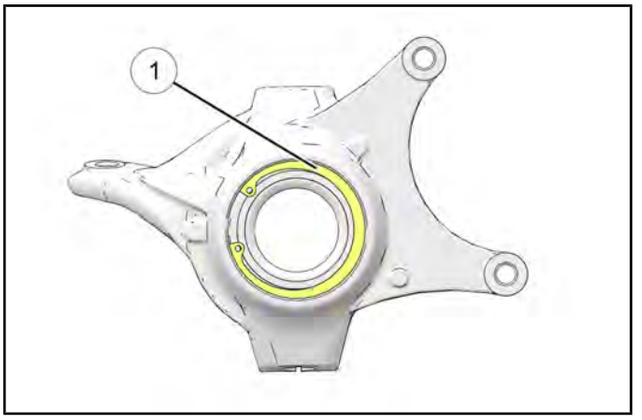
12. Replace bearing if moisture, dirt, corrosion, or roughness is evident.

8

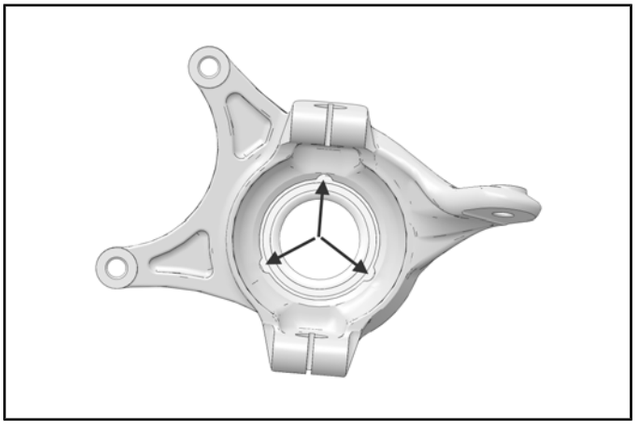
FRONT BEARING REPLACEMENT

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.



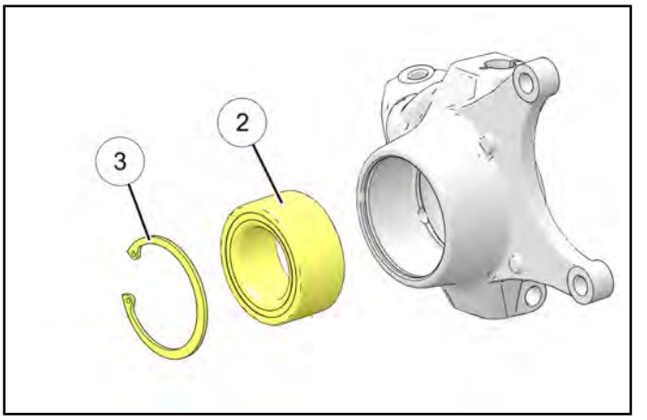
3. Drive bearing out evenly by tapping on outer race only. Once bearing is at bottom of casting, support casting on outer edges so bearing can be removed.
4. Inspect the bearing carrier housing for scratches, wear or damage. Replace front bearing carrier if damaged.

Bearing Installation

5. 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.
6. Support the bottom of the bearing carrier housing.

CAUTION
Use an arbor and press only on the outer race, otherwise bearing damage may occur.

7. 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.

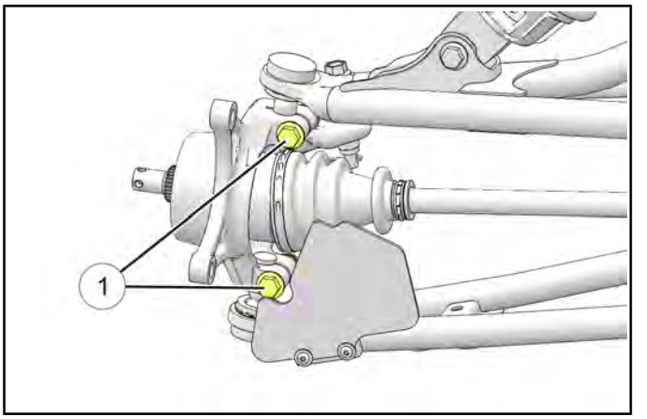


NOTICE
Use care to not allow any of the Loctite® compound to get in the bearing.

8. Wipe the housing clean of any excess compound and install the snap ring ③.

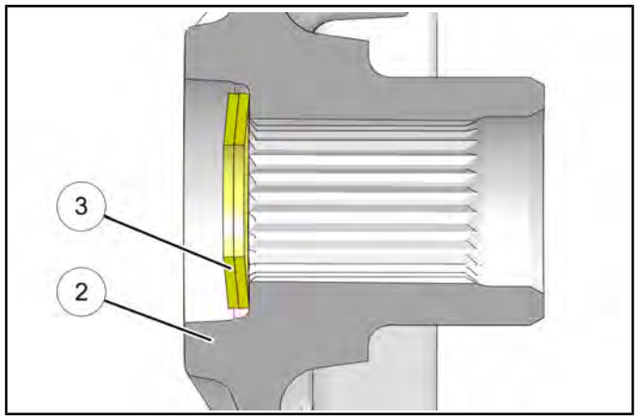
FRONT BEARING CARRIER INSTALLATION

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.



TORQUE
Ball Joint Pinch Bolts: **40 ft-lbs (54 Nm)**

4. Apply Anti-Seize to drive shaft axle splines.
5. Install front wheel hub assembly ②, cone washer ③, and hand tighten the castle nut. Install washer with domed side out.



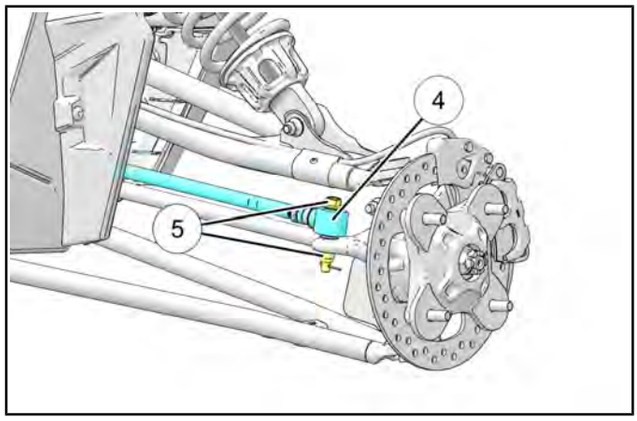
6. Install **new** brake caliper mounting bolts and torque to specification.

TORQUE
Front Caliper Mounting Bolts: **30 ft-lb (41 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.

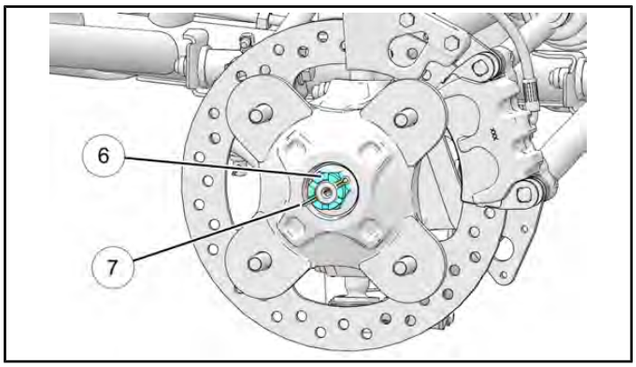
NOTICE
Refer to the photo below to ensure proper placement of the tie rod end.



8. Torque the tie rod end fastener ⑤ to specification and install a **new** cotter pin ⑤.

TORQUE
Tie Rod End Fastener: **30 ft-lb (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.



TORQUE
Wheel Hub Castle Nut: **180 ft-lbs (244 Nm)**

10. Install wheel and four wheel nuts. Torque wheel nuts to specification.

TORQUE
Wheel Nuts: **120 ft-lbs (163 Nm)**

11. Rotate wheel and check for smooth operation.

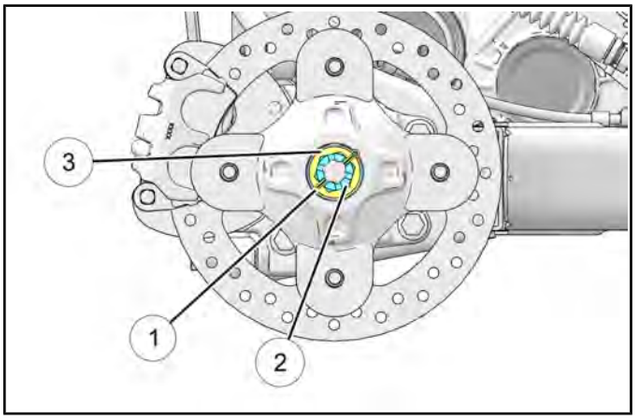
REAR BEARING CARRIER INSPECTION / REMOVAL

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

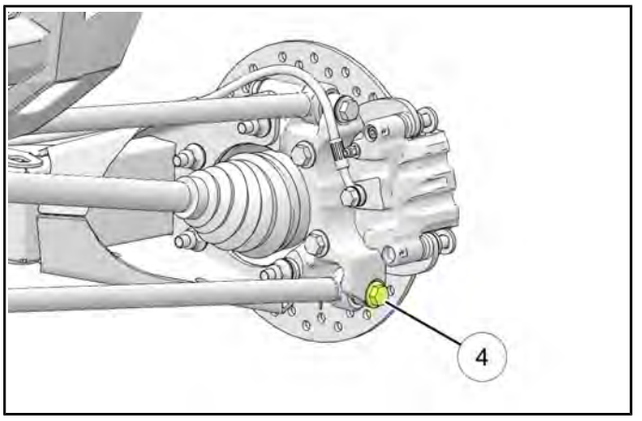
⚠ WARNING

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.

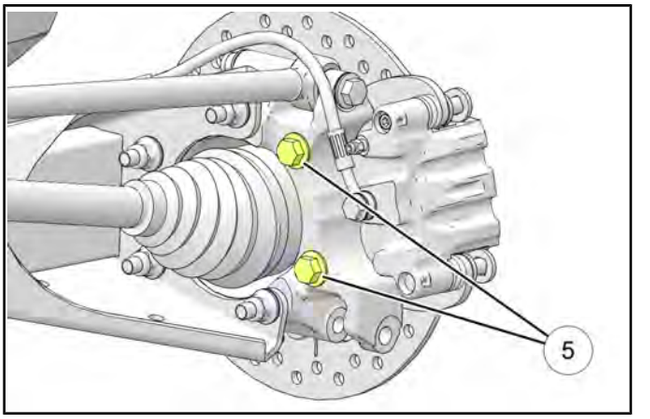
2. Check bearings for side play by grasping the top and bottom of the tire firmly and checking for movement. The tire should rotate smoothly without binding or rough spots.
3. Remove the four wheel nuts and rear wheel.
4. Remove the cotter pin ① and loosen the rear wheel hub castle nut ②. Remove the nut, and two cone washers ③ from the rear wheel hub assembly.



5. Remove the lower radius rod outer mounting bolt ④, nut and washer from the bearing carrier. Swing radius rod down. Discard the nut.



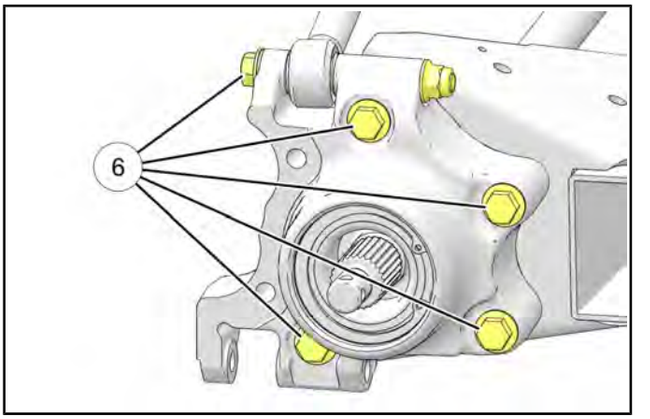
6. Remove the two brake caliper mounting bolts ⑤. Remove the rear brake caliper assembly.



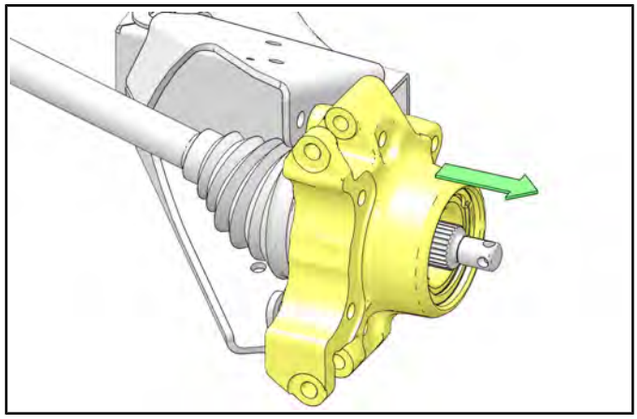
CAUTION

Do not hang the caliper by the brake line. Use wire to hang caliper to prevent damage to the brake line.

7. Remove the rear wheel hub and brake disk assembly.
8. Remove the five remaining bolts ⑥ that attach the rear bearing carrier to the trailing arm. Discard the nuts.



9. Remove the bearing carrier from the rear drive shaft and trailing arm.



10. Rotate bearing by hand and check for smooth rotation. Visually inspect bearing for moisture, dirt, or corrosion.

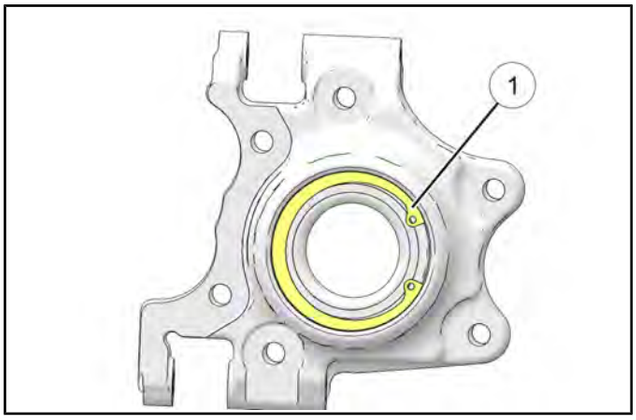
NOTICE
Due to extremely close tolerances and minimal wear, the bearings must be inspected visually, and by feel. While rotating bearings by hand, inspect for rough spots, discoloration, or corrosion. The bearings should turn smoothly and quietly, with no detectable up and down movement and minimal movement sideways between inner and outer race.

11. Replace bearing if moisture, dirt, corrosion, or roughness is evident.

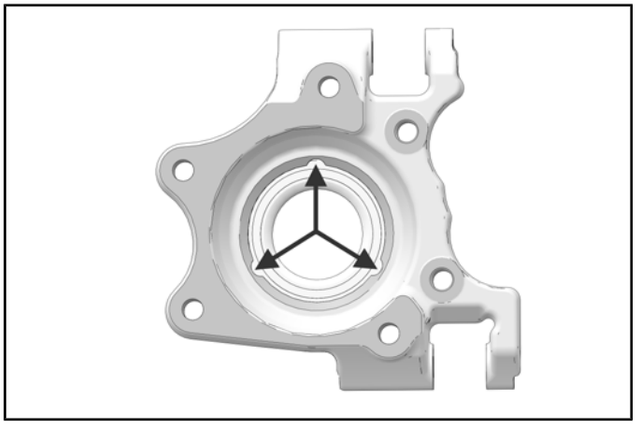
REAR BEARING REPLACEMENT

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 rear bearing carrier if damaged.

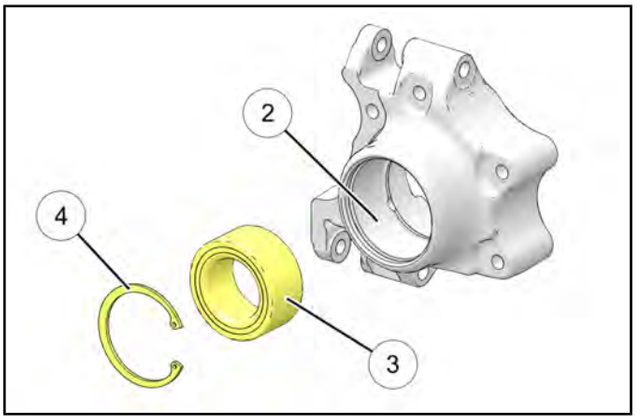
Bearing Installation

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, otherwise bearing damage may occur.

8

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.



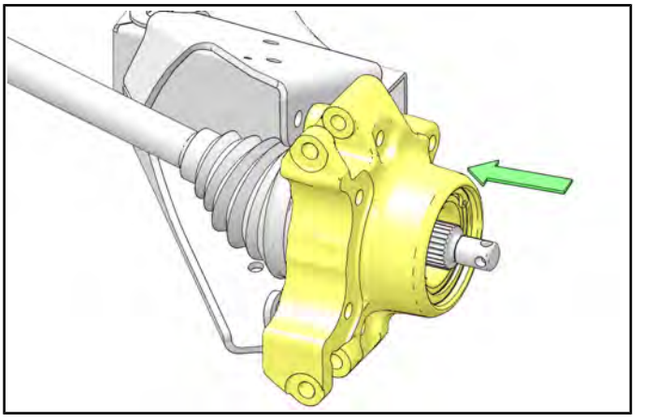
NOTICE

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.

REAR BEARING CARRIER INSTALLATION

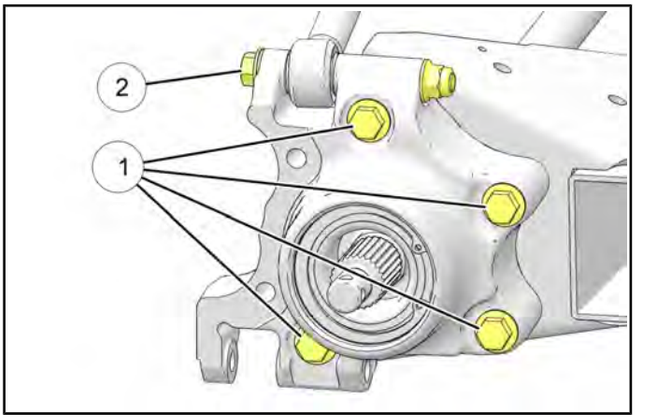
1. Install drive shaft through the backside of the bearing carrier.



2. Install the four fasteners ① that attach the rear bearing carrier to the trailing arm. Install the one fastener ② that attaches the upper radius rod to the bearing carrier. Torque bolts to specification.

NOTICE

Use new nuts upon installation of the rear bearing carrier.



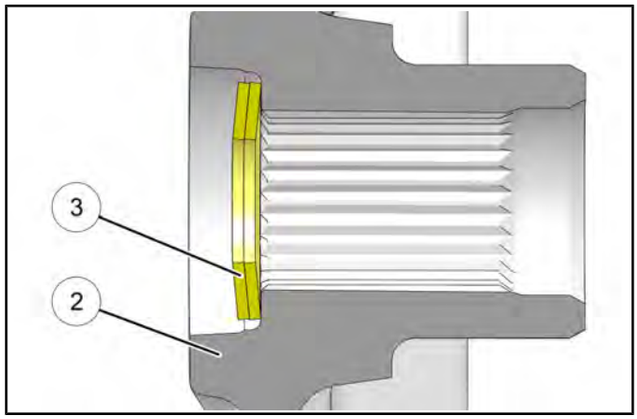
TORQUE

Bearing Carrier to Trailing Arm Bolts:
42 ft-lb (54 Nm)

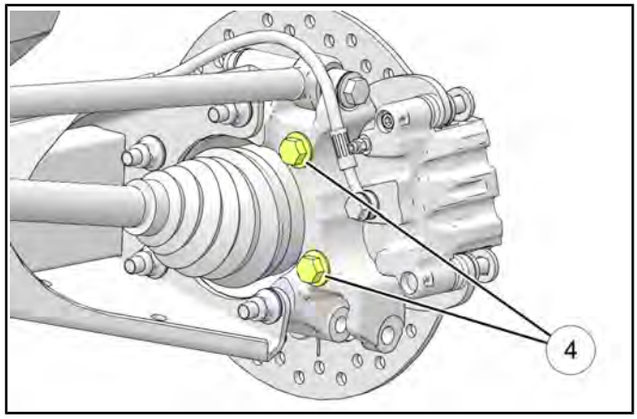
Radius Rod to Bearing Carrier Fasteners:
50 ft-lb (68 Nm) + 45°

3. Apply anti-seize to drive shaft splines.

4. Install rear wheel hub assembly ②, cone washers ③, and hand tighten the castle nut. Install washers with domed side out.

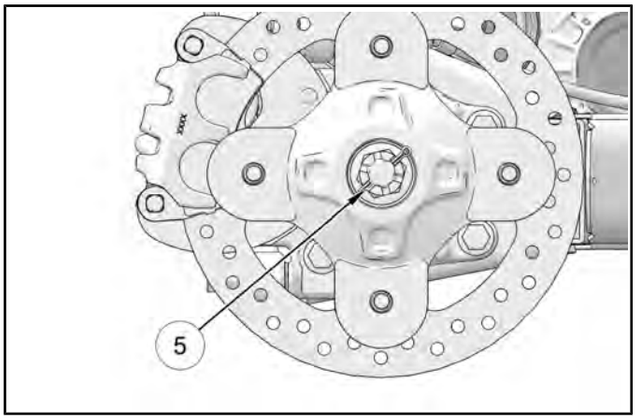


5. Install the rear brake caliper assembly and new bolts ④. Torque to specification.



TORQUE
Rear Caliper Mounting Bolts: **46 ft-lbs (62 Nm)**

6. Torque wheel hub nut to specification and install a **new** cotter pin ⑤. Tighten nut slightly if necessary to align cotter pin holes.



TORQUE
Hub Castle Nut: **180 ft-lbs (244 Nm)**

7. Install wheel and four wheel nuts. Torque wheel nuts to specification.

TORQUE
Wheel Nuts: **120 ft-lbs (163 Nm)**

8. Rotate wheel and check for smooth operation. Bend both ends of cotter pin around end of spindle in different directions.

DRIVE SHAFT

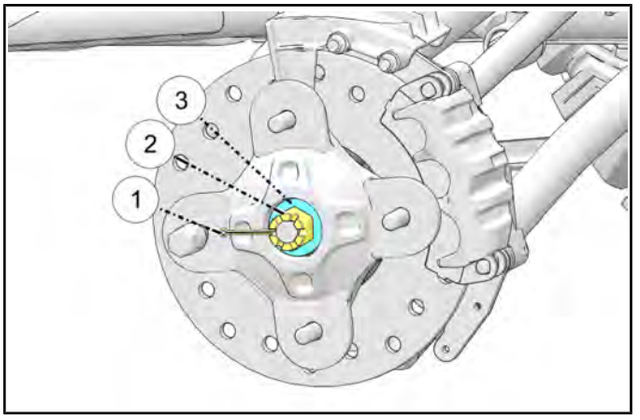
FRONT DRIVE SHAFT REMOVAL

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

⚠ CAUTION

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 wheels 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 washer ③ from the front wheel hub assembly.

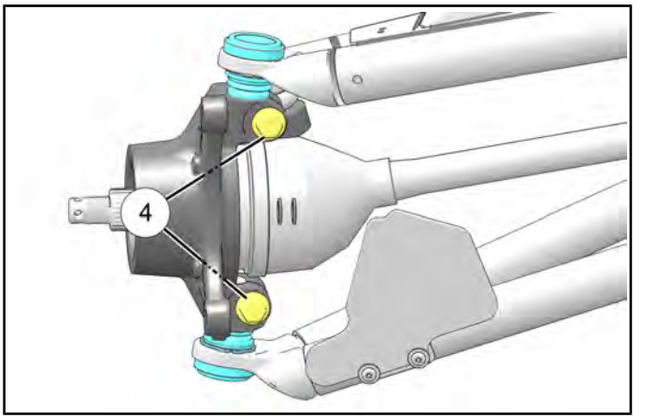


4. Remove and discard the two front brake caliper mounting bolts and remove the caliper from the brake disc. Refer to Front Brake Caliper Removal page 10.16 in the Brake System chapter.

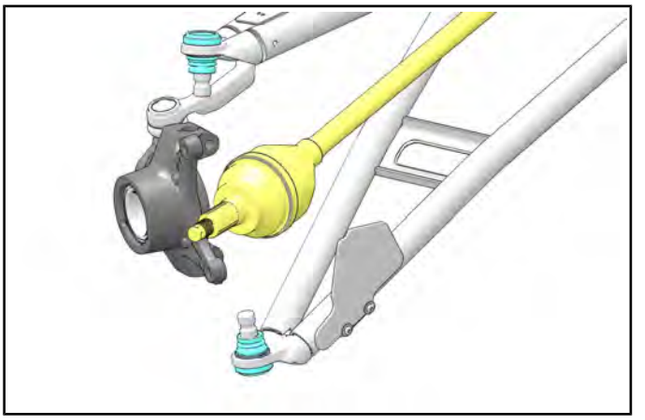
CAUTION

Do not hang the caliper by the brake line. Use wire to hang caliper to prevent damage to the brake line.

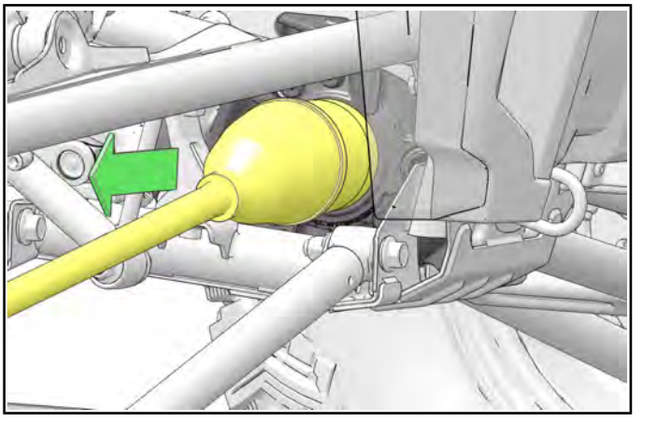
5. Remove the front wheel hub assembly.
6. Remove and discard the upper and lower ball joint pinch bolts ④ and nuts.



7. Using a soft faced hammer, lightly tap on the bearing carrier while removing the upper the joint end.
8. Remove the drive shaft from the front bearing carrier.

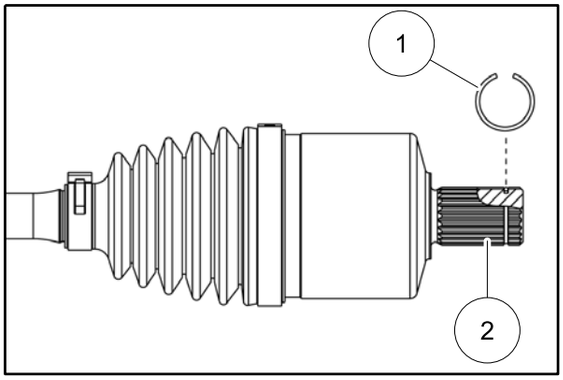


9. With a short, sharp jerk, remove drive shaft from the front gearcase.

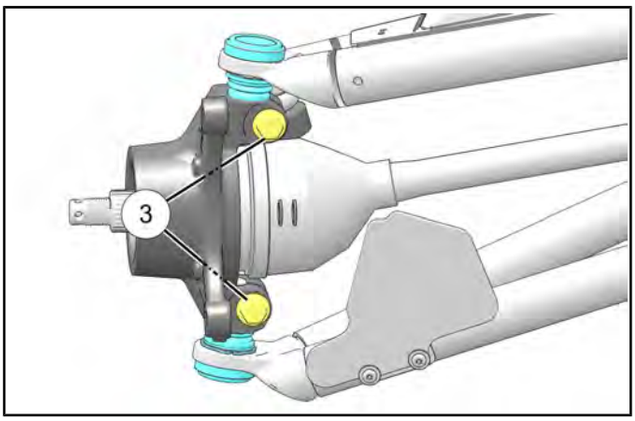


FRONT DRIVE SHAFT INSTALLATION

1. Install **new** spring ring ① on drive shaft. Apply an anti-seize compound to the splines ②.

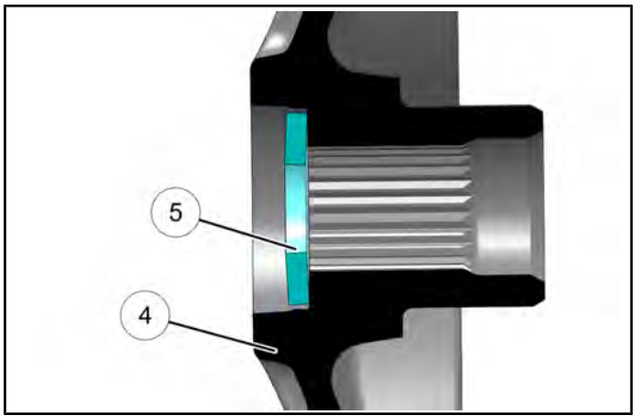


2. Align splines of drive shaft with front gearcase and reinstall the drive shaft. Use a rubber mallet to tap on the outboard end of the drive shaft if necessary
3. Install drive shaft into the front bearing carrier.
4. Install the upper and lower ball joint ends into the front bearing carrier.
5. Install **new** pinch bolts and nuts ③. Torque to specification.

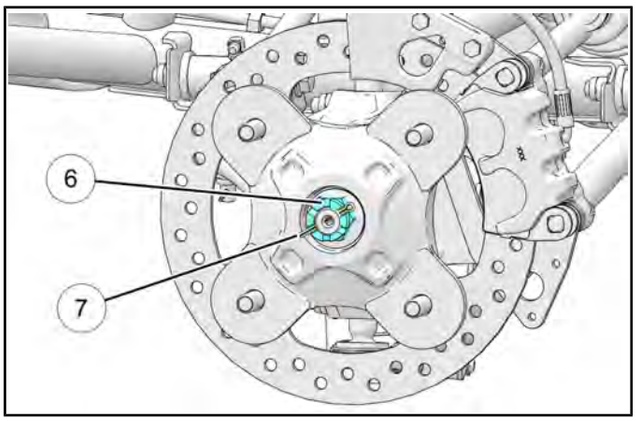


TORQUE
Ball Joint Fasteners: **42 ft-lbs (57 Nm)**

6. Apply Anti-Seize to drive shaft axle splines.
7. Install front wheel hub assembly ④, cone washer ⑤, and hand tighten the castle nut. Install washer with domed side out.



8. 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.



TORQUE
Wheel Hub Castle Nut: **180 ft-lbs (244 Nm)**

9. Install **new** brake caliper mounting bolts and torque to specification.

TORQUE
Front Caliper Mounting Bolts: **30 ft-lb (41 Nm)**

CAUTION
New bolts have a pre-applied locking agent which is destroyed upon removal. Always use new brake caliper mounting bolts upon assembly.

10. Install wheel and four wheel nuts. Torque wheel nuts to specification.

TORQUE
Wheel Nuts: **120 ft-lbs (163 Nm)**

11. Rotate wheel and check for smooth operation.

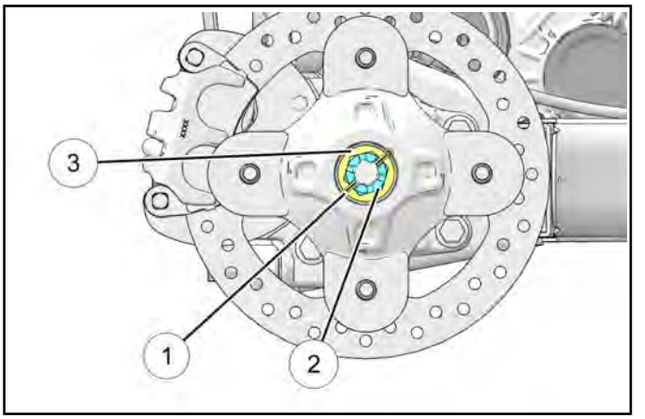
REAR DRIVE SHAFT REMOVAL

1. Raise and support the vehicle.

⚠ CAUTION

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

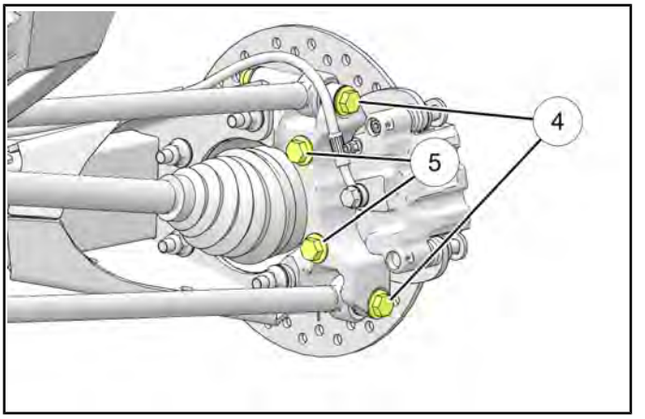
2. Remove the four wheel nuts and rear wheel.
3. Remove the cotter pin ① and loosen the rear wheel hub castle nut ②. Remove the nut, and cone washer (s) ③ from the rear wheel hub assembly.



4. Remove the two bolts ④ retaining the upper and lower radius rods to the bearing carrier. Discard the nuts. Let the radius rods swing downward.
5. Remove the brake caliper mounting bolts ⑤. Remove the rear brake caliper assembly.

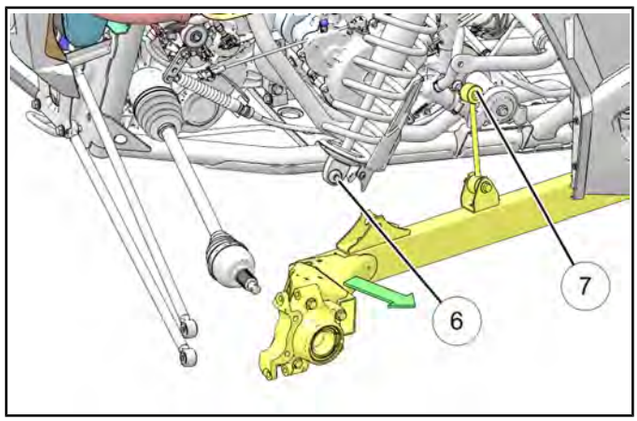
CAUTION

Do not hang the caliper by the brake line. Use wire to hang caliper to prevent damage to the brake line.

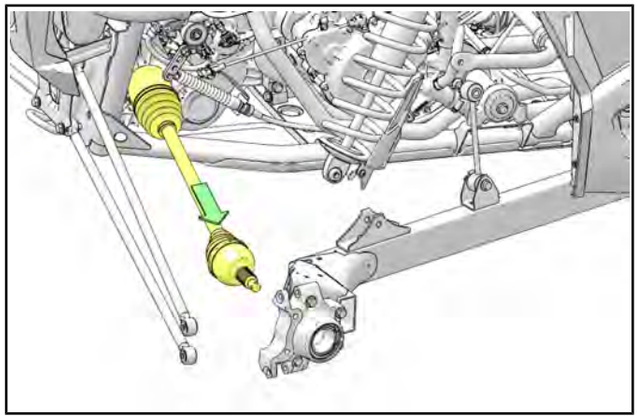


6. Remove the rear hub assembly from the bearing carrier.
7. Support the trailing arm from underneath.

8. Remove the lower shock mounting bolt and nut ⑥. Swing the shock inward. Discard the nut.
9. Remove the stabilizer bar mounting bolt, washer and nut ⑦. Discard the nut.
10. Lift the trailing arm assembly upward so the rear drive shaft is parallel with the ground.
11. Leaving the drive shaft in the transmission, swing the rear trailing arm assembly outward until it is free from the rear drive shaft.
12. Lower the trailing arm.

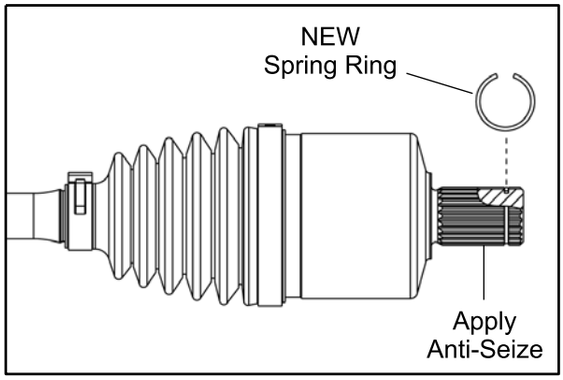


13. With a short, sharp jerk, remove drive shaft from the transmission splines.

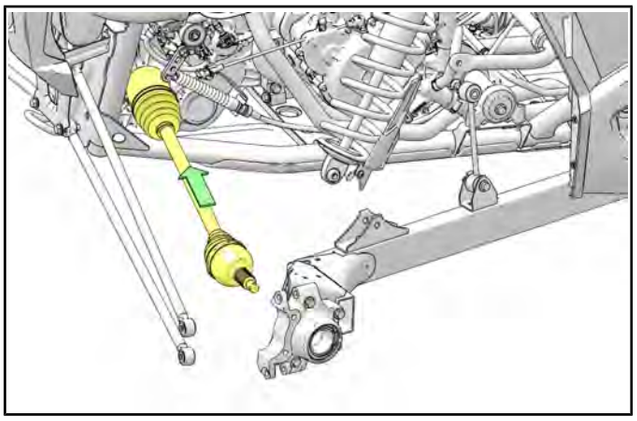


REAR DRIVE SHAFT INSTALLATION

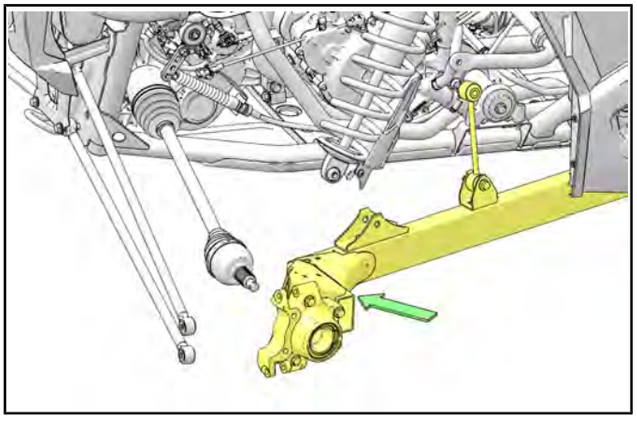
1. Install **new** spring ring ① on drive shaft. Apply an anti-seize compound to the splines ②.



2. Align splines of drive shaft with transmission splines and reinstall the drive shaft. Use a rubber mallet to tap on the outboard end of the drive shaft if necessary.



3. Swing the rear trailing arm assembly outward and upward until the rear axle can be inserted into the bearing carrier. Support the trailing arm from underneath.



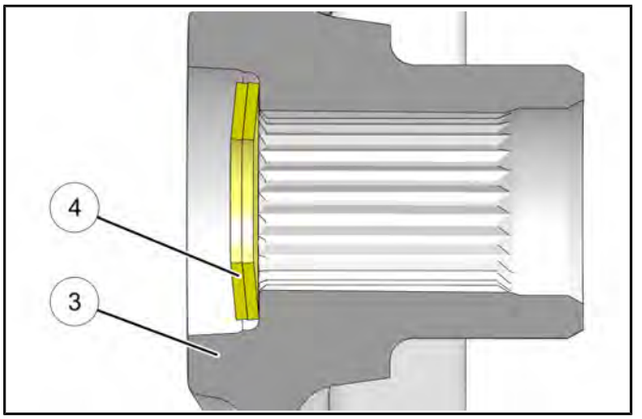
4. Install the stabilizer bar mounting bolt, washer and **new** nut. Torque fastener to specification.

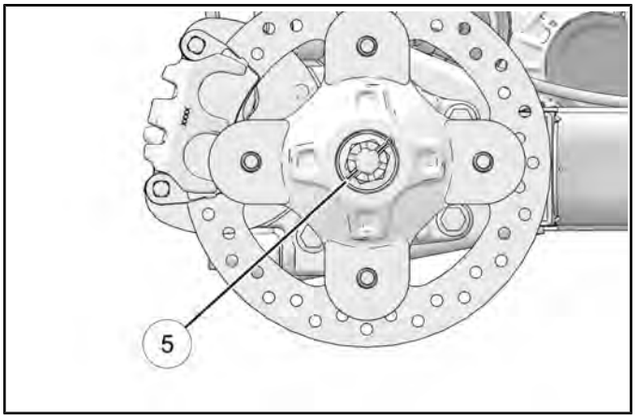
TORQUE
Lower Shock Bolt to Trailing Arm: **70 ft-lbs (95 Nm)**

5. Install the stabilizer bar mounting bolt, washer and **new** nut. Torque fastener to specification.

TORQUE
Stabilizer Bar Linkage: **42 ft-lbs (57 Nm)**

6. Apply Anti-Seize to drive shaft axle splines.
7. Install rear wheel hub assembly ③. Install the cone washer ④ and castle nut. Torque castle nut to specification. Install new cotter pin ⑤.



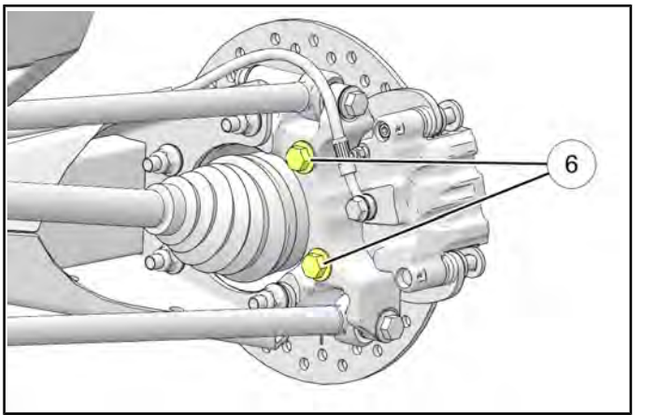


TORQUE
Rear Hub Castle Nut: **180 ft-lbs (244 Nm)**

8. Install the radius rod bolts, washers and **new** nuts. Torque fasteners to specification.

TORQUE
Radius Rods to Bearing Carrier: **50 ft-lb (68 Nm) + 45°**

9. Install the rear brake caliper assembly and **new** bolts ⑥. Torque to specification.



TORQUE
Rear Caliper Mounting Bolts: **46 ft-lbs (62 Nm)**

10. Install wheel and four wheel nuts. Torque wheel nuts to specification.

TORQUE
Wheel Lug Nuts: **120 ft-lbs (163 Nm)**

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.

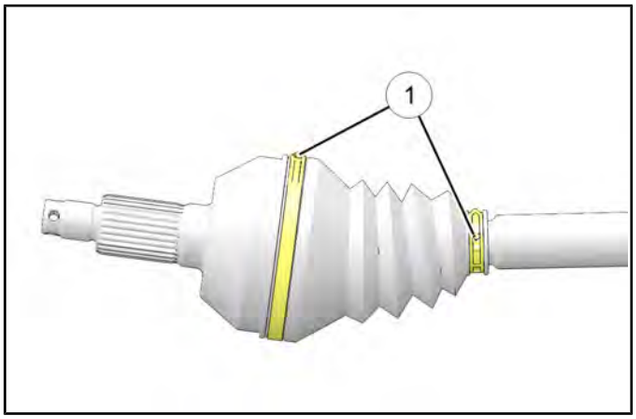
Cleanliness and following these instructions is very important to ensure proper shaft function and a normal service life.

- 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.

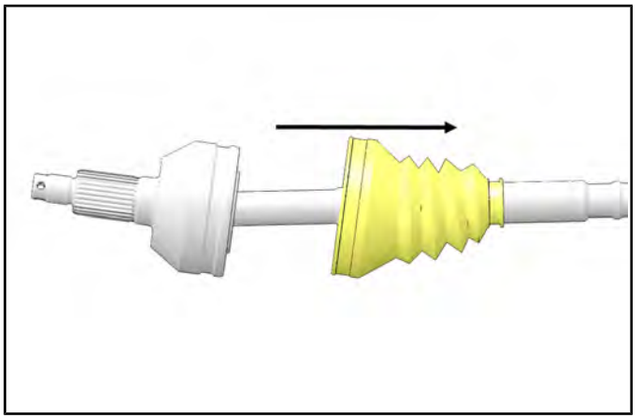
OUTER CV BOOT REPLACEMENT

NOTICE
Outer CV Joint replacement is not recommended. If the outer joint is damaged, a new half shaft assembly should be installed.

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.

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.

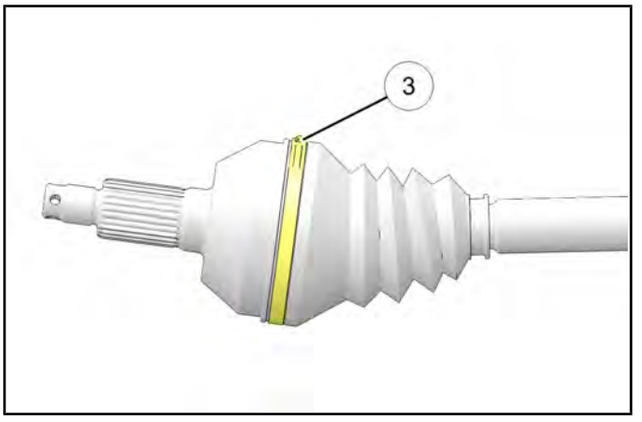
8

4. The CV joint is fitted with a circlip at the end of the shaft inside the housing. The shaft is likely to be damaged from striking the cage / race to separate the CV joint from the shaft. It is recommended to replace the entire half shaft assembly if there is damage to the outer joint.
5. Remove the plunging joint from the shaft to remove the CV boot.
6. Slide the boot clamp and boot (large end first) onto the plunging joint end of the drive shaft and position the boot in it's groove machined in the shaft.
7. 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.

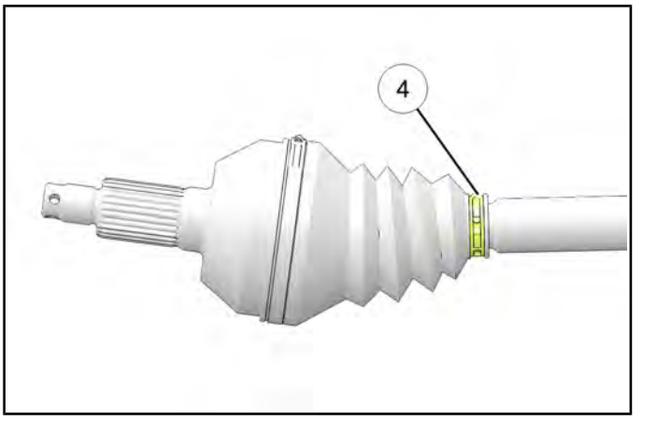
NOTICE
The amount of grease provided in the boot kit is pre-measured. Use entire contents of package.

8. Remove excess grease from the CV joint's external surfaces and place the excess grease in the boot.
9. 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.
10. Install and tighten the large clamp ③ using the appropriate clamp tool.



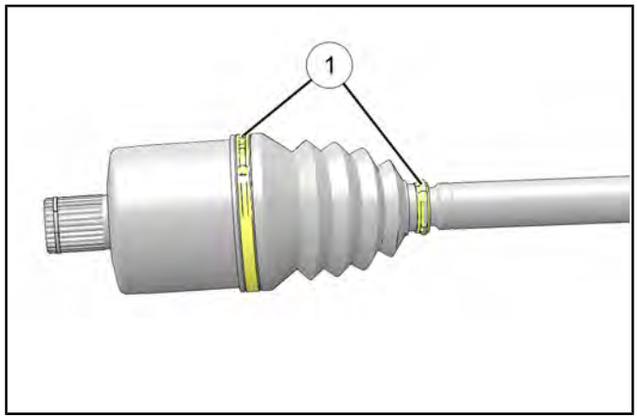
Axle Boot Clamp Tool: PU-48951
or
CV Boot Clamp Pliers: 8700226

11. 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.
12. Install and tighten the small clamp ④ on the boot using the appropriate clamp tool.

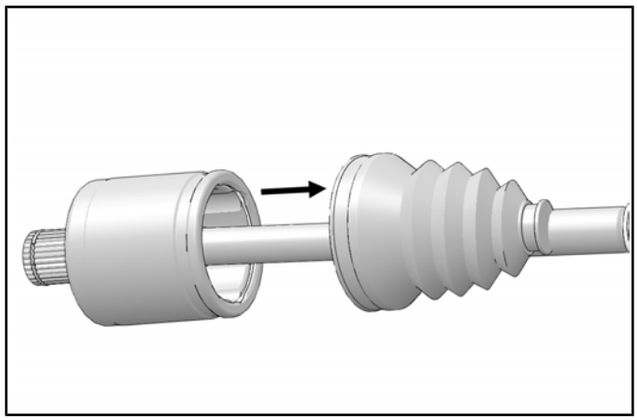


INNER PLUNGING JOINT / BOOT REPLACEMENT

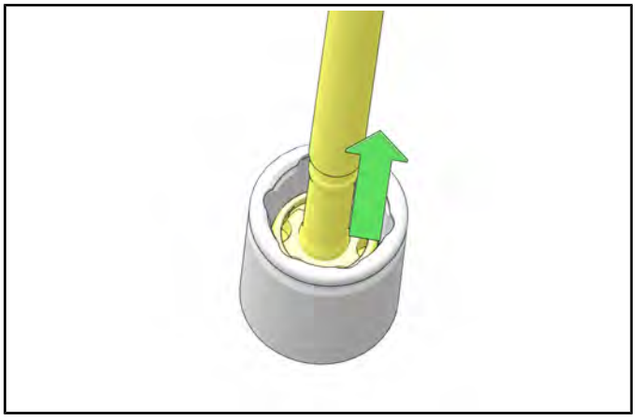
1. Use a side cutters to cut and discard the boot clamps ①.



2. Remove the large end of the boot from the plunging joint and slide the boot down the shaft.

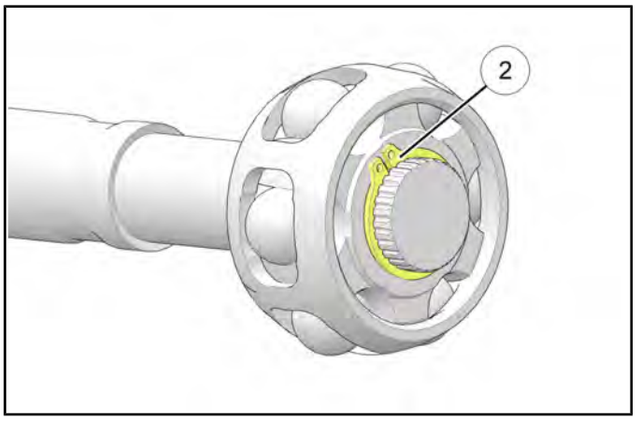


3. Remove the large circlip near the boot end of the plunging joint.
4. Clean the grease from the face of the joint.
5. Pull the shaft / joint straight out from the housing.



CAUTION
Do NOT strike the joint with a hammer.

6. Remove the snap ring ② retaining the cage / ball assembly and remove the assembly from the shaft.

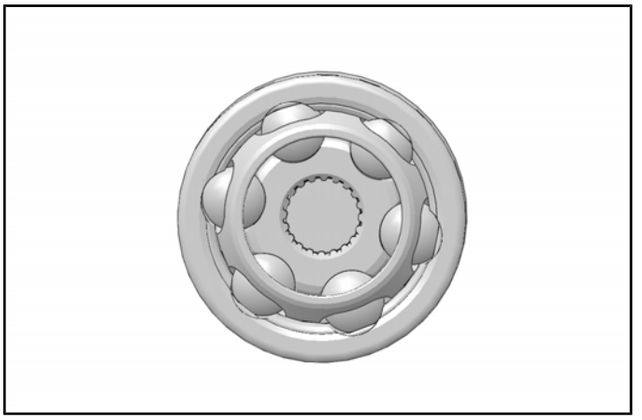


7. Remove the boot from the shaft.

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.

8. 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.

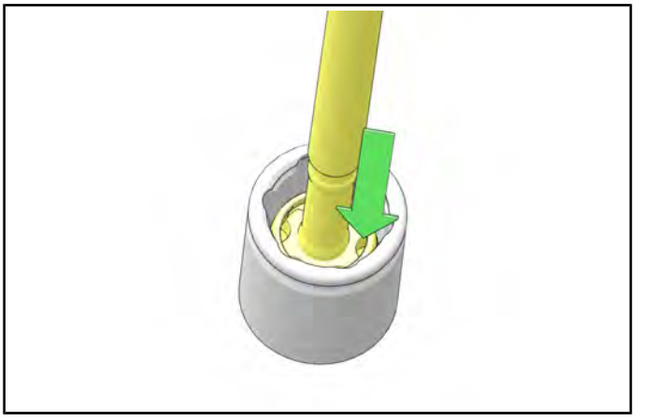


9. Visually inspect the joint for damage. Replace if needed.
10. Clean the splines on the end of the shaft and apply a light coat of grease prior to reassembly.
11. Slide the small boot clamp and boot (small end first) onto the drive shaft and position the boot in its groove machined in the shaft.
12. Install the cage / ball assembly on the shaft and install a **new** snap ring on the end of the shaft.
13. 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.

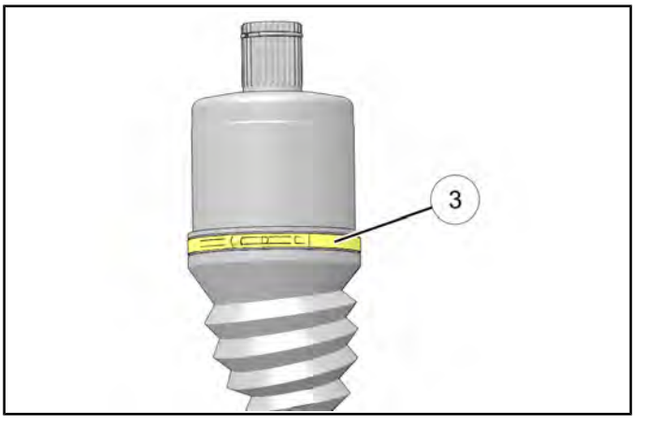
NOTICE
The amount of grease provided in the boot kit is pre-measured. Use entire contents of package.

14. Slide the joint and shaft into the housing.



CAUTION
DO NOT hammer on the joint to install it in the housing.

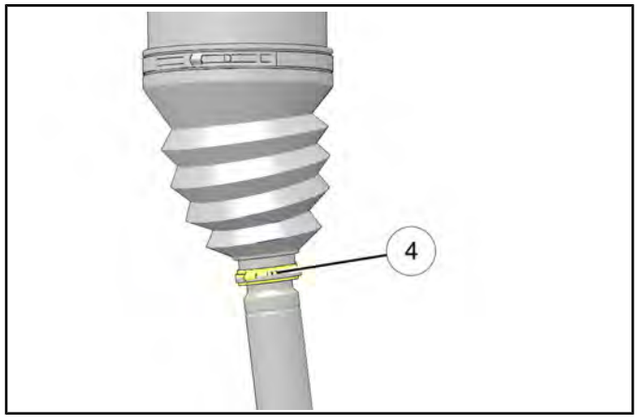
15. Install the large circlip into the groove of the plunging joint housing.
16. Remove excess grease from the CV joint's external surfaces and place the excess grease in the boot.
17. Pull the boot over the joint and position the boot lips into the grooves on the joint housing and shaft. Make sure the 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. 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.

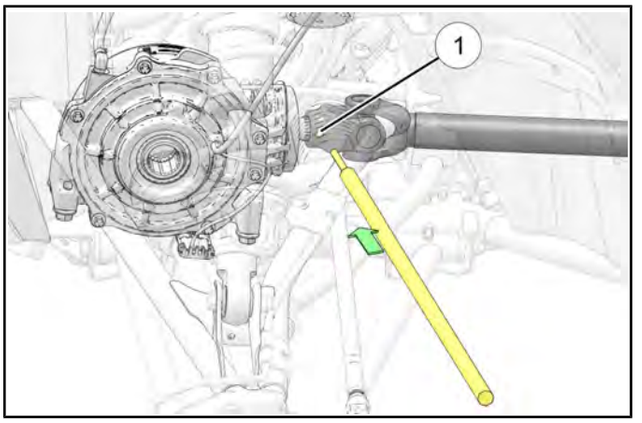
20. Position the boot lip in its groove. Install and tighten the small clamp ④ using the appropriate clamp tool.



PROP SHAFT

PROP SHAFT REMOVAL (XP)

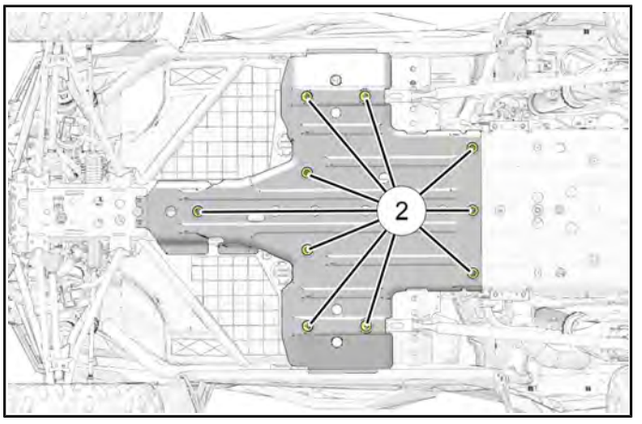
1. **If removing the front prop shaft**, Locate the prop shaft roll pin ① and use the Roll Pin Removal Tool to remove the roll pin. Discard roll pin. Push the front prop shaft rearward to remove it from the front gearcase input shaft.



Roll Pin Removal Tool: **2872608**

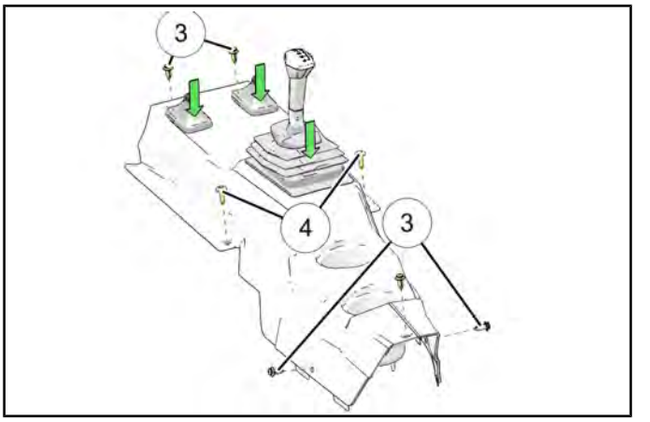
NOTICE
Right front wheel can be removed to gain better access to the prop shaft roll pin.

2. Remove the fasteners ② retaining the front skid plate.

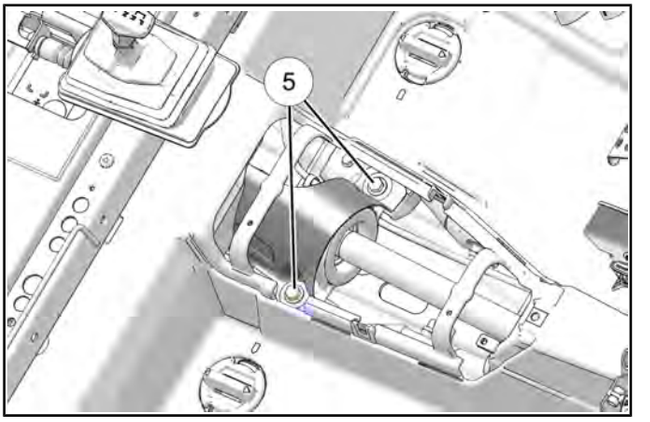


3. Remove the seats.

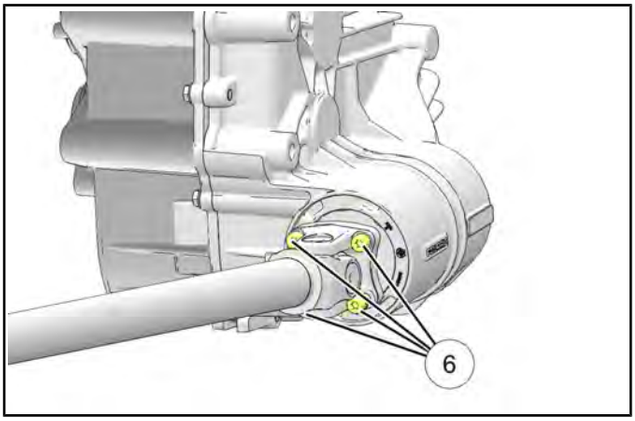
4. Remove push rivets ③ and the torx screws ④ retaining the center console. Push the rubber boots around the seat belt buckles and the shifter through the center console to remove the console.



5. Remove the two fasteners ⑤ retaining the prop shaft bearing isolator.



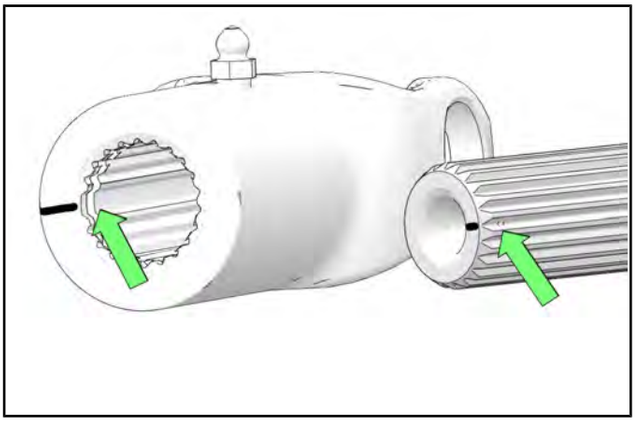
6. Remove the four fasteners ⑥ retaining the rear prop shaft to the transmission coupler. Discard the fasteners. Move the prop shaft off the coupler towards the outside of the vehicle.



IMPORTANT

The coupler fasteners have patch lock on the threads and must be replaced any time they are removed.

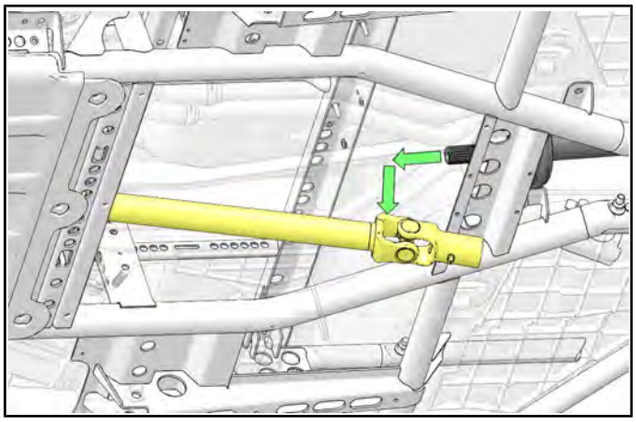
7. Mark the front and rear prop shaft for reassembly.



NOTICE

The prop shafts have a master spline and will only go on one way.

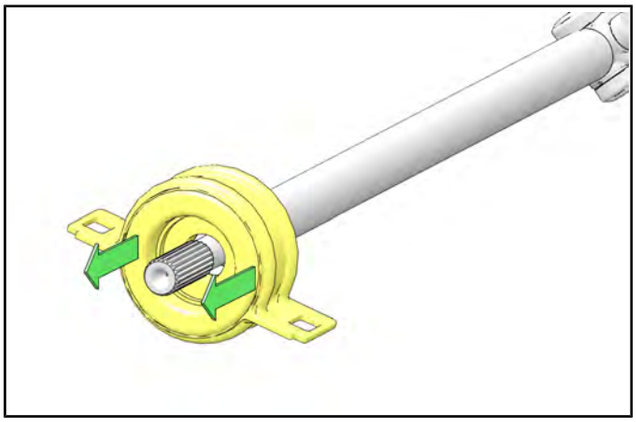
8. From under the vehicle, disengage the rear prop shaft from the front prop shaft and remove the rear prop shaft out the bottom of the vehicle.



NOTICE

Move the front prop shaft as far towards the front of the vehicle as possible to allow the rear prop shaft yoke to disengage from the splines on the front prop shaft.

9. For front prop shaft removal, pull the bearing isolator towards the rear of the vehicle to disengage it from the prop shaft.

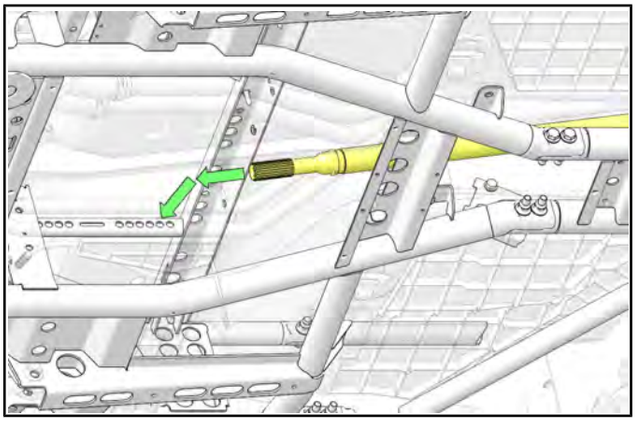


NOTICE

The front prop shaft cannot be removed with the isolator installed.

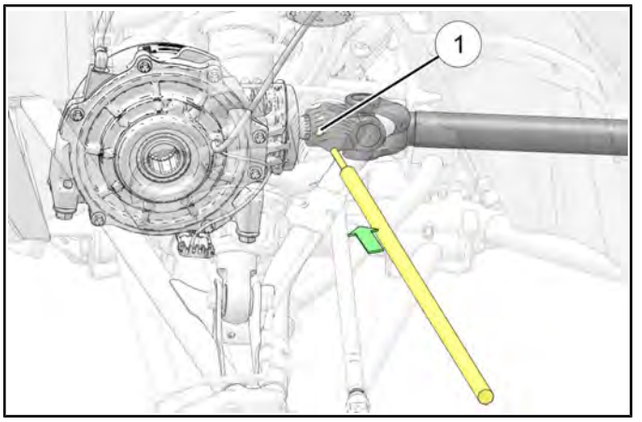
8

10. Remove the front prop shaft out the bottom of the vehicle.



PROP SHAFT REMOVAL (XP4)

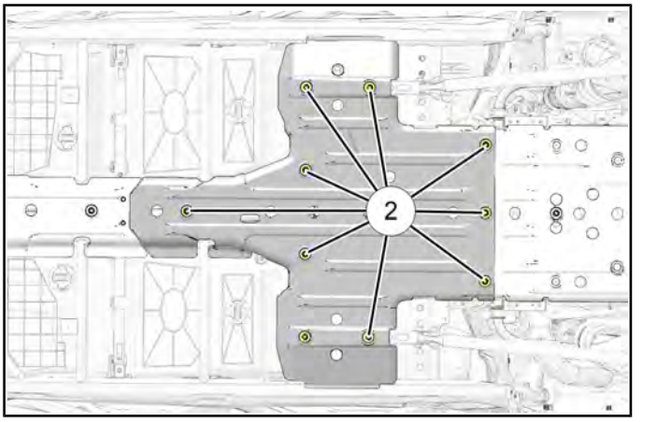
1. **If removing the front prop shaft**, Locate the prop shaft roll pin ① and use the Roll Pin Removal Tool to remove the roll pin. Discard roll pin. Push the front prop shaft rearward to remove it from the front gearcase input shaft.



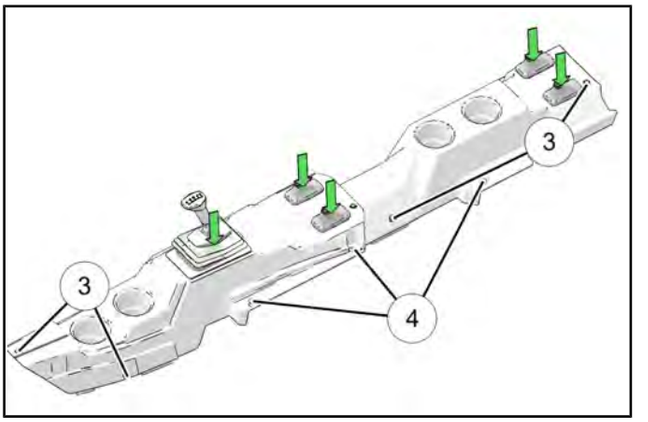
Roll Pin Removal Tool: **2872608**

NOTICE
Right front wheel can be removed to gain better access to the prop shaft roll pin.

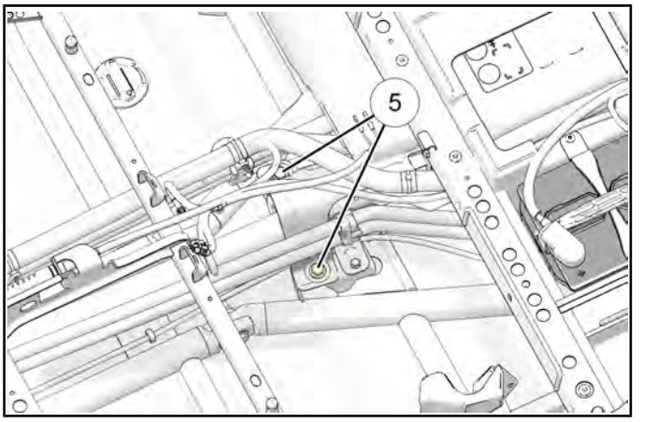
2. Remove the fasteners ② retaining the front skid plate.



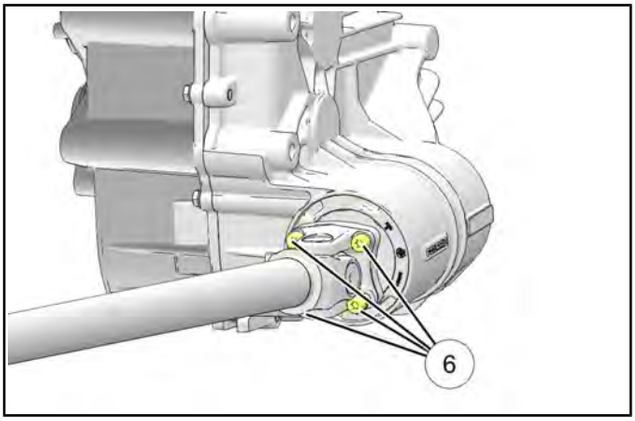
3. Remove the seats.
4. Remove push rivets ③ and the torx screws ④ retaining the front and rear center consoles. Push the rubber boots around the seat belt buckles and the shifter through the center console to remove the console.



5. Remove the two fasteners ⑤ retaining the prop shaft bearing isolator.



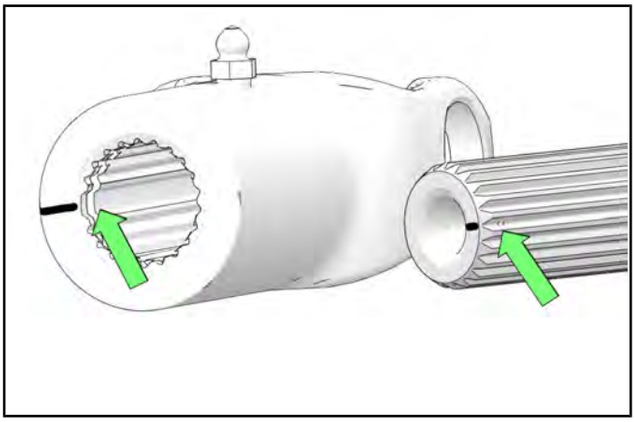
6. Remove the four fasteners ⑥ retaining the rear prop shaft to the transmission coupler. Discard the fasteners. Move the prop shaft off the coupler towards the outside of the vehicle.



IMPORTANT

The coupler fasteners have patch lock on the threads and must be replaced any time they are removed.

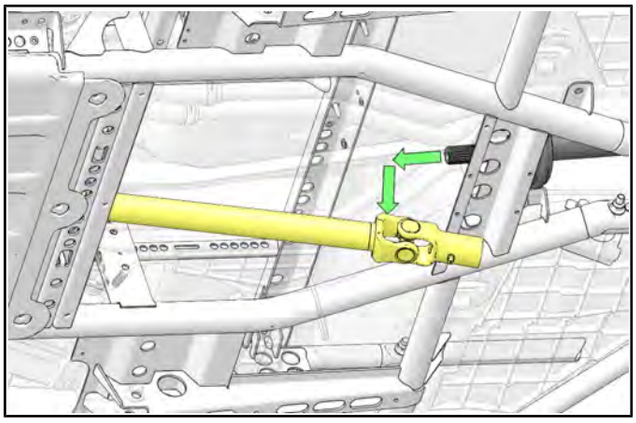
7. Mark the front and rear prop shaft for reassembly.



NOTICE

The prop shafts have a master spline and will only go on one way.

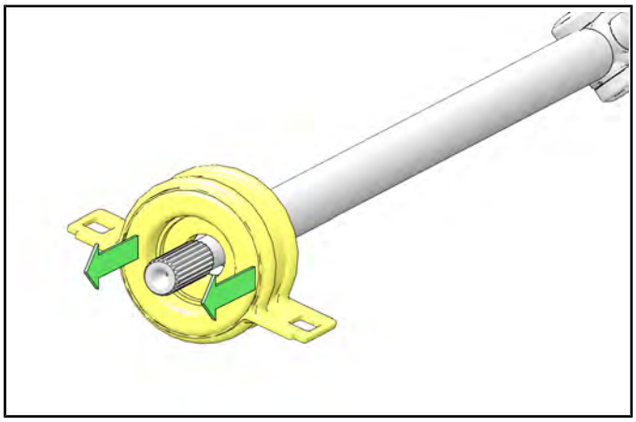
8. From under the vehicle, disengage the rear prop shaft from the front prop shaft and remove the rear prop shaft out the bottom of the vehicle.



NOTICE

Move the front prop shaft as far towards the front of the vehicle as possible to allow the rear prop shaft yoke to disengage from the splines on the front prop shaft.

9. For front prop shaft removal, pull the bearing isolator towards the rear of the vehicle to disengage it from the prop shaft.

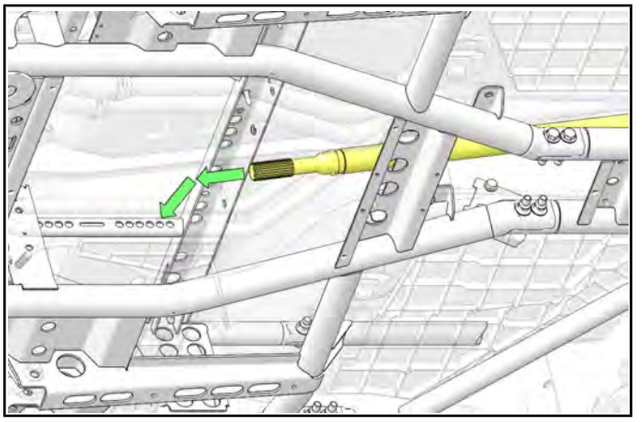


NOTICE

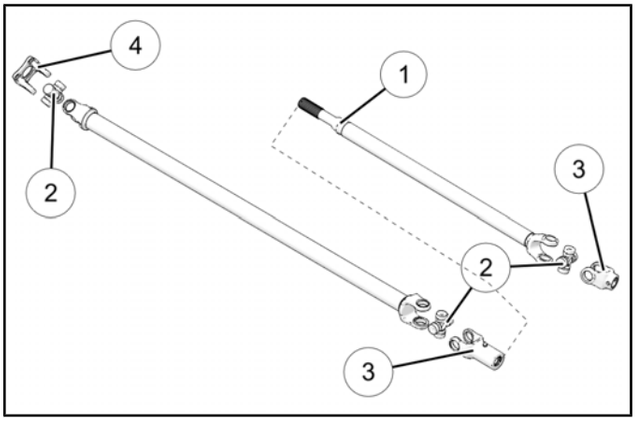
The front prop shaft cannot be removed with the isolator installed.

8

10. Remove the front prop shaft out the bottom of the vehicle.



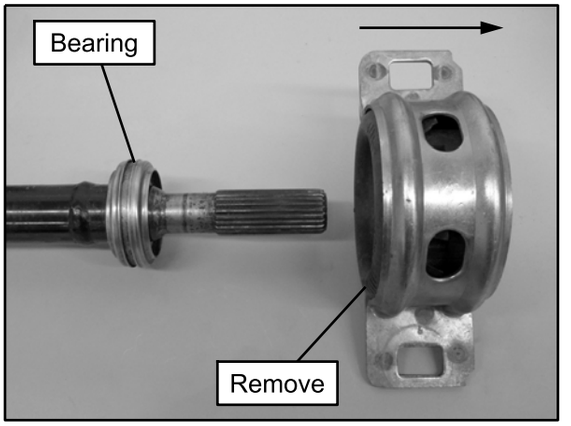
PROP SHAFT ASSEMBLY VIEW



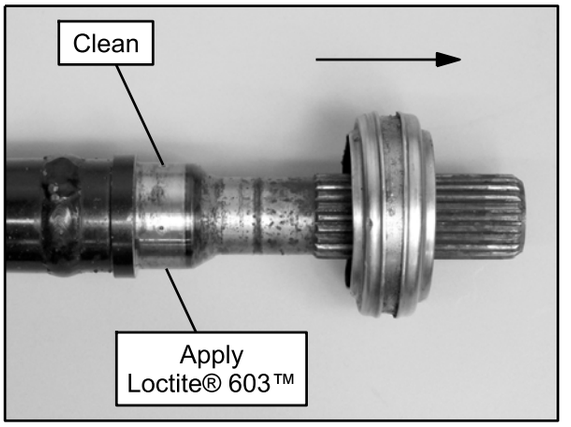
① Support Bearing (not replaceable)	③ Slip Yoke
② Cross & Bearing	④ Transmission Coupler Yoke

SUPPORT BEARING REPLACEMENT

1. Remove the rear prop shaft from the vehicle (see Chapter 7 – Rear Prop Shaft Removal page).
2. Using a rubber mallet, remove the rubber isolated bearing support from the shaft to expose the bearing.

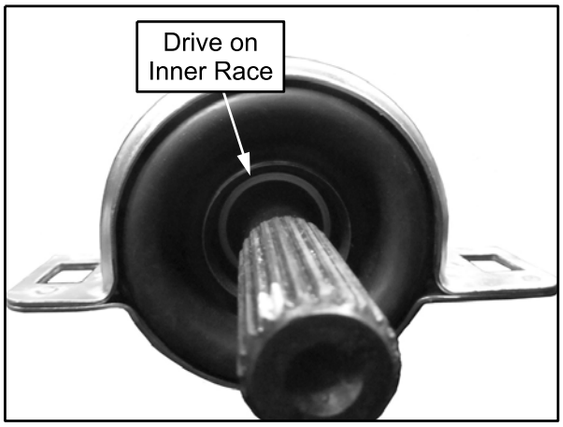


3. Using a commercially available 2-jaw puller, remove the bearing from the end of the prop shaft.
4. Clean the bearing mounting surface on the shaft and apply **Loctite® 603™** retaining compound to the clean surface.



5. Install the new support bearing assembly onto the end of the prop shaft.

6. Using an appropriate bearing/bushing installation sleeve, drive the support bearing assembly onto the prop shaft until it seats against the shoulder on the shaft.



NOTICE
Only drive on the inner race of the bearing. Driving on the bearing in any other location will damage the bearing.

7. Wipe the bearing and shaft clean of any excess retaining compound.

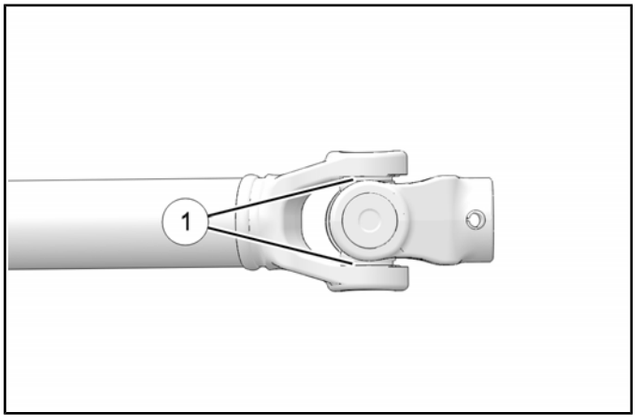
NOTICE
Do not allow any Loctite® to get in the bearing.

8. Install the rear prop shaft into the vehicle (see Chapter 7 – Rear Prop Shaft Installation page).

U-JOINT DISASSEMBLY

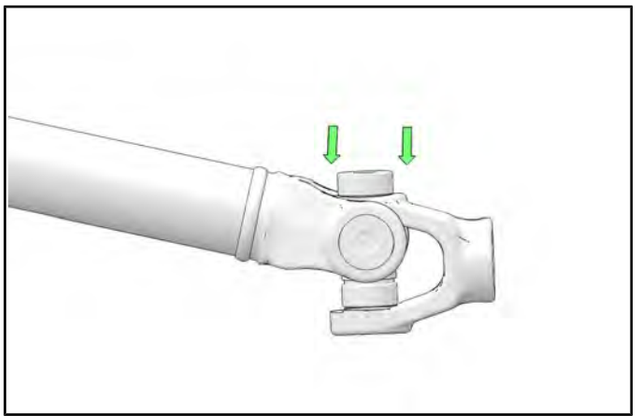
⚠ CAUTION
Always wear eye protection.

1. Remove internal snap ring ① from all four bearing caps.



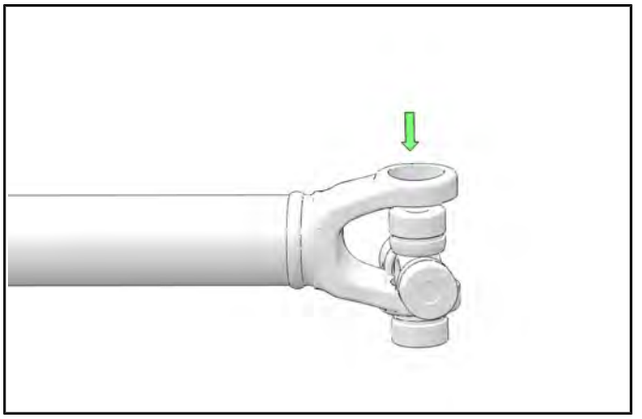
NOTICE
If yoke or bearing is removed, cross bearing must be replaced. Note orientation of grease fitting (if equipped) and mark inner and outer yoke for correct re-positioning during installation.

2. Support inner yoke as shown and drive outer yoke down (bearing cap out) with a suitable press.



8

3. Support U-joint and press inner yoke down to remove remaining bearing caps.



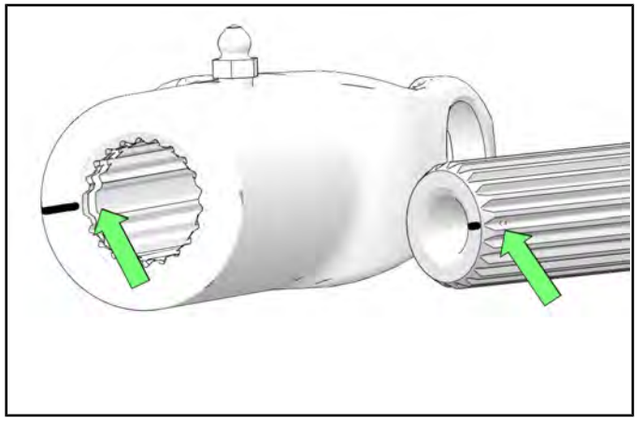
4. Force U-joint cross to one side and lift out of inner yoke.

U-JOINT ASSEMBLY

1. Install new bearing caps in yoke by hand. Carefully install U-joint cross. Tighten vise or use a press to force bearing caps in.
2. Using a suitable arbor, fully seat bearing cap in one side. Continually check for free movement of bearing cross as bearing caps are assembled.
3. Install snap ring to contain bearing cap just installed. Repeat procedure for other side.
4. Install outer yoke, aligning marks made before disassembly.
5. Repeat Steps 1-3 to install bearing caps on outer yoke.
6. Seat all bearing caps against snap rings.
7. When installation is complete, yokes must pivot freely in all directions without binding. If the joint is stiff or binding, tap the yoke lightly to center the joint until it pivots freely in all directions.

PROP SHAFT INSTALLATION (XP)

1. Install front prop shaft first and properly align the hole in the front yoke with the input shaft hole.
2. Install the support bearing isolator from the top side. Lubricate the rubber isolator to ease with the install over the prop shaft bearing.
3. Install the rear prop shaft from the bottom. Line up the master spline on the front prop shaft to the rear shaft.



4. Install the rear prop shaft coupler on the transmission output shaft. Torque **new** fasteners to specification.

TORQUE
Rear Prop Shaft Coupler Fasteners: **22 ft-lb (30 ft-lb)**

IMPORTANT
The coupler fasteners have patch lock on the threads and must be replaced any time they are removed.

5. Install the isolator mounting fasteners. Torque fasteners to specification.

TORQUE
Prop Shaft Isolator Fasteners: **33 ft-lbs (45 Nm)**

6. Install skid pan. Torque fasteners to specification.

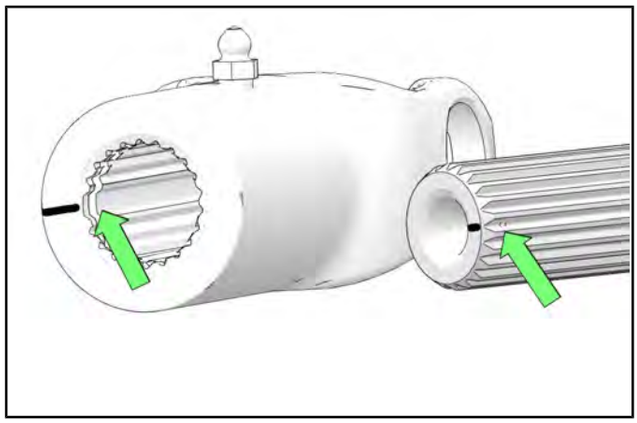
TORQUE
Skid PlateFasteners: **8 ft-lbs (11 Nm)**

7. Install new spring pin in prop shaft to the front gearcase.
8. Install the center console. Torque fasteners to specification.

TORQUE
Center Console Torx Fasteners: **8 ft-lb (11 Nm)**

PROP SHAFT INSTALLATION (XP4)

1. Install front prop shaft first and properly align the hole in the front yoke with the input shaft hole.
2. Install the support bearing isolator from the top side. Lubricate the rubber isolator to ease with the install over the prop shaft bearing.
3. Install the rear prop shaft from the bottom. Line up the master spline on the front prop shaft to the rear shaft.



4. Install the rear prop shaft coupler on the transmission output shaft. Torque **new** fasteners to specification.

TORQUE
Rear Prop Shaft Coupler Fasteners: **22 ft-lb (30 ft-lb)**

IMPORTANT
The coupler fasteners have patch lock on the threads and must be replaced any time they are removed.

5. Install the isolator mounting fasteners. Torque fasteners to specification.

TORQUE
Prop Shaft Isolator Fasteners: **33 ft-lbs (45 Nm)**

6. Install skid pan. Torque fasteners to specification.

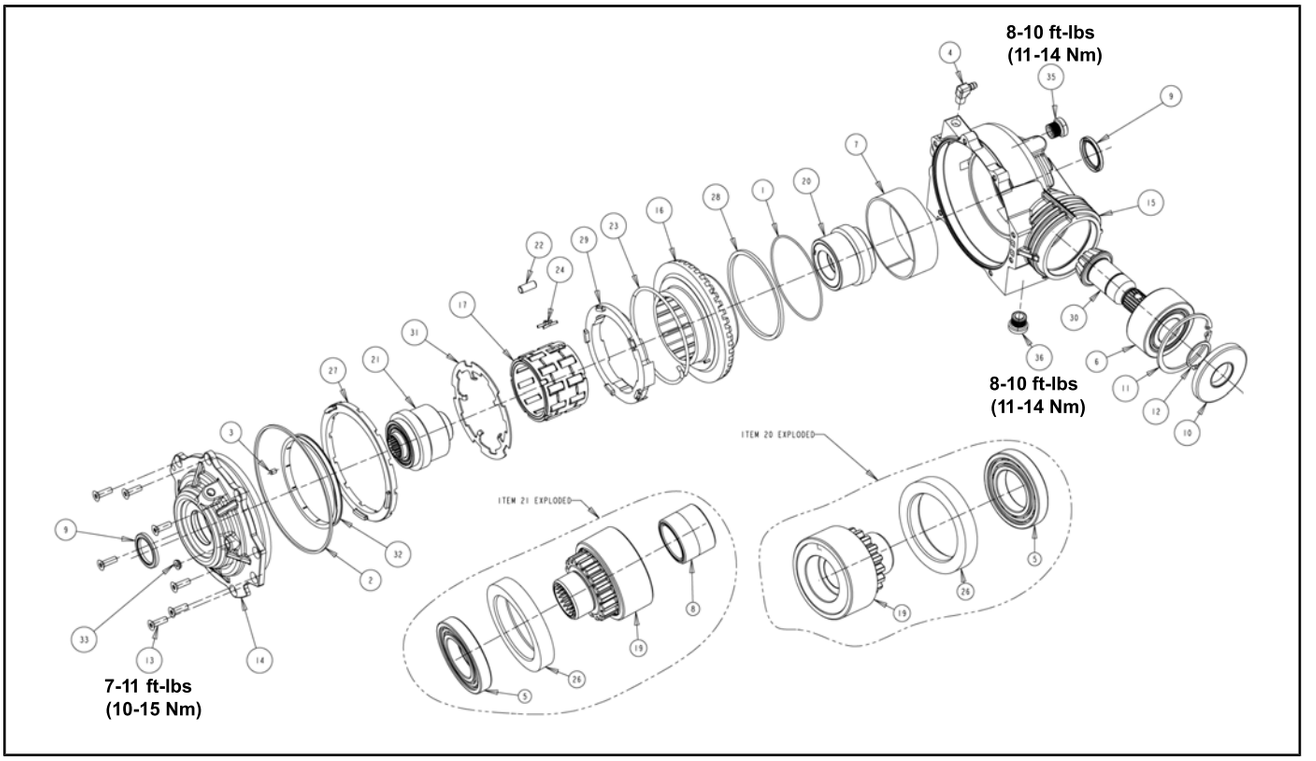
TORQUE
Skid PlateFasteners: **8 ft-lbs (11 Nm)**

7. Install new spring pin in prop shaft to the front gearcase.
8. Install the front and rear center consoles. Torque fasteners to specification.

TORQUE
Center Console Torx Fasteners: **8 ft-lb (11 Nm)**

FRONT GEARCASE / CENTRALIZED HILLIARD

CENTRALIZED HILLIARD ASSEMBLY VIEW



① O-Ring	⑰ Roll Cage
② O-Ring	⑲ Hub / Race Assembly
③ Dowel Pin	⑳ Hub Sub-Assembly (Female)
④ Vent Hose Fitting	㉑ Hub Sub-Assembly (Male)
⑤ Ball Bearing	㉒ Rollers
⑥ Ball Bearing (Double Row)	㉓ Torsion Spring
⑦ Bushing	㉔ H-Clip Spring
⑧ Bushing	㉖ Nylon Spacer
⑨ Oil Seal	㉗ Backlash Spacer
⑩ Oil Seal	㉘ Ring Gear Spacer
⑪ Retaining Ring, Internal	㉙ Torsion Spring Retainer
⑫ Retaining Ring	㉚ Pinion Gear
⑬ Cover Screws, M6 (T30 Torx)	㉛ Armature Plate
⑭ Cover Plate Assembly	㉜ AWD Coil
⑮ Gearcase Housing	㉟ Fill Plug
⑯ Clutch Housing (Ring Gear)	㊱ Drain Plug, Magnetic

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.

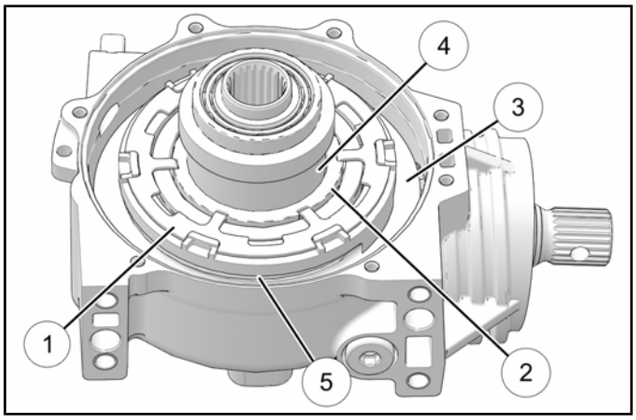
CAUTION
Switching to AWD while the rear wheels are spinning may cause severe drive shaft and gearcase damage. Always switch to AWD while the rear wheels have traction or are at rest.

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).

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.



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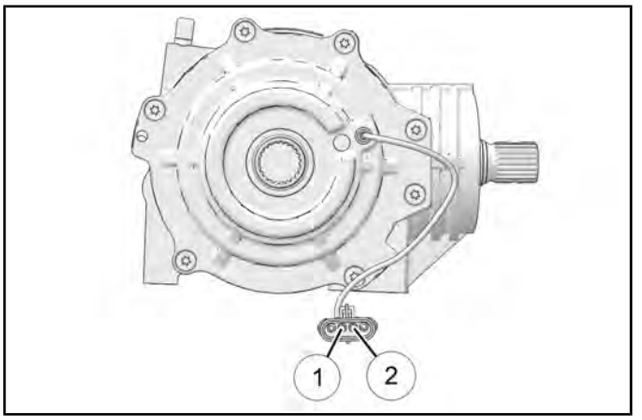
AWD DIAGNOSIS

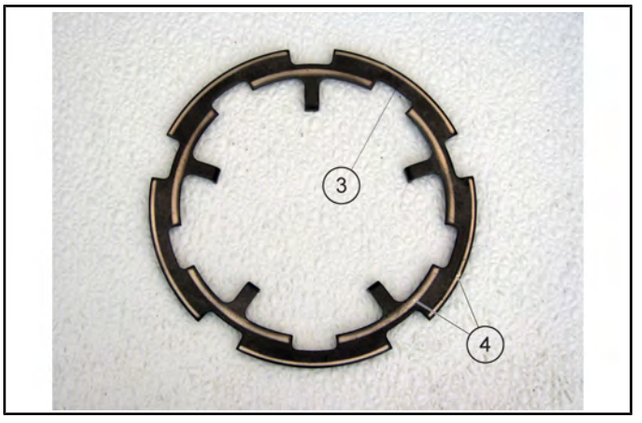
Symptom: AWD Will Not Engage

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.

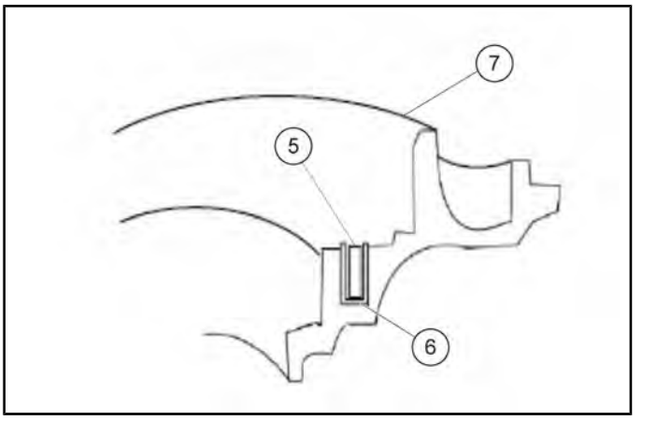


Front Gearcase Coil Resistance:
22 - 24 Ω

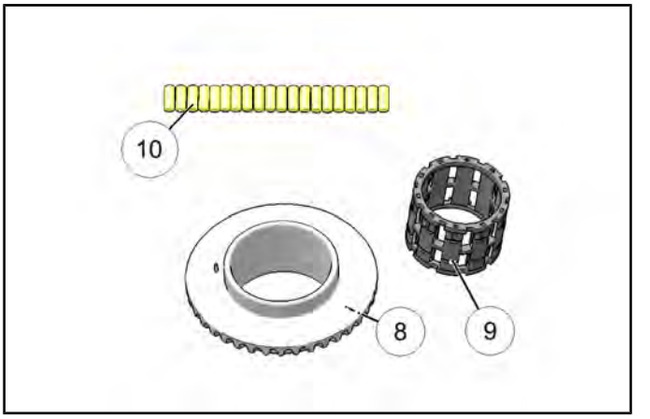
2. Turn on ignition and AWD switches and place gear selector in High or Low. Check for minimum battery voltage at Gray and Brown/White chassis wires that power the coil. Should have a minimum of 11 Vdc.
3. If electrical tests are within specification, remove gearcase (see Chapter 7 – Front Gearcase Removal page 8.31) 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.



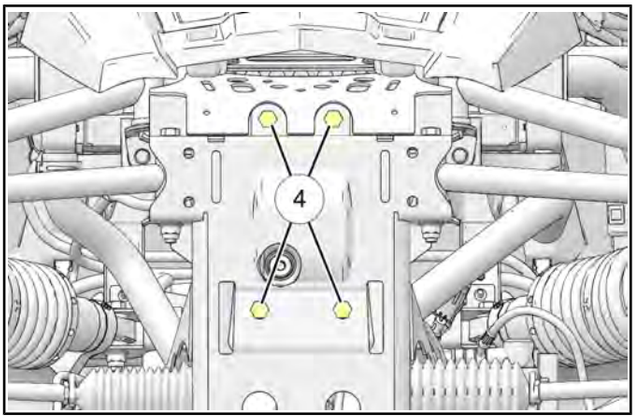
6. Inspect the roller surface on the inside of the ring gear for gouging/rough spots.



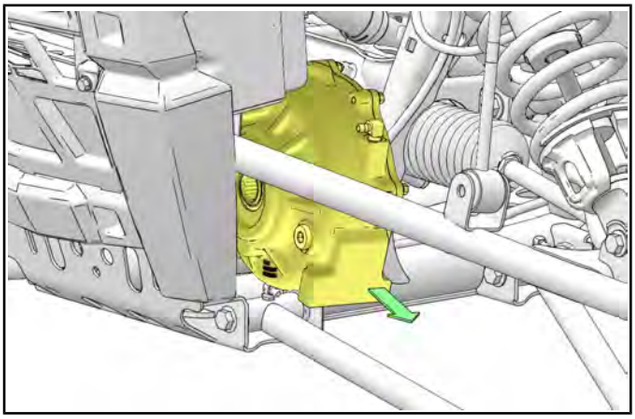
7. Inspect the roll cage ⑨ assembly for cracks or excessive wear. If damaged, replace the roll cage assembly.
8. Inspect the rollers⑩ for nicks and scratches. The rollers must slide up, down, in and out freely within the roll cage sliding surfaces and H-springs.

FRONT GEARCASE REMOVAL

1. Raise and support vehicle
2. Place gear selector in neutral.
3. Refer to FRONT DRIVE SHAFT page and remove both front drive shafts from the front gearcase.
4. Remove the front section of the prop shaft (see Chapter 7 – FRONT PROPSHAFT SERVICE page).
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.

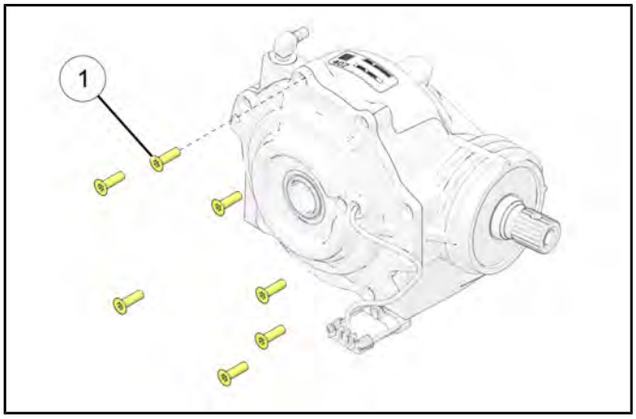


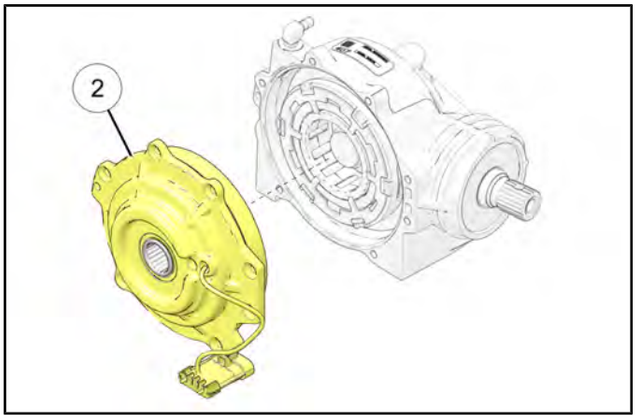
8. Rotate front of gearcase up so the input shaft is facing down. Lift and remove the gearcase from the front LH wheel well area and slide it out of the vehicle above the upper A-arm.



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 ① and remove the cover plate ② assembly.





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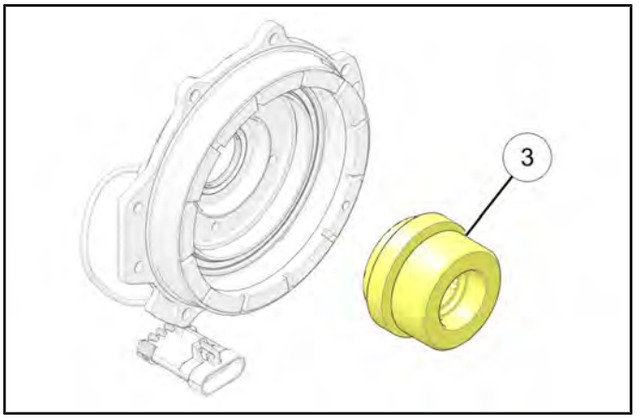
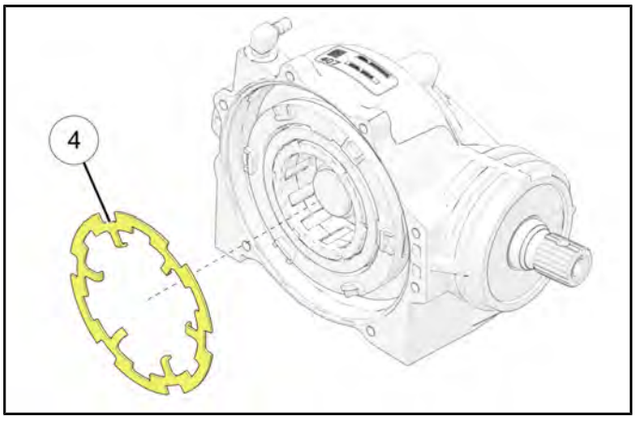
3. Remove the LH output hub assembly ③ from the clutch housing or outer cover plate assembly.

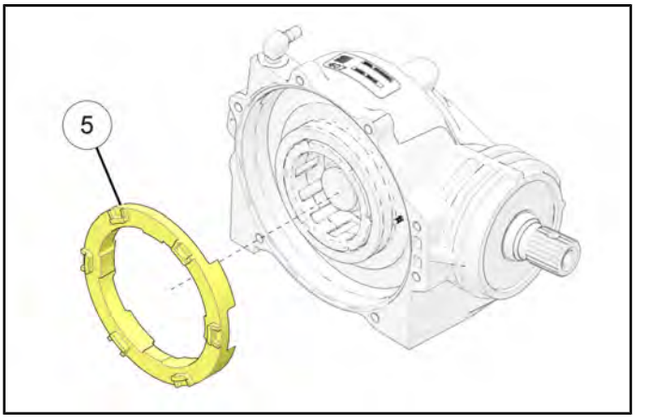


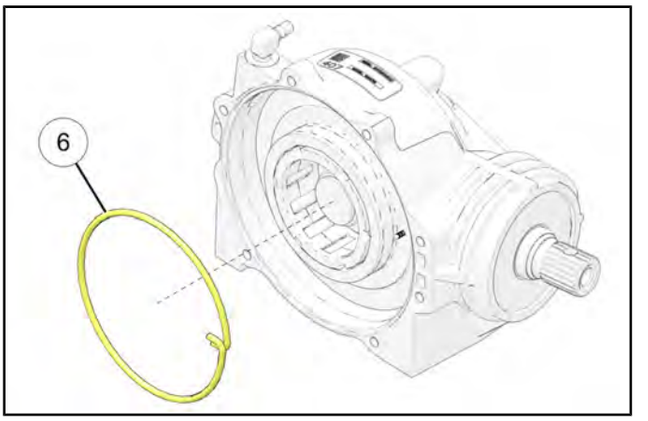
NOTICE
Nylon spacer is non-serviceable and should not be removed.

4. Remove and inspect the armature plate ④. Refer to AWD Diagnosis page 8.30 for detailed inspection process.

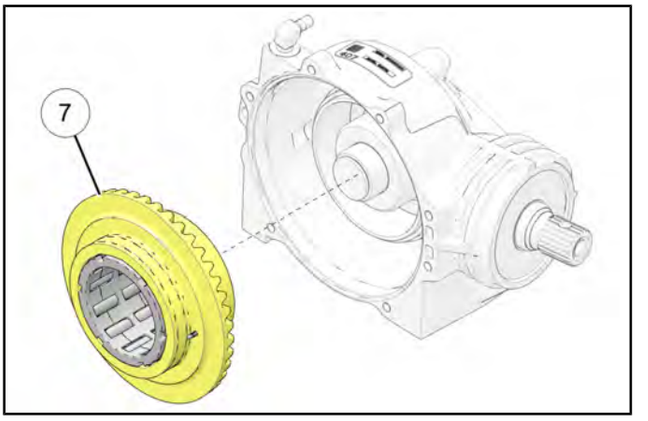


5. Remove the torsion spring retainer ⑤ and torsion spring ⑥ from the top of the ring gear.

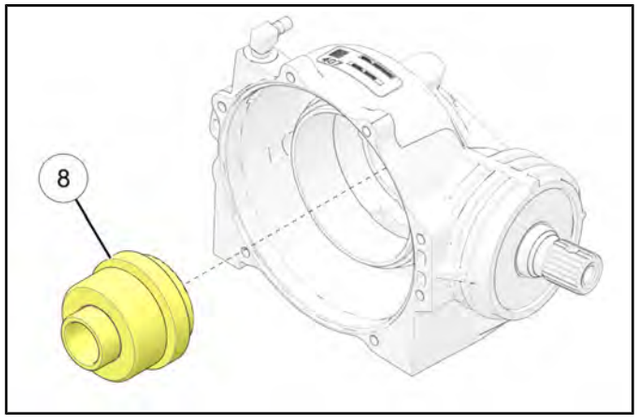




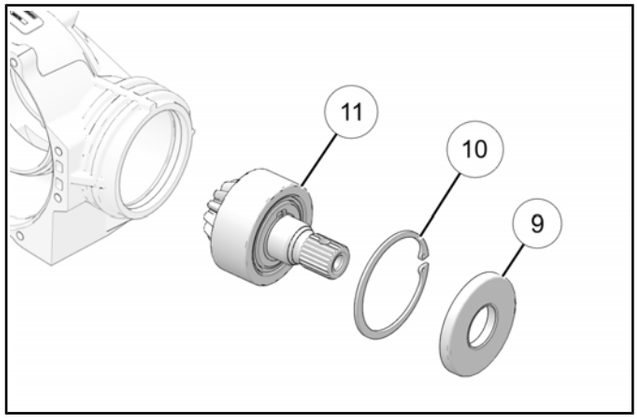
6. Remove the clutch housing / ring gear and roll cage assembly ⑦ from the gearcase housing.



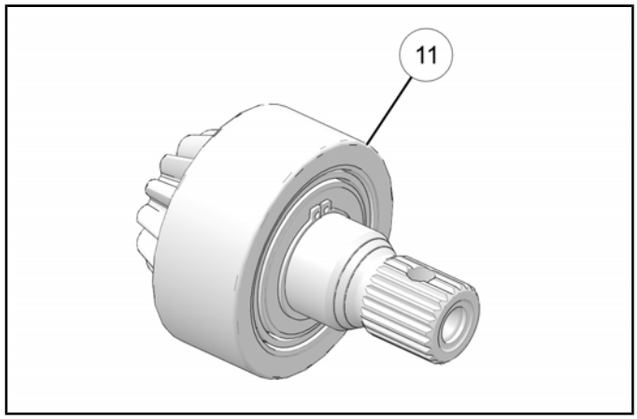
7. Remove the RH output hub assembly ⑧ from the gearcase housing.



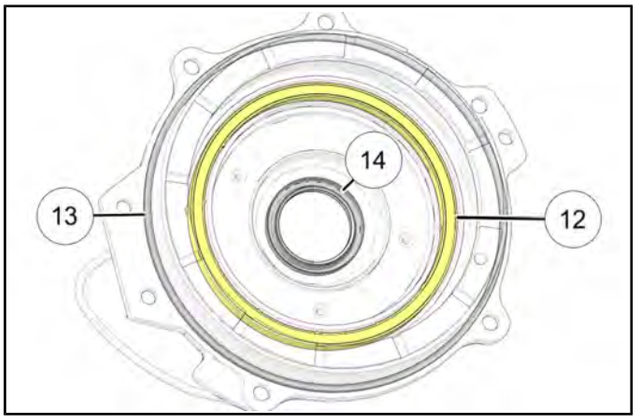
8. Remove pinion seal ⑨, internal retaining ring ⑩, and pinion gear assembly ⑪ from the gearcase housing. Inspect and clean the gearcase housing and replace all oil seals and O-rings.



9. Inspect the pinion gear ⑪ for chipped, broken or missing teeth. Inspect the pinion bearing for signs of wear and the pinion shaft seal surface for pitting.



10. Inspect the AWD coil ⑫ located in the outer cover plate assembly. Refer to AWD Diagnosis page 8.30 for detailed inspection process. Replace the cover plate seal ⑬ and O-ring ⑭.

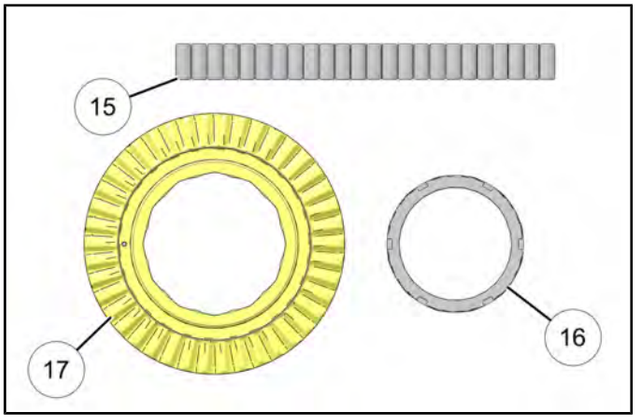


11. Remove the roll cage assembly and rollers from the clutch housing. Use a shop towel to cover the housing in order to retain all the rollers.

NOTICE

Rollers are spring loaded. Take care not to allow them to fall out or lose them upon removal of the roll cage.

12. Thoroughly clean all parts and inspect the rollers ⑮ for nicks and scratches. The rollers must slide up and down and in and out freely within the roll cage ⑯ sliding surfaces and H-springs.



NOTICE

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 ⑰ for a consistent wear pattern. Inspect the ring gear for chipped, broken, or missing teeth.

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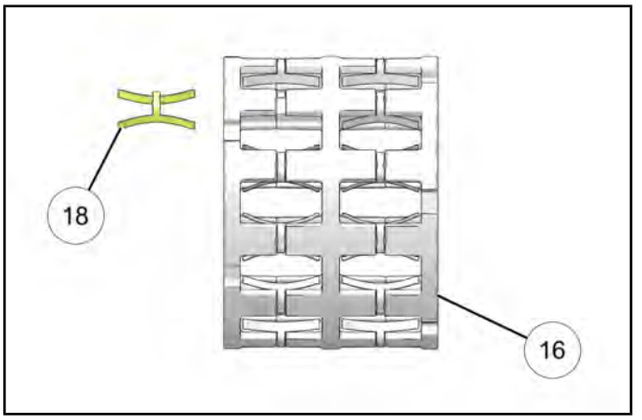
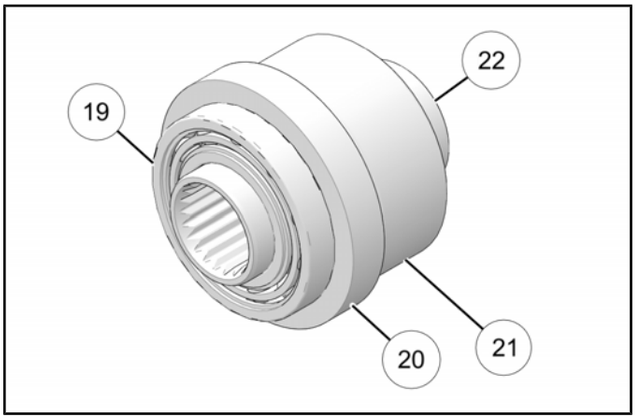
14. Inspect the roll cage assembly ⑯ sliding surfaces and H-springs ⑱. The sliding surfaces must be clean and free of nicks, burrs or scratches. If damaged, replace the roll cage assembly.



15. Inspect both output hub assemblies. Inspect the bearings and replace if needed.



⑲ Bearing	㉑ Roller Surface
⑳ Spacer	㉒ Thrust Bearing

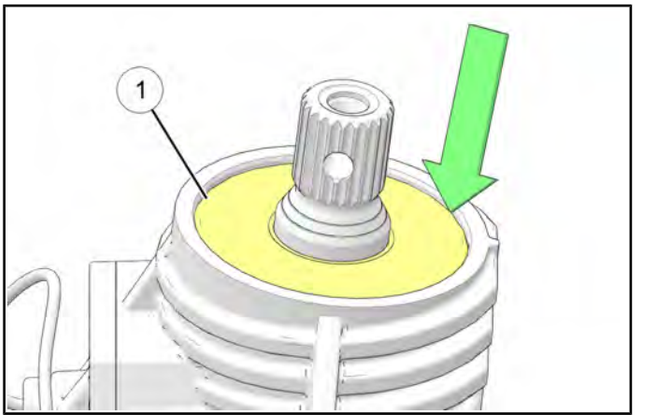
16. Clean and inspect all remaining front gearcase components. Check each for excessive wear or damage.

FRONT GEARCASE ASSEMBLY

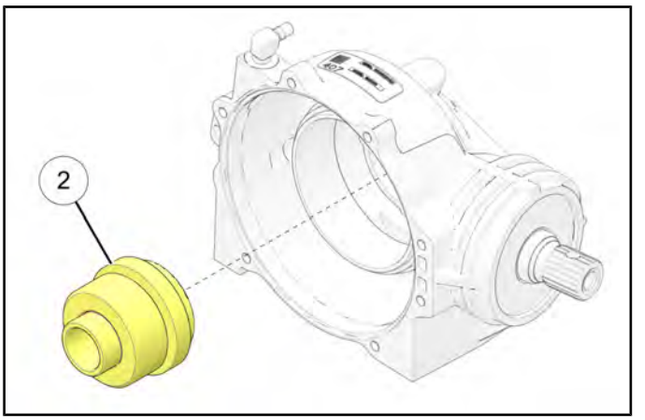
1. As mentioned during gearcase disassembly section, replace all O-rings, seals and worn components.
2. Install pinion shaft assembly and install internal snap ring.

NOTICE
If bearing replacement was required, press new bearing onto the pinion shaft and install a new external snap ring.

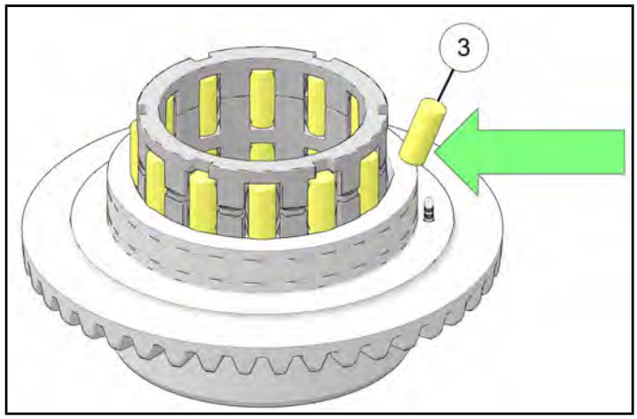
3. Install a new pinion shaft seal ① into the pinion gear housing. Using a universal seal installer, press the new seal into the housing until the seal is just below the housing chamfer.



4. Install the RH output hub ② into the gearcase housing.



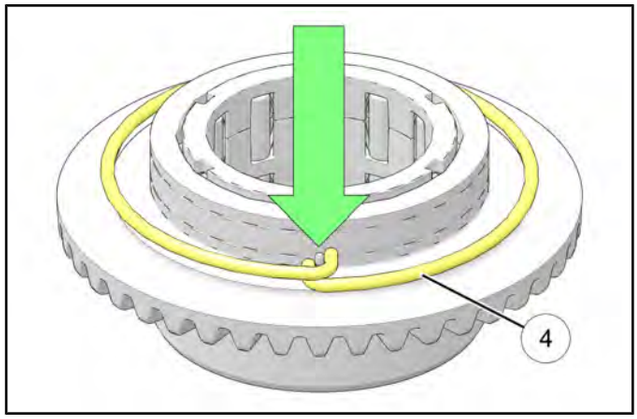
5. Carefully install the rollers ③ into the roll cage assembly while installing the assembly into the clutch housing.



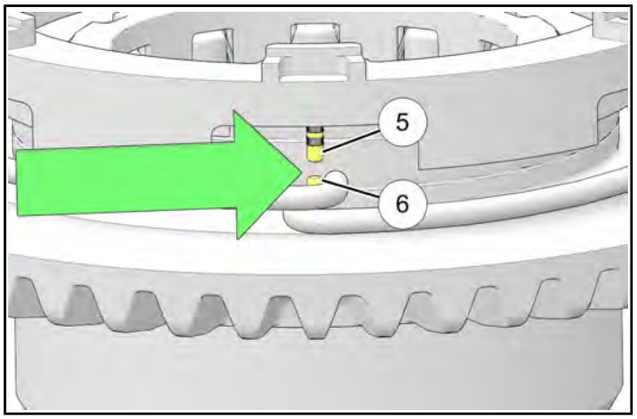
NOTICE

Install roll cage so that the ring gear grooves line up with the roll cage windows (see below). Be sure role cage top groove is facing upward.

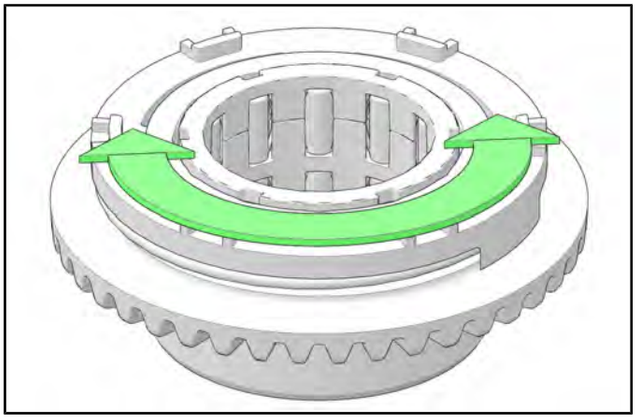
6. Install the torsion spring ④ by wrapping each leg of the spring around the dowel pin on the ring gear.



7. Align spring retainer dowel pin ⑤ with ring gear dowel pin ⑥ 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.



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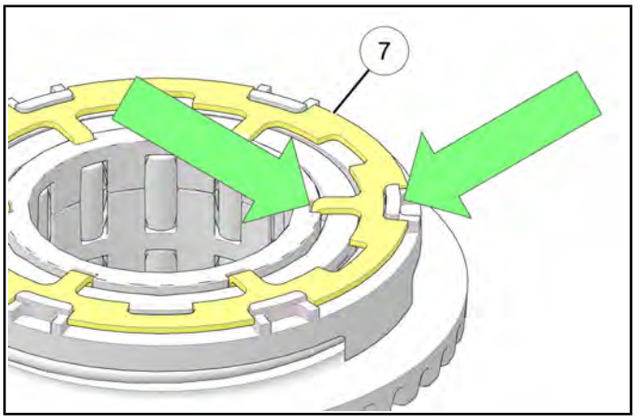
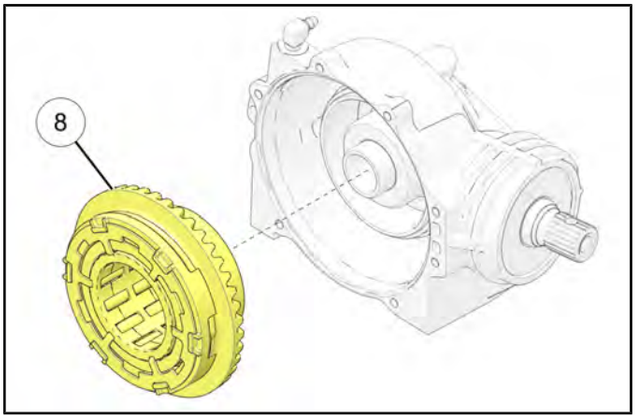
9. Install armature plate ⑦. Be sure all of the armature plate tabs are fully engaged into the roll cage assembly and that it is resting properly on the torsion spring retainer.



NOTICE
Verify armature plate tabs are in the roll cage slots and that it rests properly on the spring retainer.

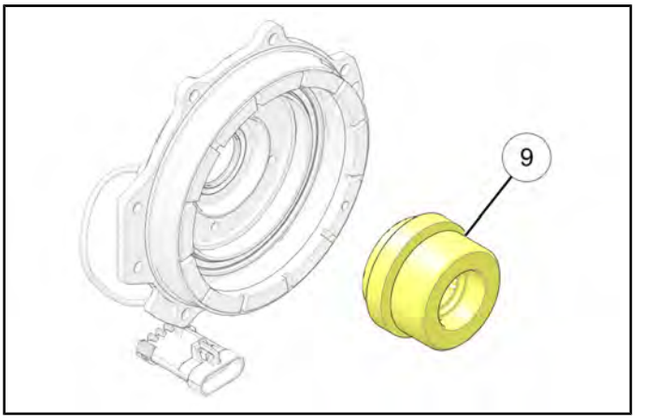
10. Carefully install the ring gear and roll cage assembly ⑧ into the gearcase housing.



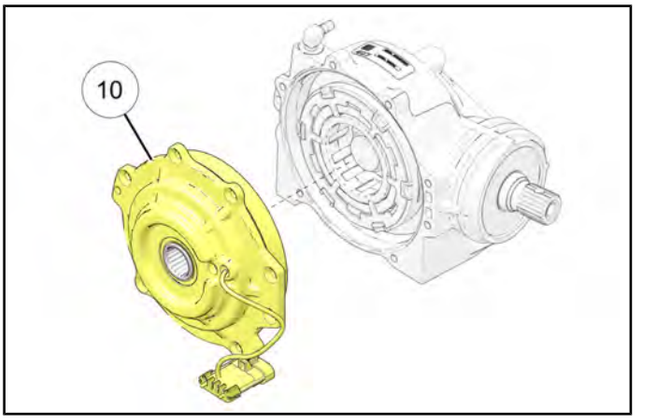
11. Install a new O-ring on the cover plate assembly.

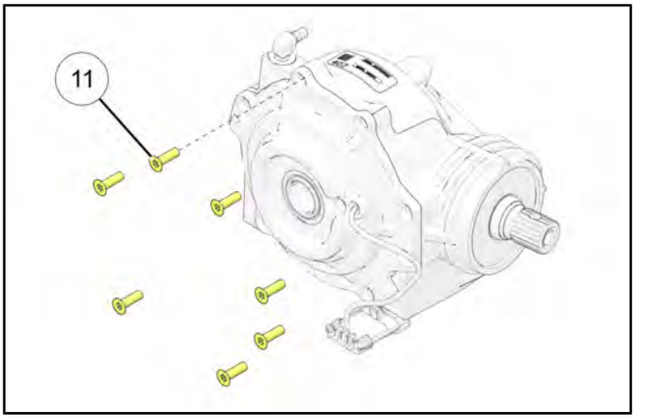
NOTICE
Be sure the square O-ring is placed flat on the cover surface. If the O-ring is twisted fluid leakage may occur.

12. Carefully install the LH output hub assembly ⑨ into the cover plate. Take care not to damage the new cover plate seal while installing the output hub.



13. Install the output cover assembly ⑩ onto the gearcase housing. Install the seven cover plate screws ⑪ and torque to specification.

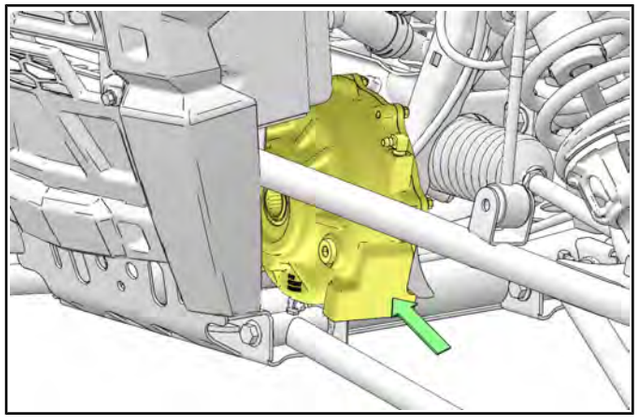




TORQUE
Cover Plate Screws: **9 ft-lbs (12 N·m)**

FRONT GEARCASE INSTALLATION

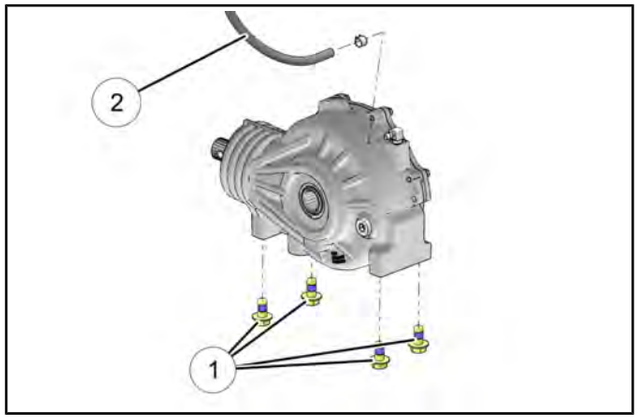
1. Install the gearcase back into the vehicle through the LH wheel well area, above the upper A-arm.



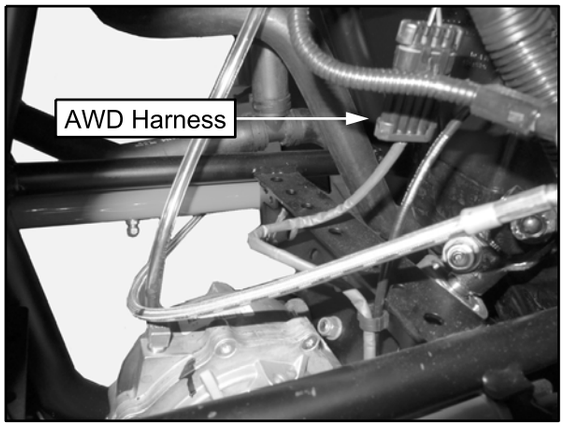
2. Lubricate the front gearcase splines with Anti-Seize.
3. Install the prop shaft onto the front gearcase input shaft. Use a NEW spring pin in the front propshaft.
4. Install the four bolts ① that secure the front gearcase to the frame and torque to specification.

TORQUE
Front Gearcase Mounting Bolts: **35 ft-lbs (47 N·m)**

5. Install the vent line ②.



6. Connect the AWD wire harness.

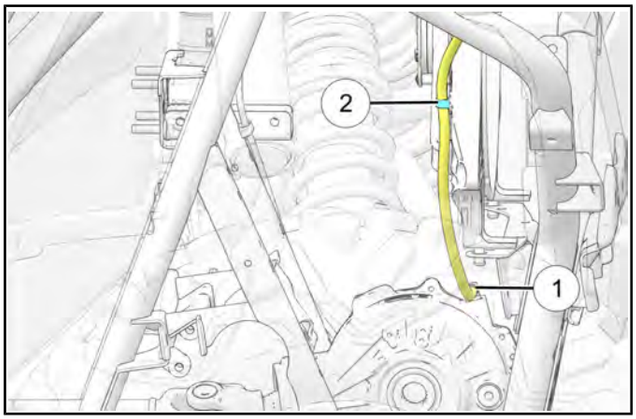


7. Refer to FRONT DRIVE SHAFT - Drive Shaft Installation page and install both front drive shafts into the gearcase.
8. Add the proper lubricant to the front gearcase. Refer to Chapter 2 for fluid fill and change information.

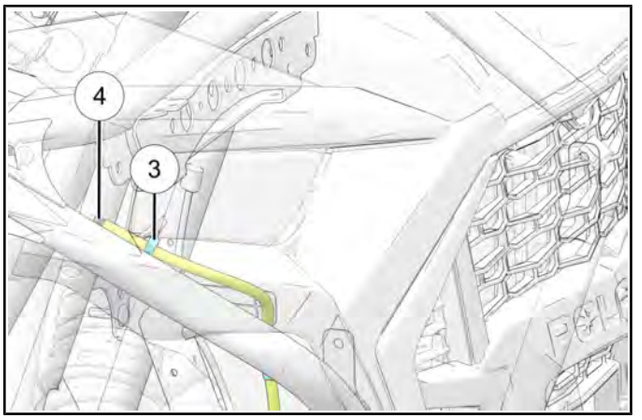
FLUID CAPACITY
Recommended Front Gearcase Fluid: **Demand Drive Fluid 2877922 (quart)** **Capacity:8.5 oz (250 mL)** (fill on a level surface to bottom of threads on the fill hole)

FRONT GEARCASE VENT LINE ROUTING

The front gearcase vent line starts at the front gearcase ① and routes up the right side. The vent line is secured by a retaining clip ② mounted to the cooling fan.

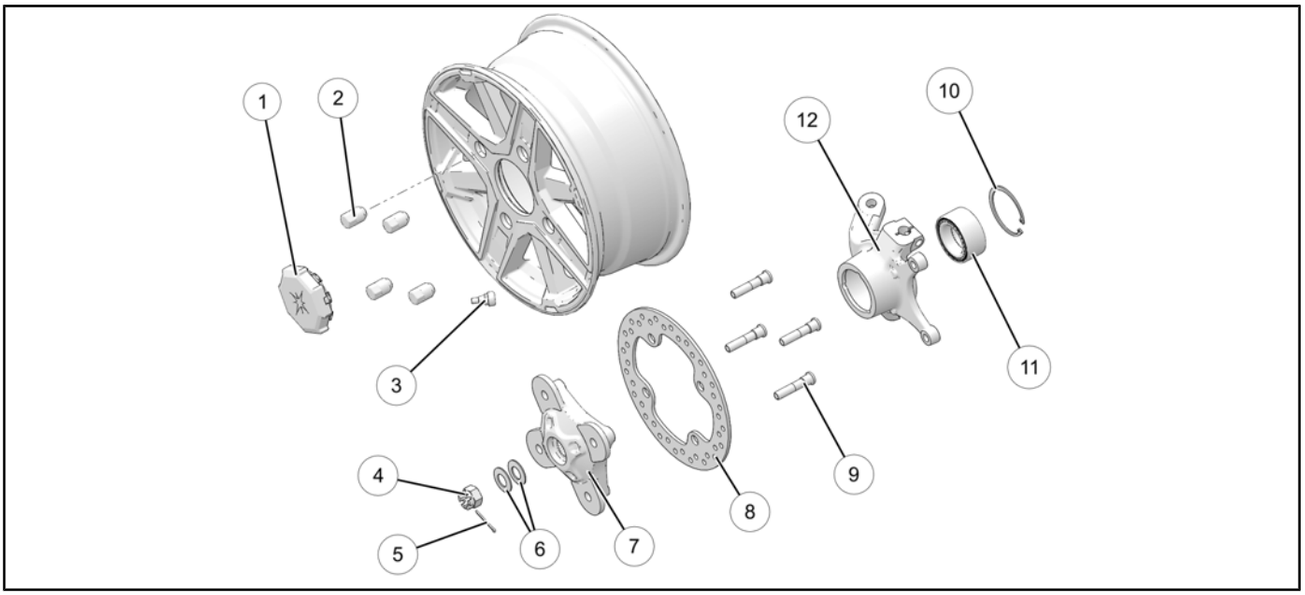


The vent line routes up the right support tube, is secured by a retaining clip ③, and terminates in a fitting ④ on the support tube.



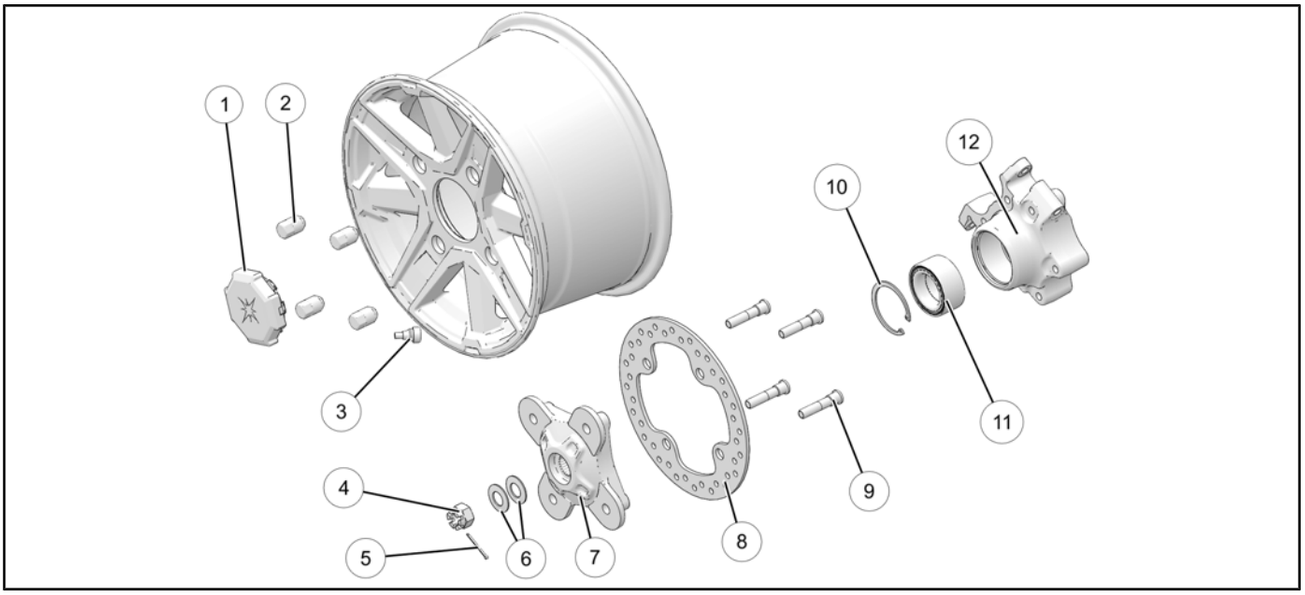
WHEEL HUBS

FRONT HUB ASSEMBLY VIEW



① Wheel Cap	⑤ Cotter Pin	⑨ Studs
② Wheel Lug Nuts **120 ft-lbs (163 Nm)**	⑥ Washers	⑩ Snap Ring
③ Valve Stem	⑦ Wheel Hub	⑪ Wheel Bearing
④ Hub Castle Nut **180 ft-lbs (244 Nm)**	⑧ Brake Disc	⑫ Bearing Carrier

REAR HUB ASSEMBLY VIEW



8

NOTES

CHAPTER 9
STEERING / SUSPENSION

GENERAL INFORMATION

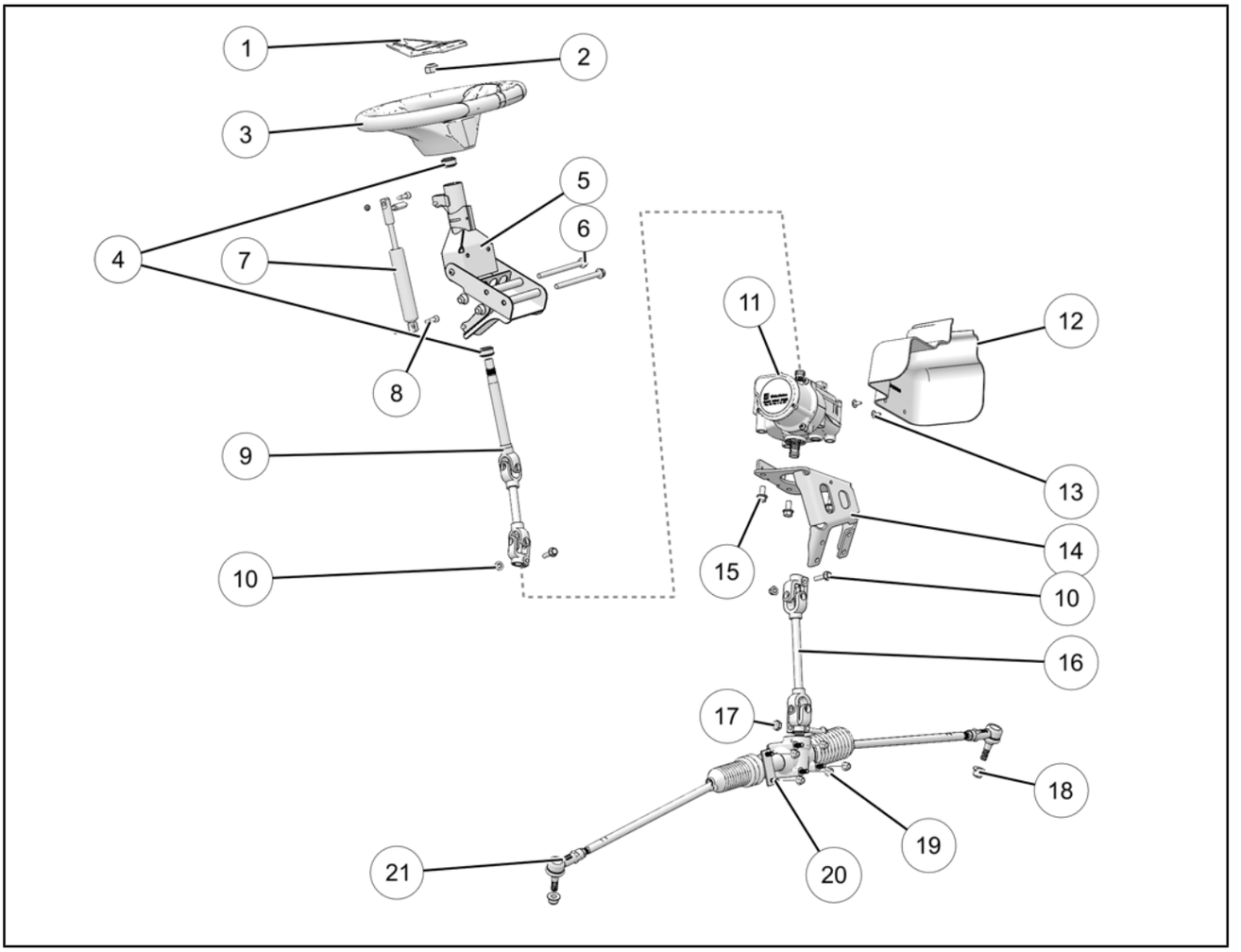
SPECIAL TOOLS

PART NUMBER	TOOL DESCRIPTION
2200421	Gas Shock Recharging Kit
2871351	IFP Depth Tool
2876389	Multi-Function Pliers
2878925	Shock Spring Preload Spanner Wrench
PU-50939	Seal Protector Sleeve
PU-51039	Gas Shock Fill Tool
PU-51829	Spanner Wrench - 2.5″ / 3.0″ Inner Internal Bypass
PU-51830	Spanner Wrench - 2.5″ Outer Internal Bypass
PU-51832	Spanner Wrench - 3.0″ Outer Internal Bypass
PU-51837	Shock Body Holding Tool (2.5″)
PU-51838	Shock Body Bolding Tool (3.0″)

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

STEERING SYSTEM

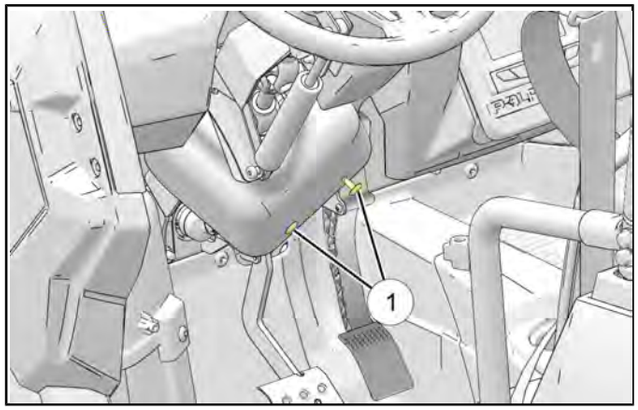
STEERING SYSTEM ASSEMBLY VIEW



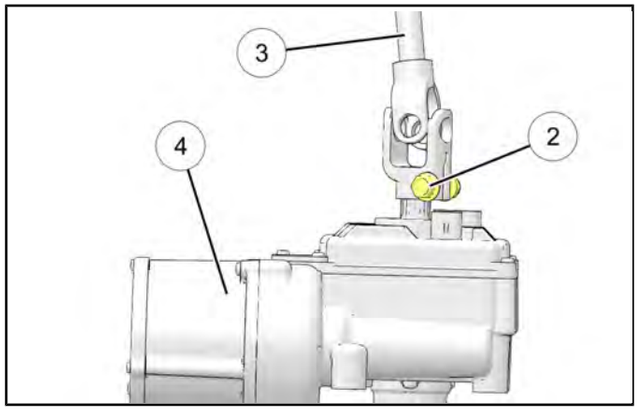
① Wheel Cap	⑧ Steering Shock Fasteners **7 ft-lb (10 Nm)**	⑮ EPS to Bracket Fasteners **30 ft-lb (41 Nm)**
② Steering Wheel Nut **65 ft-lbs (88 Nm)**	⑨ Upper Steering Shaft	⑯ Lower Steering Shaft
③ Steering Wheel	⑩ Steering Shaft to EPS Fasteners **25 ft-lb (34 Nm)**	⑰ Steering Shaft to Rack Fasteners **50 ft-lb (68 Nm)**
④ Steering Shaft Bushings	⑪ EPS Unit	⑱ Tie Rod End Nut (Do not reuse) **30 ft-lbs (41 Nm) + 90°**
⑤ Steering Column	⑫ EPS Cover	⑲ Steering Rack Mounting Nuts **50 ft-lbs (68 Nm)**
⑥ Steering Column Fasteners **40 ft-lb (54 Nm)**	⑬ Cover Screws **15 ft-lb (20 Nm)**	⑳ Steering Rack
⑦ Tilt Steering Shock	⑭ EPS Mounting Bracket	㉑ Tie Rod End **14 ft-lbs (19 Nm)**

UPPER STEERING SHAFT REMOVAL

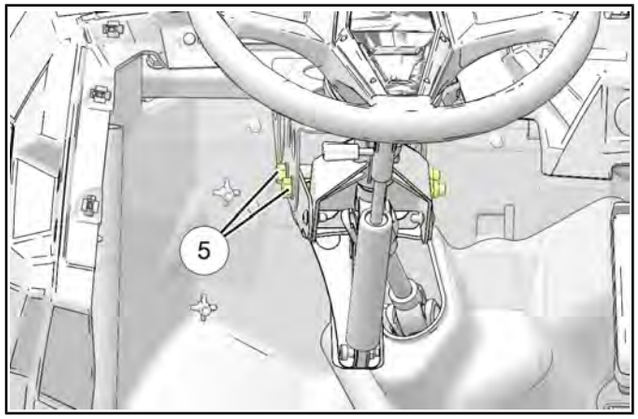
1. Remove the two Torx fasteners ① retaining the black plastic cover and remove the cover from the vehicle.



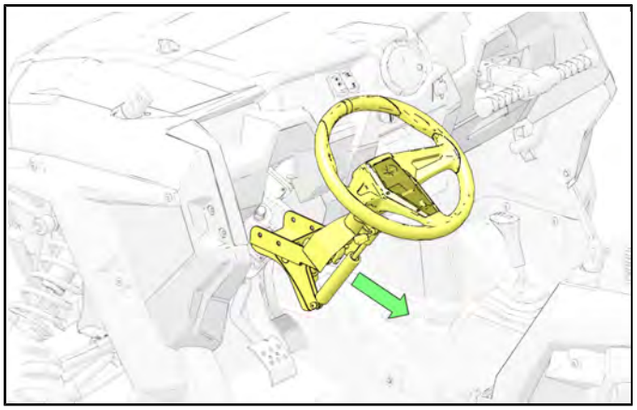
2. Remove the pinch bolt retaining the upper steering shaft to the power steering unit.



3. Lift the steering wheel up and remove the fasteners ⑤ that retain the steering column.



4. Remove the steering shaft, steering column and steering wheel from the vehicle as an assembly.



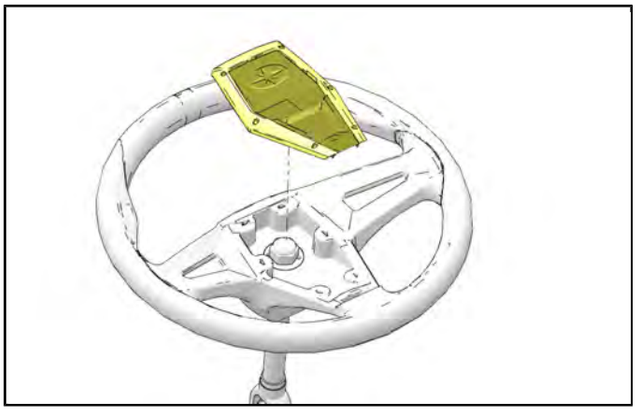
5. If replacing the upper steering shaft or steering wheel, refer to Steering Wheel Removal page 9.5.

STEERING WHEEL REMOVAL

1. Remove the upper steering shaft, pivot tube and steering wheel as an assembly *before* attempting to remove the steering wheel. Refer to Upper Steering Shaft Removal page 9.5.

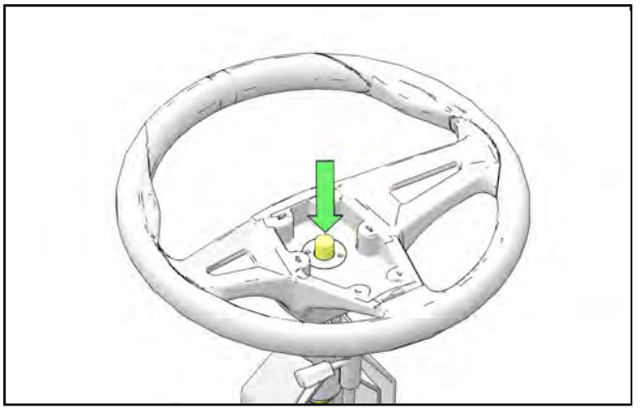
CAUTION
Striking the steering wheel or steering shaft while installed in the vehicle can permanently damage the EPS unit and cause a Power Steering Fault.

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.



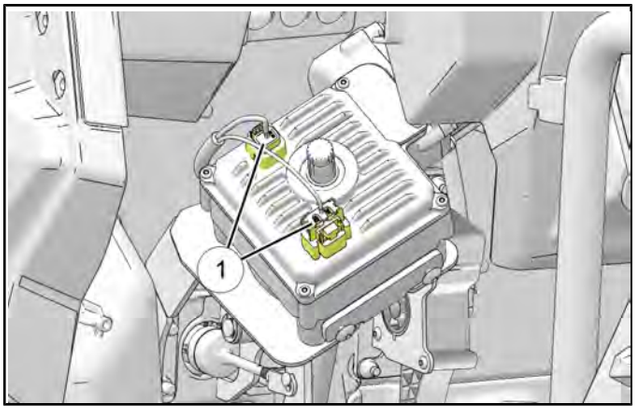
6. Once the steering wheel pops loose, completely remove the nut and lift the steering wheel off the shaft.

POWER STEERING UNIT REMOVAL

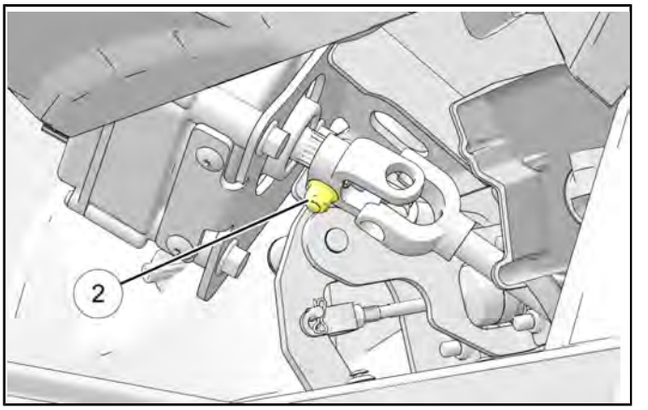
1. Remove the upper steering shaft, pivot tube and steering wheel from the vehicle as an assembly. Refer to Upper Steering Shaft Removal page 9.5.

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.

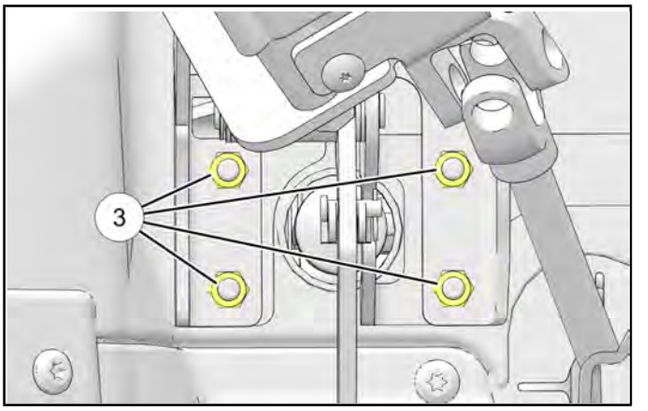
2. Disconnect the two electrical harnesses ① from the power steering unit .



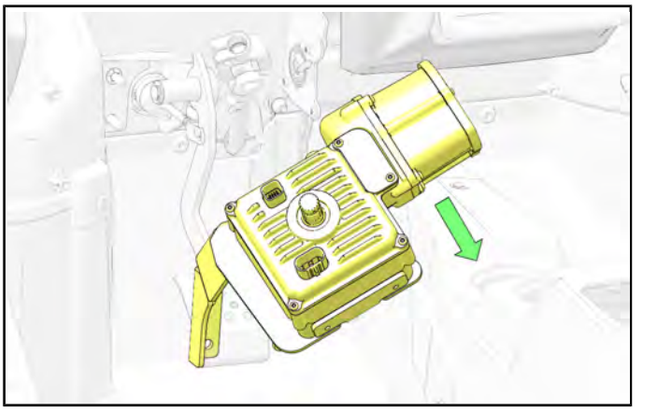
3. Remove the pinch bolt ② retaining the lower steering shaft to the power steering unit .



4. While supporting the power steering unit, remove the four nuts ③ from the mount bracket.

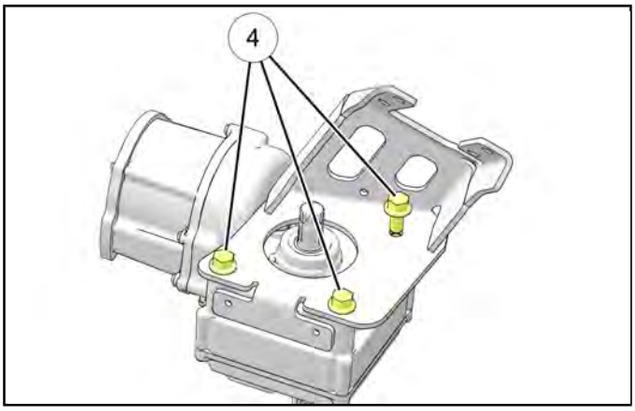


5. Carefully remove the power steering unit and mount bracket from the vehicle as an assembly.



IMPORTANT
Power steering units have a steering position sensor. Avoid spinning steering shafts after removing power steering unit from the vehicle.

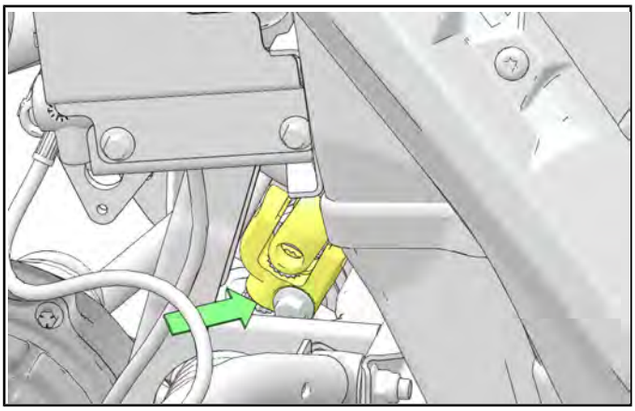
6. If replacing the power steering unit, remove the three bolts ④ that retain the power steering unit to the mount bracket.



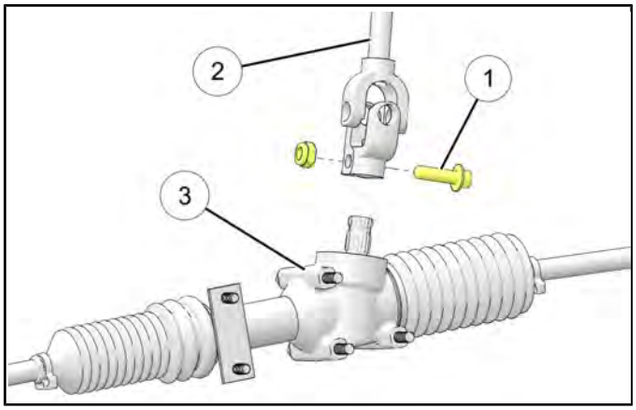
IMPORTANT
Electronic Power Steering (EPS) units are programmed to be vehicle specific and are not interchangeable between product lines.

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 installation.



3. Remove the power steering unit (see Power Steering Unit Removal page 9.6).
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

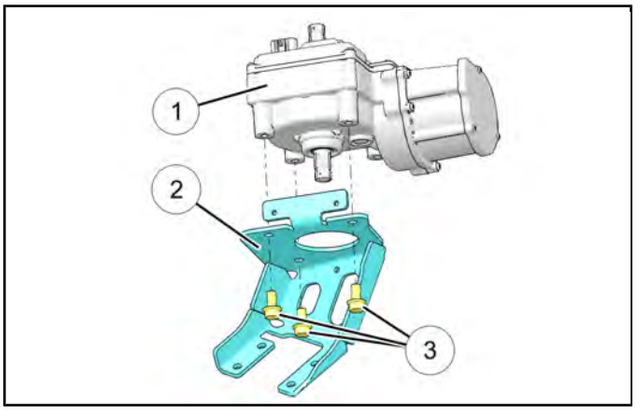
1. Install the lower steering shaft onto the gear box and align the marks made during step 2 of the “Lower Steering Shaft Removal (EPS Models)” procedure.
2. Install the pinch bolt that retains the lower steering shaft to the steering rack assembly and torque to specification.

TORQUE
Lower Steering Shaft Pinch Bolt: **50 ft-lb (68 Nm)**

3. Install the power steering unit and reassemble the vehicle (see Power Steering Unit Installation page 9.8).
4. Vehicles equipped with Dynamix suspension having a steering shaft, EPS unit, steering rack, or tie rod removed/adjusted/disconnected MUST have Steering Angle Sensor Centering procedure performed once everything is reinstalled. Refer to Steering Angle Sensor Centering (Dynamix) page 12.35.

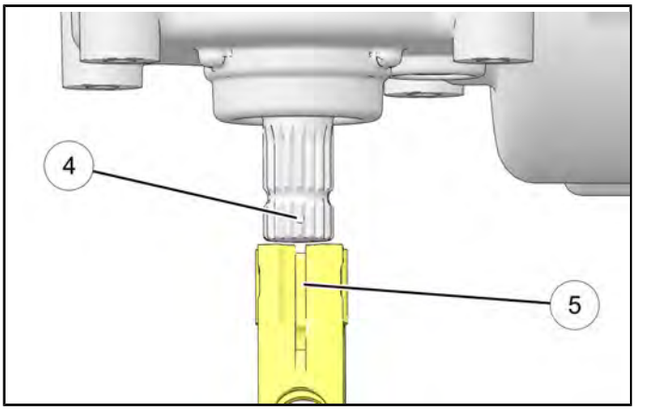
POWER STEERING UNIT INSTALLATION

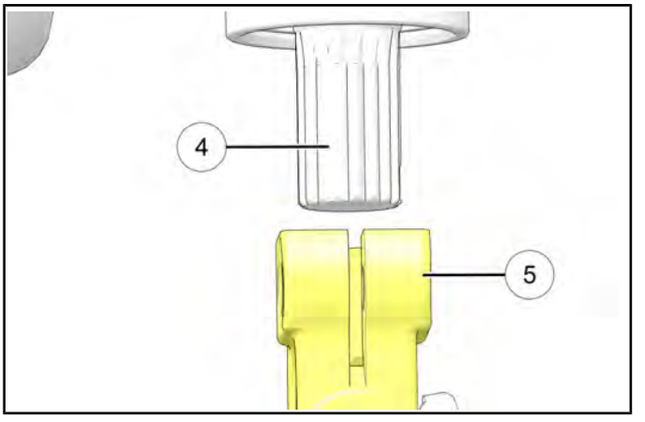
1. If the power steering unit ① was removed from the mount bracket ②, reinstall it prior to vehicle installation. Torque the mounting bolts ③ to specification.



TORQUE
Power Steering Mounting Bolts: **30 ft-lb (41 Nm)**

2. Install the power steering unit into the vehicle and align the skip-tooth spline on the power steering stub shaft with the opening in the lower steering shaft.



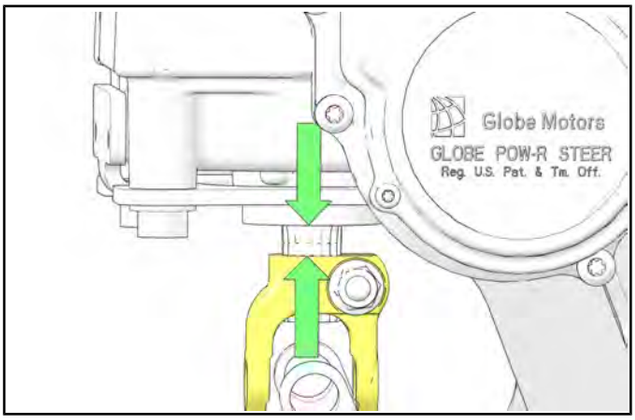


NOTICE
Stub shafts with and without groove shown.

3. Place the power steering mount bracket over the top of the brake pedal mount studs and finger tighten the four nuts.

4. Position the lower steering shaft on the power steering unit stub shaft and install new fasteners. Torque to specification.

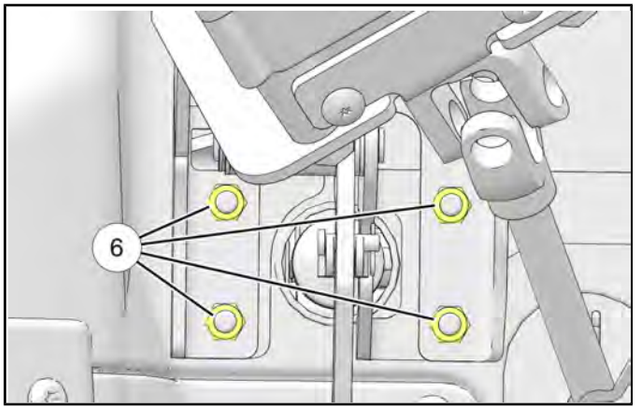
TORQUE
Steering Shaft to EPS Unit Pinch Bolt: **25 ft-lb (34 Nm)**



IMPORTANT
To ensure the steering shaft splines are fully engaged to the EPS unit, inspect the opening using a no-go gauge. The gauge must not pass between the EPS unit and steering shaft. If the steering shaft fails this test, loosen pinch bolt, re-adjust steering shaft, re-torque pinch bolt, and repeat inspection.

MEASUREMENT
Shaft w/groove: **0.55” (14 mm)** Shaft w/o groove: **0.63” (16 mm)**

5. Torque the four mount bracket nuts ⑥ to specification.



TORQUE
Power Steering Unit Mount Bracket Nuts: **18 ft-lb (24 Nm)**

6. Proceed to Upper Steering Shaft Installation page 9.9.
7. Vehicles equipped with Dynamix suspension having a steering shaft, EPS unit, steering rack, or tie rod removed/adjusted/disconnected MUST have Steering Angle Sensor Centering procedure performed once everything is reinstalled. Refer to Steering Angle Sensor Centering (Dynamix) page 12.35.

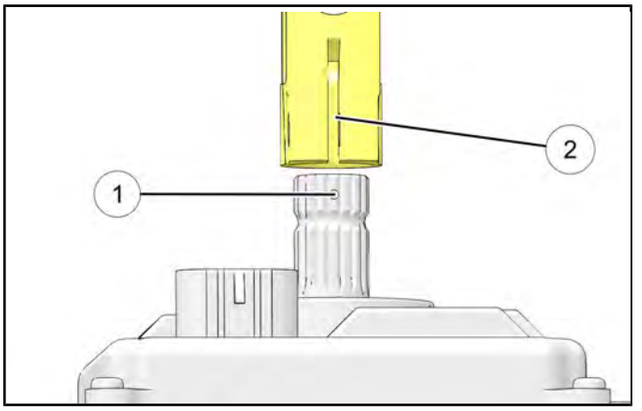
UPPER STEERING SHAFT INSTALLATION

NOTICE
If steering wheel was removed, follow this procedure to ensure the upper steering shaft is properly positioned on the power steering stub shaft.

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.

NOTICE
Be sure upper steering shaft hardware is positioned correctly.

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 steering column asm and torque fasteners to specification.

TORQUE
Steering Column Asm Fasteners: **40 ft-lb (54 Nm)**

3. Install the tilt shock and torque fastener to specification.

TORQUE
Tilt Shock Fastener: **7 ft-lb (10 Nm)**

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.

TORQUE
Steering Wheel Nut: **65 ft-lbs (88 Nm)**

5. Install a new upper steering shaft pinch bolt and nut. Torque pinch bolt to specification.

TORQUE
Steering Shaft Pinch Bolt: **25 ft-lb (34 Nm)**

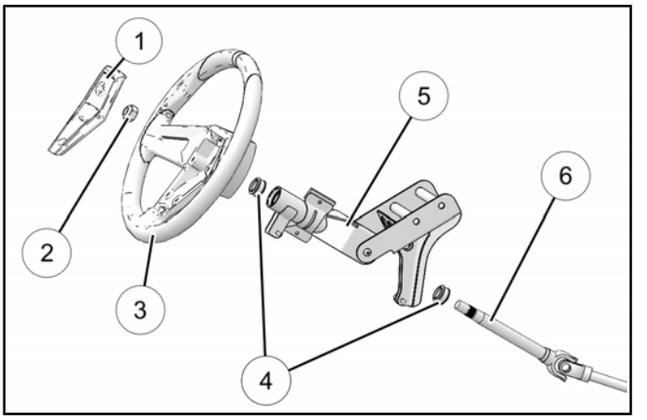
6. Reconnect both electrical harnesses onto the power steering unit. Be sure the connectors snap into place.
7. Reinstall the black plastic cover over the power steering unit and install the two Torx fasteners.
8. Vehicles equipped with Dynamix suspension having a steering shaft, EPS unit, steering rack, or tie rod removed/adjusted/disconnected MUST have Steering Angle Sensor Centering procedure performed once everything is reinstalled. Refer to Steering Angle Sensor Centering (Dynamix) page 12.35.
9. Turn the key switch on and test EPS operation.

STEERING SHAFT BUSHING REPLACEMENT

NOTICE
Replacement steering column assembly comes with new upper and lower bearings installed. Use this procedure if replacing only the bushing.

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 steering column.

NOTICE
Observe the order and location of the washers and spacers between the steering wheel and steering column.



① Cap	④ Bushing
② Nut	⑤ Steering Column
③ Steering Wheel	⑥ Steering Shaft

4. Reinstall the upper washers and spacers in the order in which they were removed.
5. Install the steering wheel and hand tighten the nut.

6. Reinstall the steering shaft assembly in the vehicle. Install the lower portion of the steering shaft onto the power steering unit. Torque the lower pinch bolt to specification.

TORQUE
Steering Shaft Pinch Bolt: **15 ft-lbs (20 Nm)**

7. Install the fasteners that retain the steering column. Torque fasteners to specification.

TORQUE
Steering Column Asm Fasteners: **40 ft-lb (54 Nm)**

8. Install the fastener retaining the upper portion of the steering wheel tilt shock to the pivot tube. Torque fastener to specification.

TORQUE
Tilt Shock Bolt: **7 ft-lb (10 Nm)**

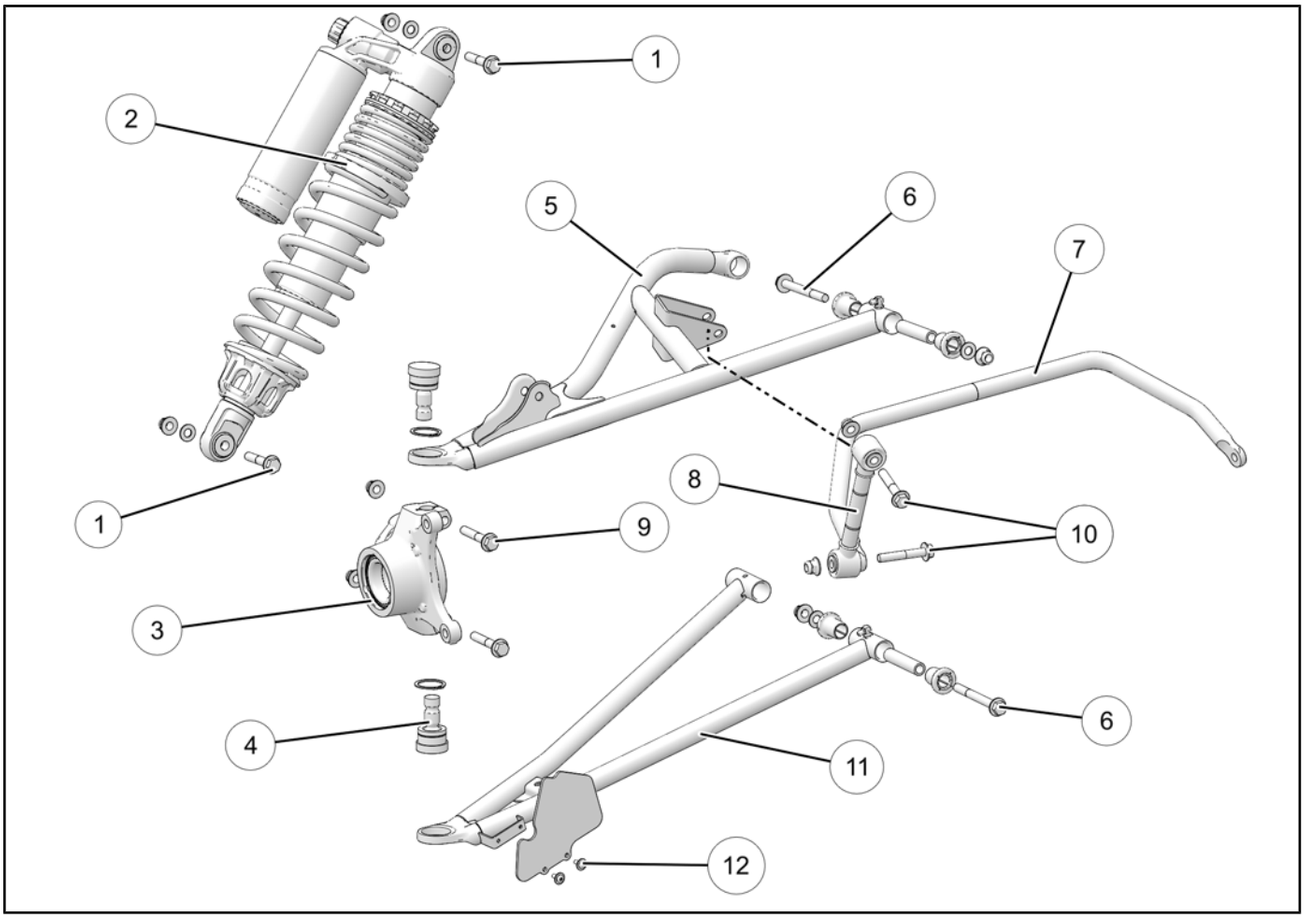
9. Be sure the front wheels are facing straight forward. Remove the steering wheel and align as needed. Apply Loctite® 271™. Torque the steering wheel nut to specification.

TORQUE
Steering Wheel Nut: **65 ft-lbs (88 Nm)**

10. Install steering wheel cap and field test steering operation.

FRONT SUSPENSION

FRONT SUSPENSION ASSEMBLY VIEW



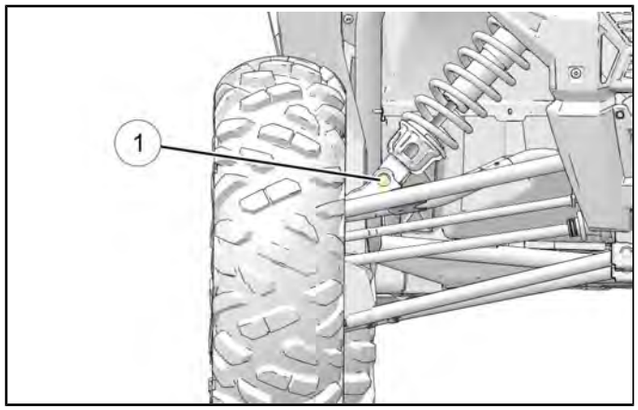
① Shock Fasteners **42 ft-lbs (57 Nm)**	⑦ Front Stabilizer Bar
② Shock Assembly	⑧ Stabilizer Bar Link
③ Knuckle / Bearing Carrier	⑨ Ball Joint Fasteners **42 ft-lbs (57 Nm)**
④ Ball Joint	⑩ Stabilizer Bar Link Fasteners **42 ft-lbs (57 Nm)**
⑤ Upper A-Arm	⑪ Lower A-Arm
⑥ A-Arm Fasteners **42 ft-lb (57 Nm)**	⑫ CV Guard Screws **35 in-lb (4 Nm)**

FRONT A-ARM REMOVAL / REPLACEMENT

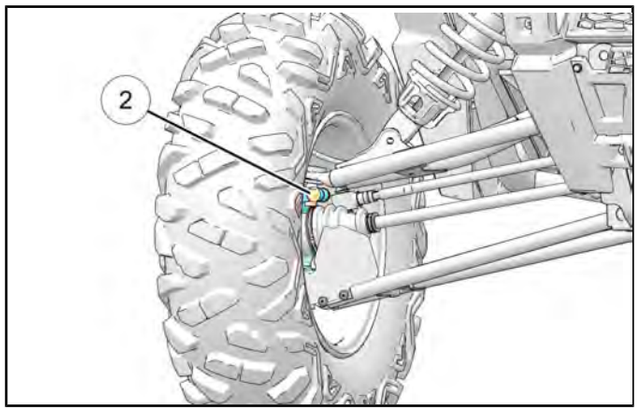
The following procedure details upper and lower A-arm removal and replacement on one side of the vehicle.

Upper A-Arm

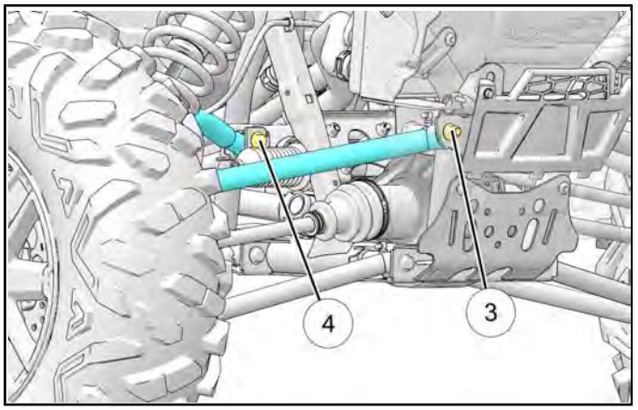
1. Elevate and safely support the front of the vehicle and remove the front wheel.
2. Remove lower shock fastener ① from upper A-arm.



3. Remove the nut retaining the front stabilizer bar link to the upper control arm.
4. Remove upper ball joint pinch bolt ② from bearing carrier.



5. Using a soft face hammer, tap on bearing carrier to loosen the upper A-arm ball joint end while lifting upward on the upper A-arm. Completely remove the ball joint end from the bearing carrier.
6. Remove the front bumper to allow A-arm bolt removal.
7. Loosen and remove the upper A-arm front through-bolt fastener ③ and rear though-bolt fastener ④. Remove the upper A-arm from the vehicle.



8. 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.

9. If not replacing the A-arm, thoroughly clean the A-arm and pivot tube.
10. Install new ball joint into A-arm. Refer to “Ball Joint Replacement” section.
11. Insert new A-arm bushings and pivot tube into new A-arm.
12. Install new upper A-arm assembly onto vehicle frame. Torque new bolt to specification.

TORQUE
Front Upper A-arm Bolts: **42 ft-lb (57 Nm)**

13. Insert upper A-arm ball joint end into the bearing carrier. Install upper ball joint pinch bolt into the bearing carrier and torque bolt to specification.

TORQUE
Front Ball Joint Pinch Bolts: **42 ft-lbs (57 Nm)**

14. Install the nut retaining the front stabilizer bar link to the upper control arm.. Torque fasteners to specification.

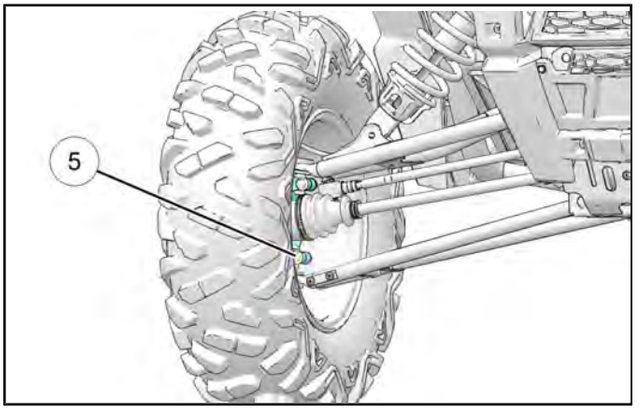
TORQUE
Stabilizer Bar Link Fasteners: **40 ft-lb (54 Nm)**

15. Attach shock to A-arm with fastener. Torque lower shock bolt to specification.

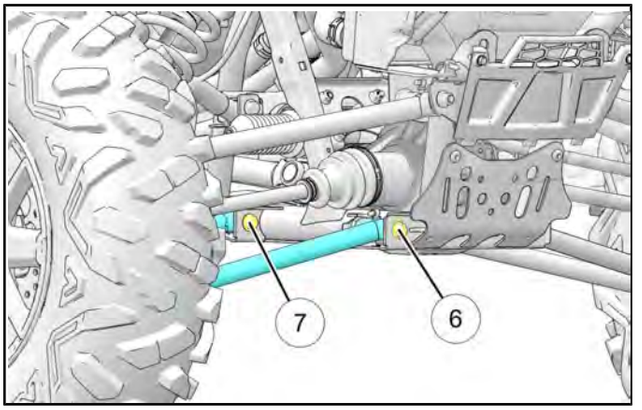
TORQUE
Front Shock Mounting Bolts: **42 ft-lbs (57 Nm)**

Lower A-Arm

16. Remove lower ball joint pinch bolt ⑤ from bearing carrier.



17. Using a soft face hammer, tap on bearing carrier to loosen the lower A-arm ball joint end while pushing downward on the lower A-arm. Completely remove the ball joint end from the bearing carrier.
18. Loosen and remove the lower A-arm front through-bolt fastener ⑥ and rear through-bolt fastener ⑦. Remove the lower A-arm from the vehicle.



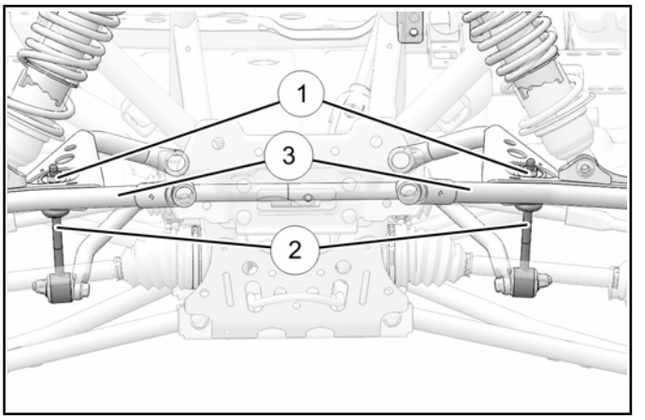
19. Examine A-arm bushings and pivot tube. Replace if worn. Discard hardware.
20. If not replacing the A-arm, thoroughly clean the A-arm and pivot tube.
21. Install new ball joint into A-arm. Refer to “Ball Joint Replacement” section.
22. Insert new A-arm bushings and pivot tube into new A-arm. A light press force may be needed.
23. Install new lower A-arm assembly onto vehicle frame. Torque new bolt to specification.
24. Insert lower A-arm ball joint end into the bearing carrier. Install lower ball joint pinch bolt into the bearing carrier and torque bolt to specification.

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

TORQUE
Lower A-arm Bolts: **42 ft-lb (57 Nm)** Front Ball Joint Pinch Bolts: **42 ft-lbs (57 Nm)**

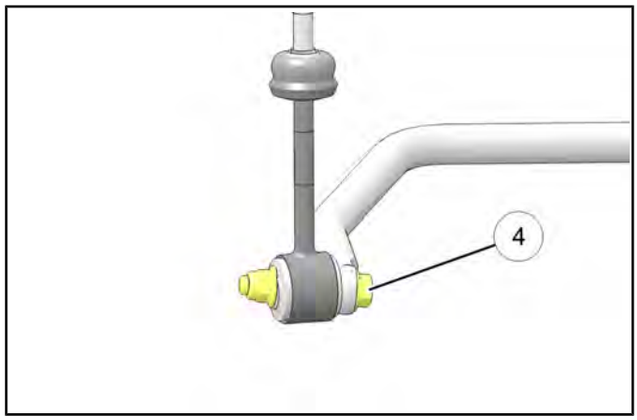
FRONT STABILIZER BAR REMOVAL

1. Remove the nut ① retaining the front stabilizer bar link ② to the upper control arm ③on 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.

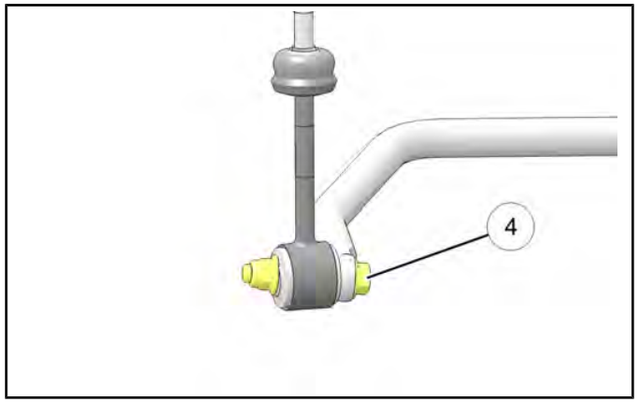
4. Remove the fasteners ④ retaining the stabilizer bar link to the stabilizer bar.



FRONT STABILIZER BAR INSTALLATION

1. Install the fasteners ④ retaining the stabilizer bar link to the stabilizer bar. Torque fasteners to specification.

TORQUE
Stabilizer Bar Link Fasteners: **40 ft-lb (54 Nm)**

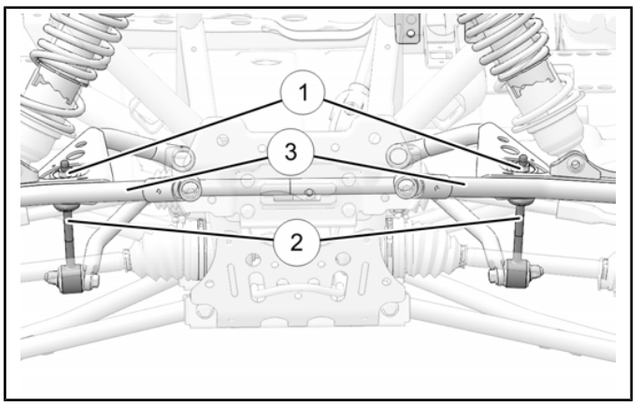


2. Install the stabilizer bar from the side.
3. Install the fasteners retaining the stabilizer bar mount to the frame. Torque fasteners to specification.

TORQUE
Stabilizer Bar Mount Bracket Fasteners: **17 ft-lb (23 Nm)**

4. Install the nut ① retaining the front stabilizer bar link ② to the upper control arm ③on both sides. Torque fasteners to specification.

TORQUE
Stabilizer Bar Link Fasteners: **40 ft-lb (54 Nm)**



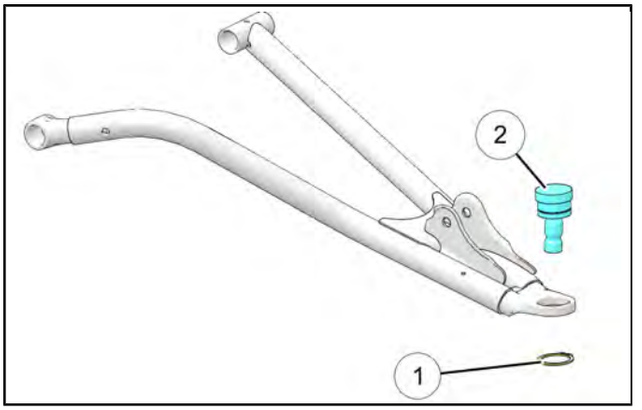
BALL JOINT SERVICE PREPARATION

NOTICE
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.
3. **To service the upper ball joint:** Remove and discard the two front brake caliper mounting bolts and remove the caliper from the brake disc (see Caliper Removal page 10.16 in the Brake System Chapter).
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.
7. **To service the lower ball joint:** 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.

BALL JOINT REMOVAL

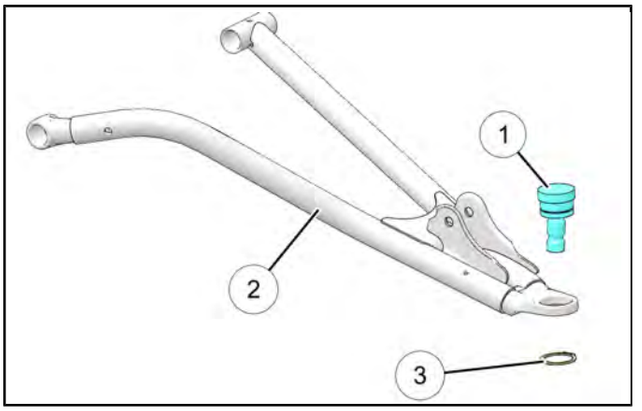
1. Remove the retaining ring ① from the ball joint ②.



2. Place a proper sized driver on the ball joint and place the A-arm in a press.
3. 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 ① is fully installed into the A-arm ②, install a new retaining ring ③.



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.

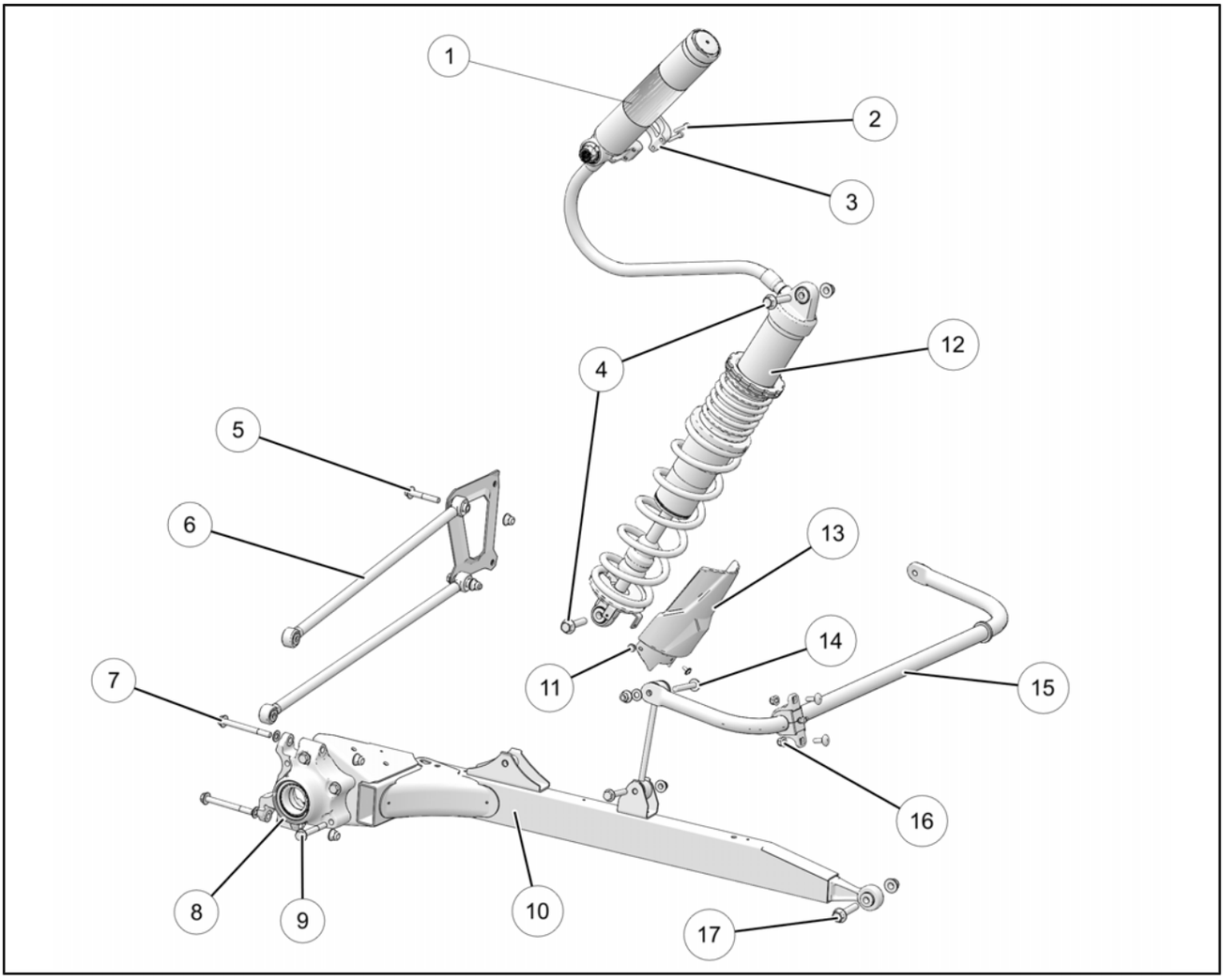
CAUTION
New bolts have a pre-applied locking agent which is destroyed upon removal. Always use new brake caliper mounting bolts upon assembly.

7. Install wheel and four wheel nuts. Torque wheel nuts to specification.

TORQUE
Front Ball Joint Fasteners: **42 ft-lbs (57 N·m)** Front Shock Mounting Bolts: **42 ft-lbs (57 N·m)** Front Caliper Mounting Bolts: **30 ft-lbs (42 Nm)** Wheel Nuts (Alum): **120 ft-lbs (163 N·m)**

REAR SUSPENSION

REAR SUSPENSION ASSEMBLY VIEW (REMOTE RESERVOIR)



① Shock Reservoir	⑦ Radius Rod Fasteners **50 ft-lb (68 Nm) + 45°**	⑬ Shock Guard
② Clamp Screws	⑧ Rear Bearing Carrier	⑭ Stabilizer Bar Link Fasteners **42 ft-lbs (57 Nm)**
③ Reservoir Mounting Clamp	⑨ Bearing Carrier Bolts **42 ft-lb (57 Nm)**	⑮ Rear Stabilizer Bar
④ Shock Bolts **70 ft-lbs (95 Nm)**	⑩ Trailing Arm	⑯ Stabilizer Bar Mounting Clamp Fasteners **30 ft-lb (42 Nm)**
⑤ Radius Rod Fasteners **50 ft-lb (68 Nm) + 45°**	⑪ Shock Guard Screws **14 in-lbs (2 Nm)**	⑰ Trailing Arm Mounting Bolts **70 ft-lb (95 Nm)**
⑥ Radius Rod	⑫ Rear Shock Assembly	

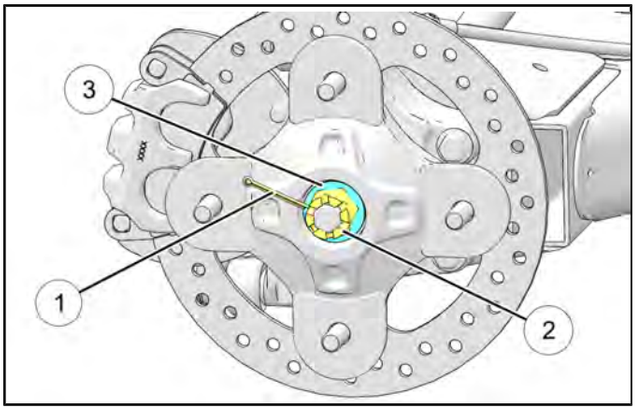
TRAILING ARM REMOVAL / INSTALLATION

NOTICE
Use new attaching nuts upon installation of the rear trailing arm and bearing carrier.

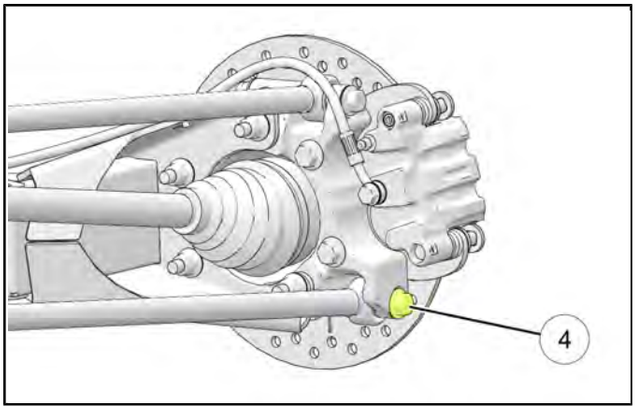
1. Raise and support vehicle by main frame.

⚠ WARNING
Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure.

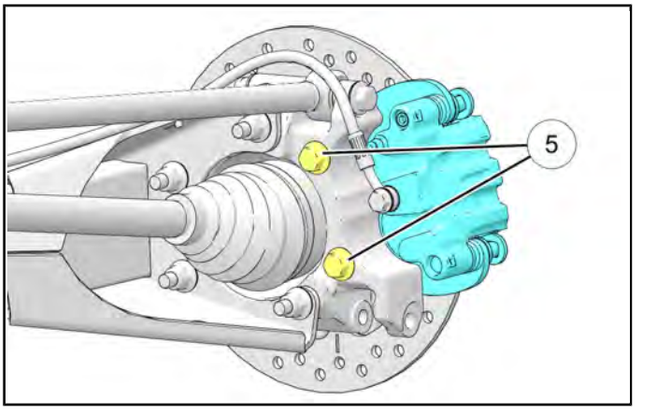
2. Remove the four wheel nuts and remove the rear wheel.
3. Remove the cotter pin ① and loosen the rear wheel hub castle nut ②. Remove the nut, and two cone washers ③ from the rear wheel hub assembly.



4. Remove the lower radius rod mounting bolt ④, nut and washer from the bearing carrier. Swing radius rod down. Discard the nut.

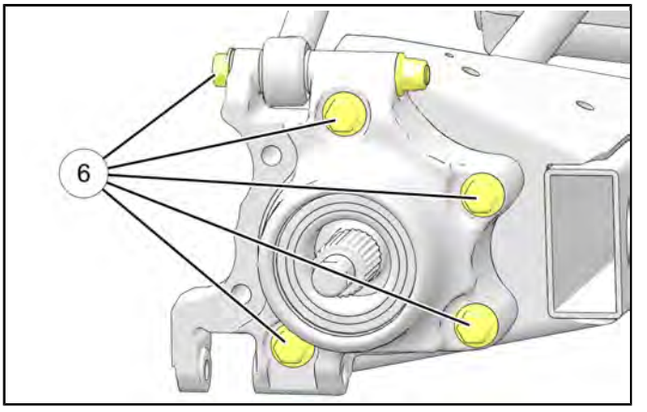


5. Remove the two brake caliper mounting bolts ⑤. Discard bolts.

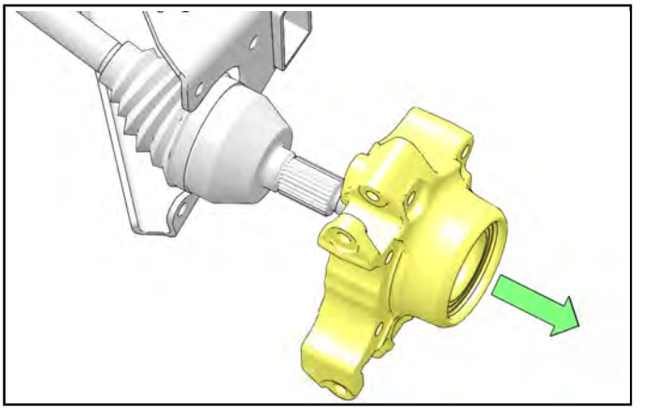


CAUTION
Do not hang the caliper by the brake line. Use wire to hang caliper to prevent damage to the brake line.

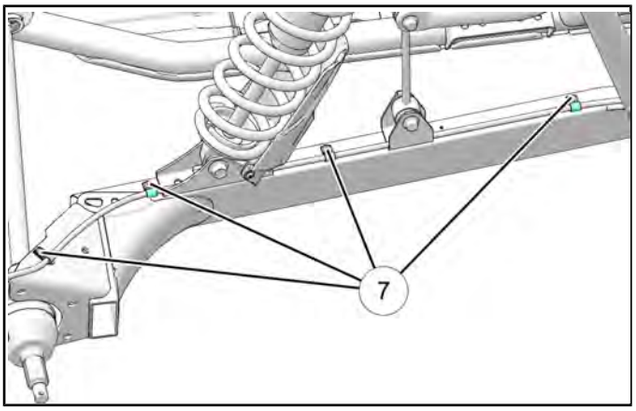
6. Remove the rear wheel hub and brake disk assembly.
7. Remove the five remaining bolts ⑥ that attach the rear bearing carrier to trailing arm. Discard the nuts.



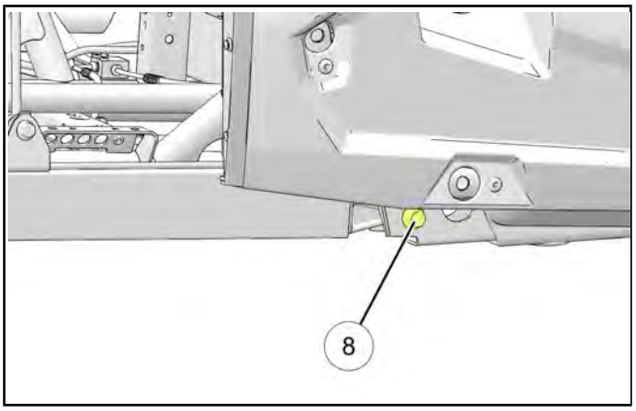
8. Remove the bearing carrier from the rear drive shaft and trailing arm.



9. Rotate bearing by hand and check for smooth rotation. Visually inspect bearing for moisture, dirt, or corrosion. Replace bearing if moisture, dirt, corrosion, or roughness is evident.
10. Remove the four fasteners ⑦ that secure the brake line retainers to the trailing arm.
11. Remove the lower stabilizer bar linkage fastener. Discard the nut.
12. Support trailing arm with suitable jack stand or support.
13. Remove the lower shock bolt. Discard the nut.



14. Remove the front trailing arm bolt ⑧. Discard the nut.



15. Remove trailing arm from vehicle. Visually inspect trailing arm, bushings, o-rings and spherical bearing for wear.
16. Replace trailing arm if physically damaged.
17. Reverse this procedure to reinstall rear trailing arm.

NOTICE
Use new fastener nuts upon installation of the rear trailing arm and bearing carrier.

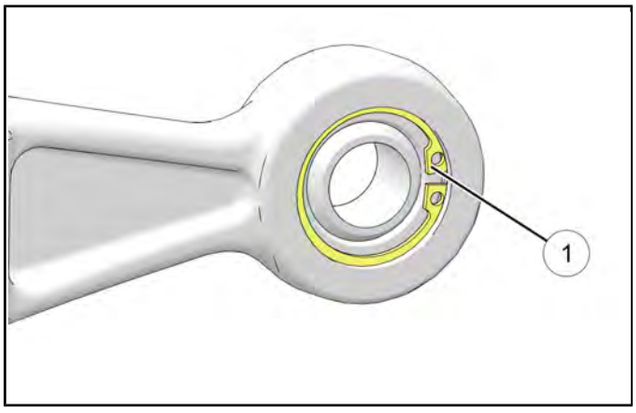
18. Torque all fasteners to specification.

TORQUE
Trailing Arm to Main Frame: **70 ft-lb (95 Nm)** Rear Shock Mounting Bolts: **70 ft-lbs (95 Nm)** Rear Stabilizer Bar Linkage: **42 ft-lbs (57 Nm)** Inner Radius Rod Mounting Bolts: **50 ft-lb (68 Nm) + 45°** Outer Radius Rod Mounting Bolts: **50 ft-lbs (68 Nm) + 90°** Bearing Carrier to Trailing Arm Bolts: **42 ft-lb (57 Nm)** Rear Brake Caliper Mounting Bolts: **46 ft-lbs (62 Nm)** Rear Wheel Hub Castle Nut: **180 ft-lbs (244 Nm)** Wheel Nuts: **120 ft-lbs (163 Nm)**

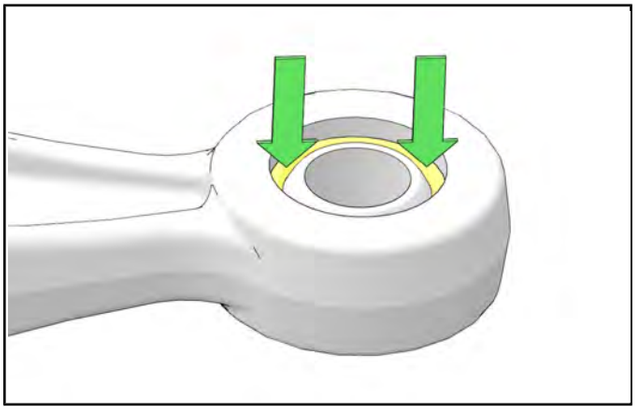
19. After rear trailing arm installation, test vehicle at low speeds before putting into service.

TRAILING ARM SPHERICAL BEARING REPLACEMENT

1. Remove trailing arm (see Chapter 8 – Trailing Arm Removal / Installation page).
2. Remove bushings and O-rings.
3. Remove snap ring ① that retains the spherical bearing.



4. Properly support the trailing arm and press the spherical bearing out of trailing arm casting.
5. Be sure to only press on outer most surface of bearing race, do not press on the center spherical bearing.



6. Inspect trailing arm bearing housing for wear or damage. Replace trailing arm if damaged.
7. Press in new bearing until fully seated into trailing arm casting.
8. Install **new** snap ring, O-rings (not required) and bushings.

RADIUS ROD REMOVAL / INSTALLATION

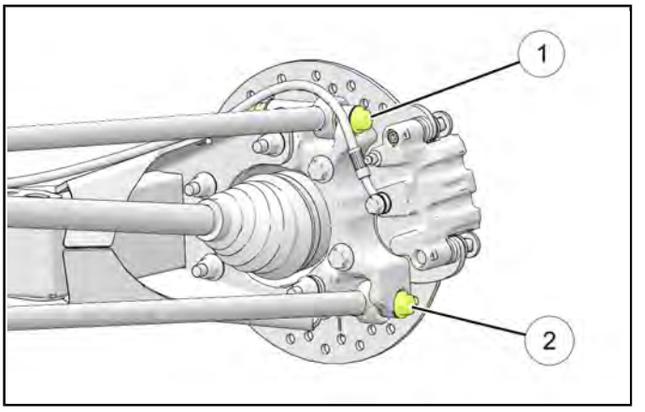
The following procedure details upper and lower radius rod removal and replacement on one side of the vehicle. Repeat the following steps to remove the A-arm from the opposite side.

1. Raise and support vehicle by main frame.

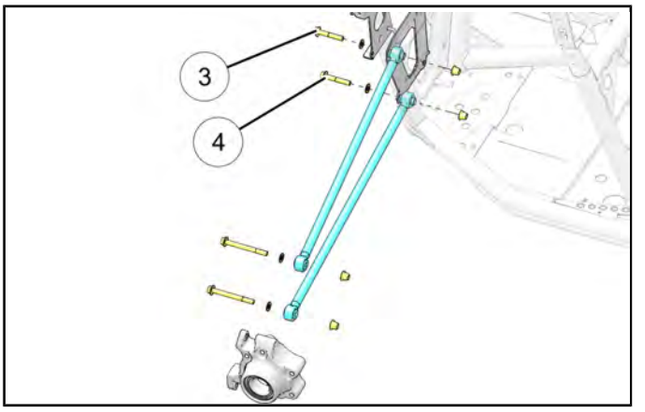
⚠ WARNING

Serious injury or death may result if machine tips or falls. Be sure machine is secure before beginning this service procedure.

2. Remove the rear wheel nuts and rear wheel.
3. Identify / mark radius rods “upper” and “lower”.
4. Remove the nut, bolt and washer ① & ② attaching the upper and lower radius rod to the bearing carrier. Discard the nuts.



5. Remove bolts ③ & ④ attaching radius rods to the vehicle frame. Discard the nuts.



6. Remove radius rods from vehicle.
7. Examine radius rod shafts, boots and spherical bearings. Replace entire radius rod if any excessive wear is evident.
8. Reverse this procedure to reinstall the radius rods.

9. Torque all fasteners to specification.

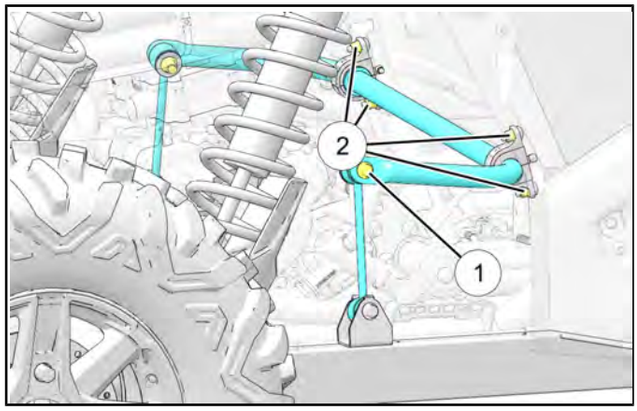
NOTICE
Use new attaching nuts upon installation of the rear radius rods.

TORQUE
Inner Radius Rod Mounting Bolts: **50 ft-lb (68 Nm) + 45°** Outer Radius Rod Mounting Bolts: **50 ft-lbs (68 Nm) + 90°**

⚠ WARNING
Upon radius rod installation, test vehicle at low speeds before putting into service.

REAR STABILIZER BAR REMOVAL

1. Lift and support vehicle by main frame.
2. Remove rear wheels nut and wheels.
3. Identify / mark top side of the stabilizer bar to reference during installation.
4. Remove the fasteners retaining the stabilizer bar to the linkage ① on each side of the vehicle.



5. Remove the four fasteners ② retaining the stabilizer bar to the vehicle frame.
6. Remove the bushing brackets and bushings for ease of removal.
7. Carefully remove the stabilizer from the LH wheel well area of the vehicle.
8. Inspect the stabilizer bar for straightness. Inspect the pivot bushings and replace if needed.

STABILIZER BAR INSTALLATION

1. Carefully install stabilizer bar through the LH wheel well area.

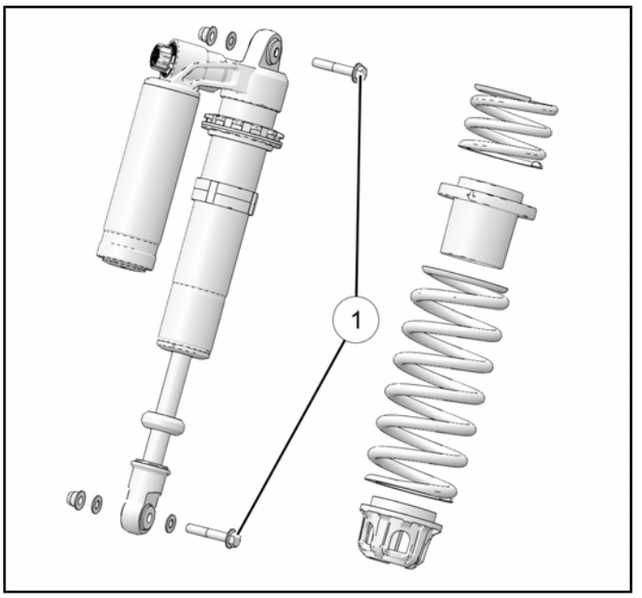
NOTICE
Be sure fuel lines and shift cable are routed ABOVE the stabilizer bar.

2. Fully install stabilizer bar, bushings, bracket and bracket fasteners and stabilizer links. Center stabilizer bar in the frame. Torque fasteners to specification (see below).
3. Torque all fasteners to specification (see below).
4. Lubricate stabilizer bar pivot bushings via grease fitting (fittings are accessible through skid plate).
5. Install rear wheels and wheel nuts. Torque wheel nuts to specification.

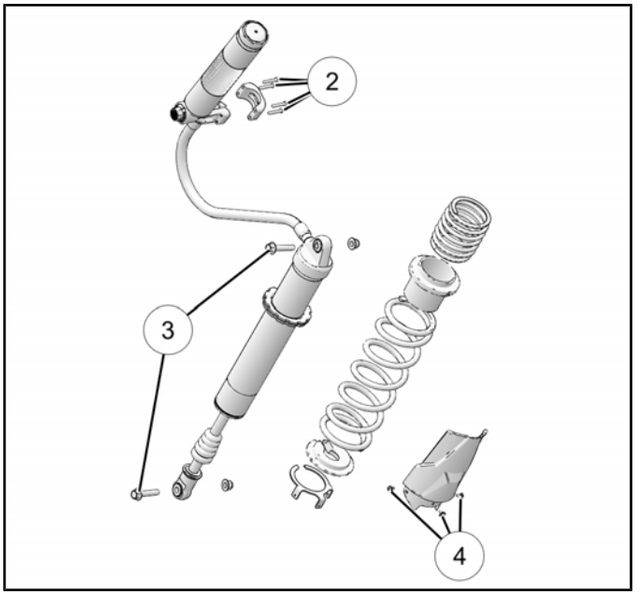
TORQUE
Rear Stabilizer Bar Linkage: **40 ft-lbs (54 N·m)** Stabilizer Bar Mounting Bracket Bolts: **17 ft-lbs (23 N·m)** Wheel Lug Nuts: **120 ft-lbs (163 N·m)**

SHOCKS / SPRINGS

SHOCK ASSEMBLY VIEW



① **42 ft-lbs (57 Nm)**	③ **70 ft-lbs (95 Nm)**
② **35 in-lb (4 Nm)**	④ **14 in-lbs (2 Nm)**
Retainer gap should be 180° from spring end	



SHOCK REMOVAL / INSTALLATION

1. Elevate the vehicle off the ground to relieve the suspension load.
2. Support under A-arm or trailing 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.

TORQUE
Shock Mounting Bolts: **Front: 42 ft-lbs (57 Nm)** **Rear: 70 ft-lbs (95 Nm)**

SHOCK / SPRING REPLACEMENT

1. Remove the shock and note the spring preload distance (see Spring Adjustment page .)
2. Loosen the 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.

NOTICE
The spring retainer gap should be 180° from the end of the spring upon installation.

5. Tighten the spring adjustment ring to set the preload distance noted in Step 1.
6. Reinstall the shock onto the vehicle and torque new fasteners to specification.

SPRING ADJUSTMENT

The front and rear shocks have a ride height 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 spring equally.

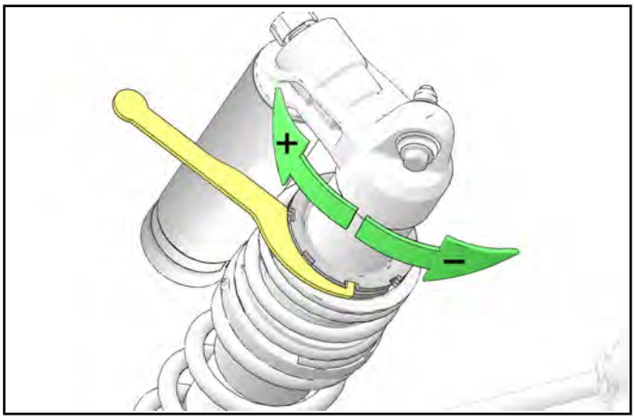
NOTICE

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

The factory setting is appropriate for nearly all riding conditions.

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

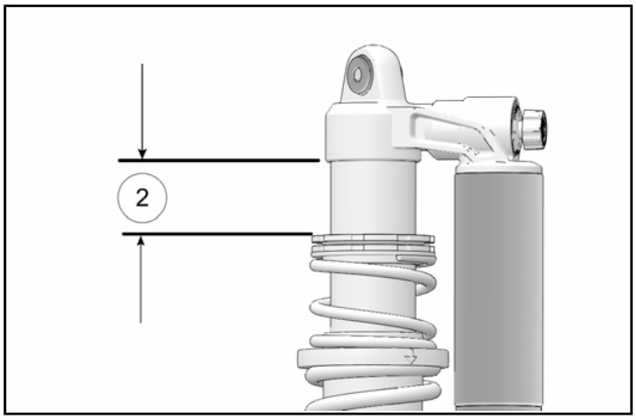
1. Raise and safely support front or rear of the vehicle off the ground to allow the suspension to fully extend.
2. Using the shock spanner/spreader tool included in the vehicle's tool kit, turn the adjustment collar to increase or decrease ride height.

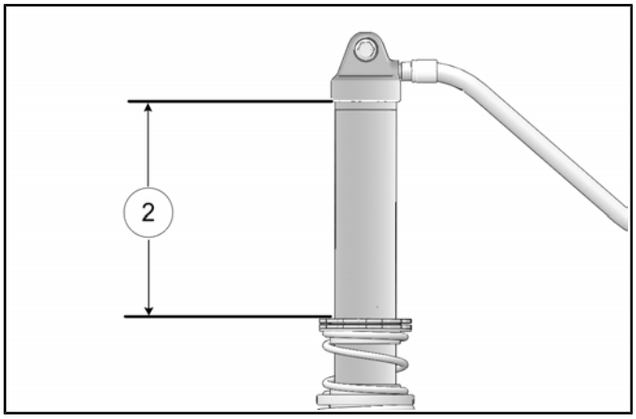


Shock Spanner / Clutch Spreader Tool:
2878925

NOTICE

DO NOT increase the spring adjustment ② by more than one inch (25.4 mm) over the factory setting without verifying loaded ride height.





SPRING ADJUSTMENT - FACTORY SETTING

	FRONT	REAR
RZR XP Turbo	1.90″ (4.83 cm)	8.31″ (21.11 cm)
RZR XP 4 Turbo	1.70″ (4.32 cm)	7.10″ (18.02 cm)

NOTICE

Always return the spring adjuster to the factory setting 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 the shock 'Piggyback' reservoir of each shock. Damping adjustments can be made without using any tools.

NOTICE
When the adjuster knob is turned counter-clockwise until it stops, the damping is in the fully open position (softest).

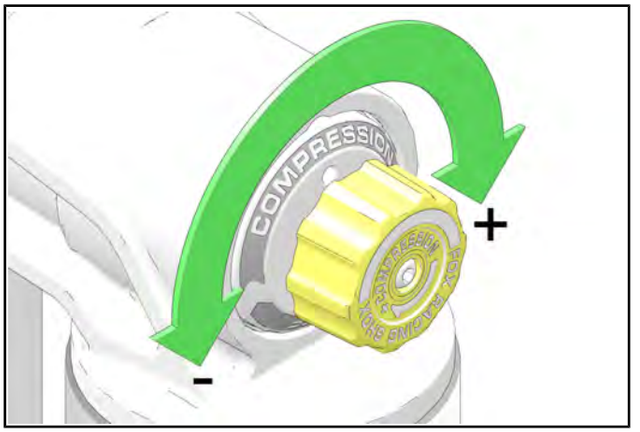
Turn the adjuster knob clockwise to increase compression damping. Turn the adjuster knob counter-clockwise to decrease compression damping.

NOTICE
The recommended factory setting for the front and rear shocks are provided in the following compression adjustment tables.

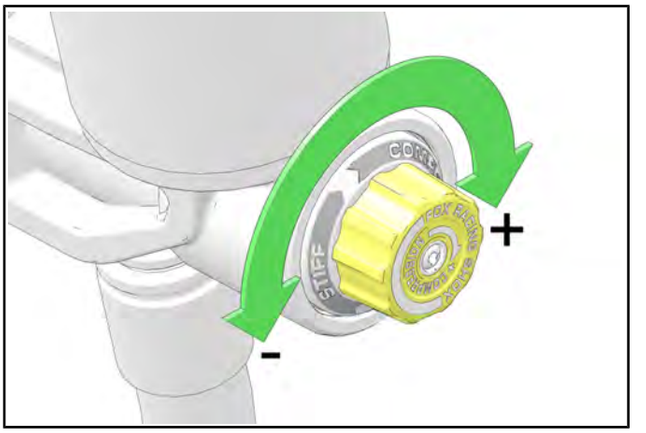
FOX 2.5″ FRONT SHOCK

SETTING	COMPRESSION DAMPING
Softest	Full counter-clockwise position
Factory	12 clicks CCW from full firm setting/full clockwise
Firmest	Full clockwise position

FRONT



REAR



FOX 3.0″ REAR SHOCK

SETTING	COMPRESSION DAMPING
Softest	Full counter-clockwise position
Factory	12 clicks CCW from full firm setting/full clockwise
Firmest	Full clockwise position

The rear shock adjuster can be found on the remote reservoir. Clockwise will increase damping and counter-clockwise will decrease damping.

FOX internal bypass shocks are position sensitive and become progressively stiffer as the suspension compresses. To maintain the intended ride comfort, it is important that ride height is maintained to the factory setting.

Adding extra weight to the vehicle will decrease ride height and cause the shock to operate in the stiffer bypass zones. To correctly compensate for added cargo or accessory weight, spring preload should be added to keep the shock in the optimal zone and maintain ground clearance.

Refer to the following adjustment table to correctly compensate for weight added to the vehicle.

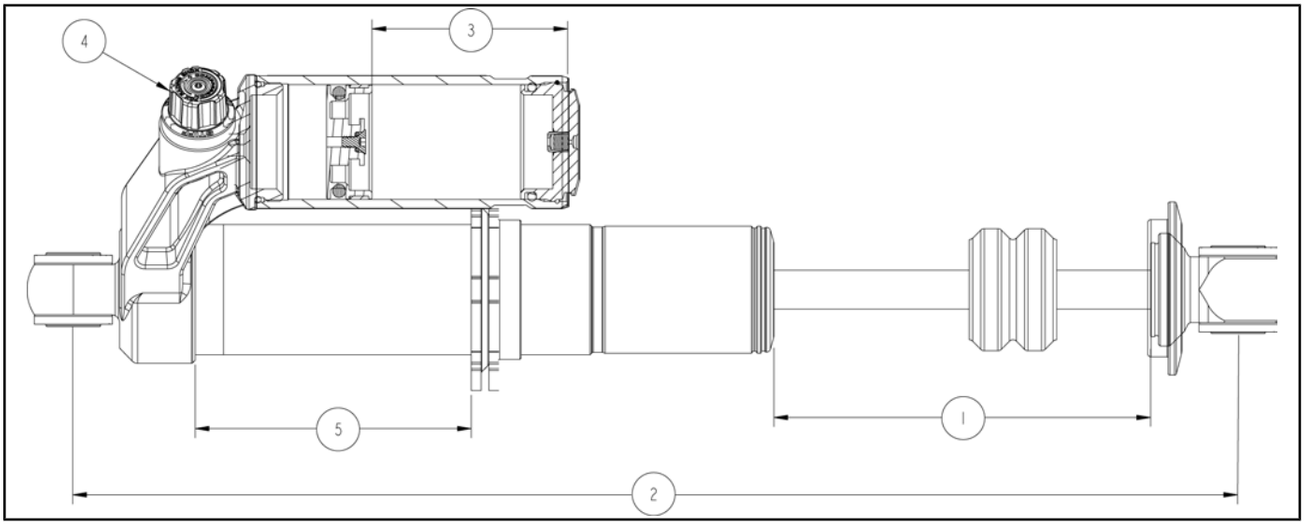
NOTICE
These settings are only guidelines. The spring preload and shock clickers can be adjusted further to match personal riding style and location of the weight on the vehicle.

FOX INTERNAL BYPASS SHOCK ADJUSTMENTS

RIDERS	CARGO + ACCESSORIES	SPRING ADJUSTMENT	FRONT SHOCK	REAR SHOCK
Driver Only	0	Remove 0.2″ (5 mm) preload, front and rear	16 clicks out	16 clicks out
Driver +1	0	**Factory default**	12 clicks out	12 clicks out
Driver +1	100 lbs (45 kg)	Add 0.2″ (5 mm) preload, front and rear	10 clicks out	10 clicks out
Driver +1	200 lbs (91 kg)	Add 0.4″ (10 mm) preload, front and rear	8 clicks out	8 clicks out
Driver +1	300 lbs (136 kg)	Add 0.6″ (15 mm) preload, front and rear	6 clicks out	6 clicks out

** shaded cells are factory default settings*

FOX 2.5″ FRONT SHOCK INFORMATION



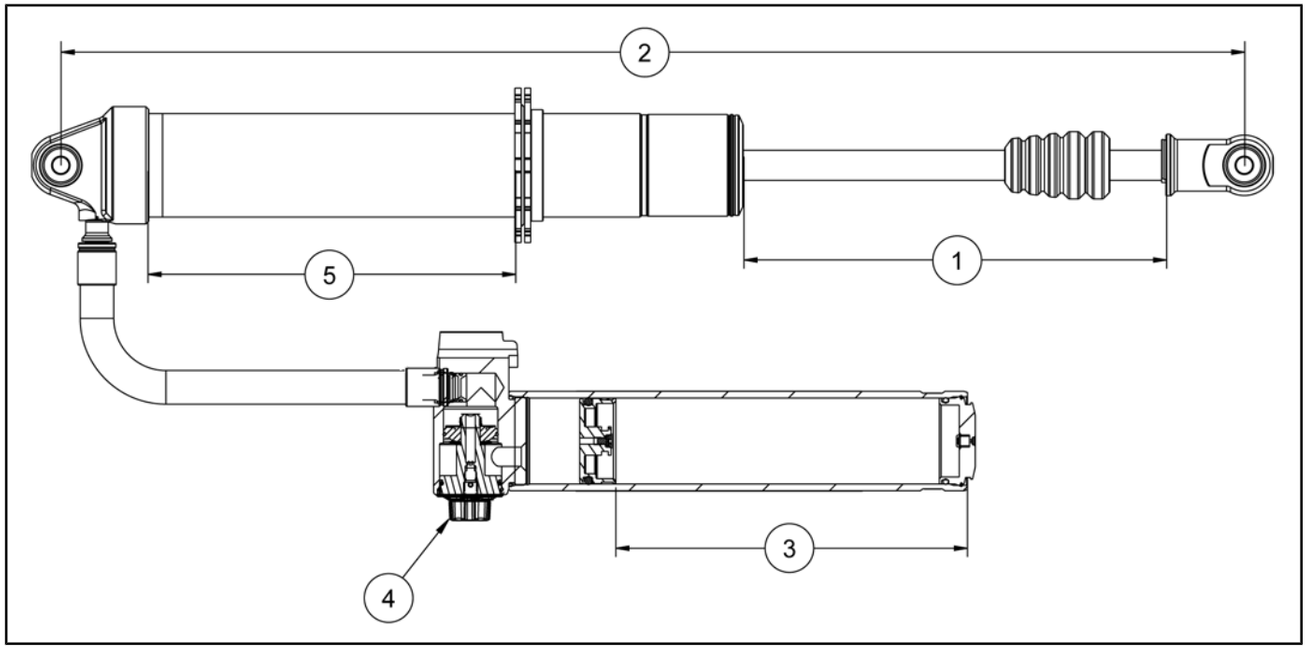
FRONT SHOCK SPECIFICATIONS

	RZR XP TURBO	*RZR* XP 4 TURBO
Shock Travel ①	8.44″ (21.44 cm)	8.44″ (21.44 cm)
Extended Length ②	25.09″ (63.73 cm)	25.09″ (63.73 cm)
IFP Depth ③	5.70″ (14.48 cm)	5.70″ (14.48 cm)
Nitrogen Pressure	100 psi (690 kPa) +/- 5%	100 PSI (690 kPa) +/- 5%
Gas Shock Oil	2874124 (qt.)	2874124 (qt.)
Compression Adjustment (factory) ④	12 clicks CCW from full firm setting/ full clockwise	12 clicks CCW from full firm setting/ full clockwise
Spring Adjustment Setting ⑤	1.90″ (4.83 cm)	1.70″ (4.32 cm)

FRONT SHOCK VALVING

RZR XP TURBO		*RZR* XP 4 TURBO	
COMPRESSION	**REBOUND**	**COMPRESSION**	**REBOUND**
1.600 x 0.006 SB	1.425 x 0.012	1.600 x 0.006 SB	1.425 x 0.012
1.600 x 0.015	1.350 x 0.012	1.600 x 0.015	1.350 x 0.012
1.425 x 0.015	1.250 x 0.012	1.425 x 0.015	1.250 x 0.012
1.350 x 0.015	1.100 x 0.012	1.425 x 0.015	1.100 x 0.012
1.250 x 0.015	0.950 x 0.012	1.350 x 0.015	0.950 x 0.012
1.100 x 0.015	0.800 x 0.012	1.250 x 0.015	0.800 x 0.012
0.950 x 0.015	0.875 x 0.100 (Back Up)	1.100 x 0.015	0.875 x 0.100 (Back Up)
0.800 x 0.015	0.875 x 0.100 (Back Up)	0.900 x 0.015	0.875 x 0.100 (Back Up)
1.570 x 0.128 (Top Out)		1.570 x 0.128 (Top Out)	

FOX 3.0″ REAR SHOCK INFORMATION



REAR SHOCK SPECIFICATIONS

	RZR XP TURBO	*RZR* XP 4 TURBO
Shock Travel ①	12.14″ (30.82 cm)	12.14″ (30.82 cm)
Extended Length ②	34.34″ (87.2 cm)	34.34″ (87.2 cm)
IFP Depth ③	7.00″ (17.78 cm)	7.00″ (17.78 cm)
Nitrogen Pressure	100 psi (690 kPa) +/- 5%	100 PSI (690 kPa) +/- 5%
Gas Shock Oil	2874124 (qt.)	2874124 (qt.)
Compression Adjustment (factory) ④	12 clicks CCW from full firm setting/ full clockwise	12 clicks CCW from full firm setting/ full clockwise
Spring Adjustment Setting ⑤	8.31″ (21.09 cm)	7.10″ (18.03 cm)

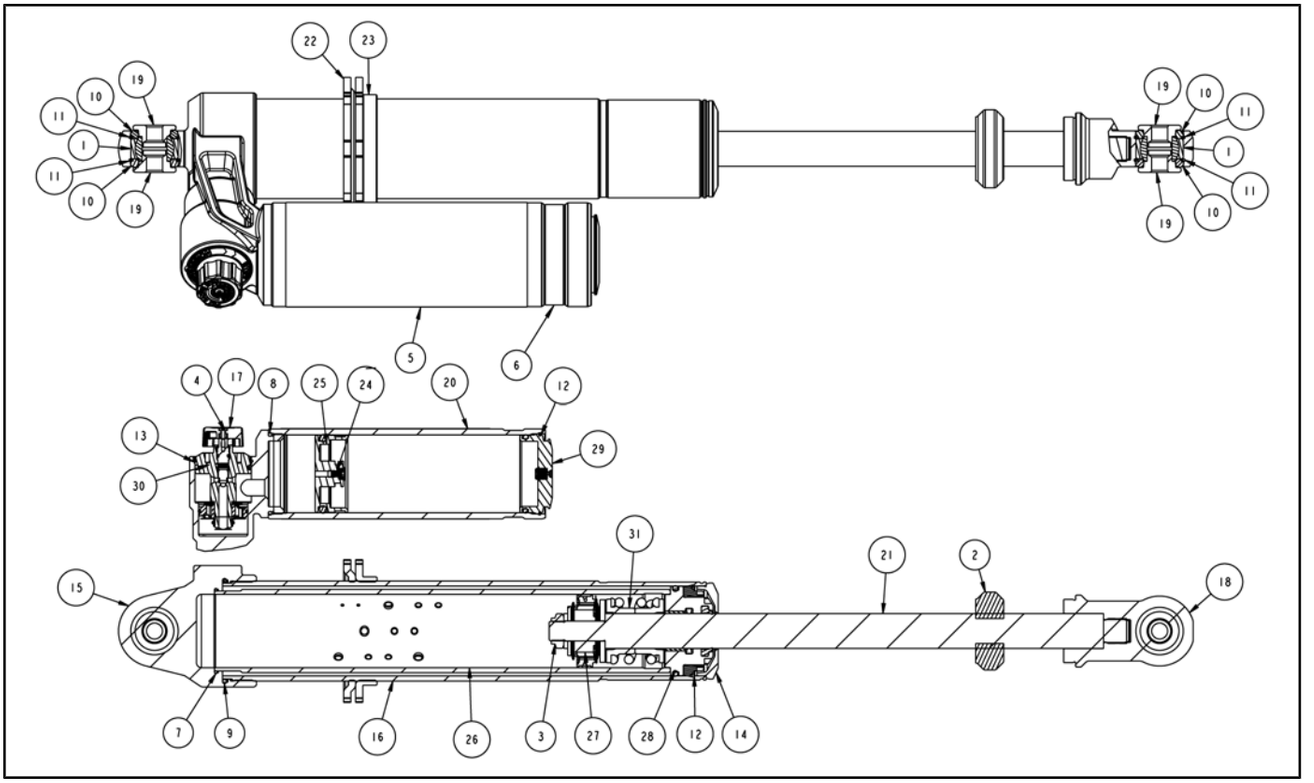
REAR SHOCK VALVING

RZR XP TURBO		*RZR* XP 4 TURBO	
COMPRESSION	**REBOUND**	**COMPRESSION**	**REBOUND**
1.800 x 0.006 SB	1.600 x 0.015	1.800 x 0.006 SB	1.600 x 0.012
1.800 x 0.015	1.425 x 0.015	1.800 x 0.015	1.425 x 0.012
1.600 x 0.015	1.350 x 0.015	1.600 x 0.015	1.350 x 0.012
1.425 x 0.015	1.250 x 0.015	1.425 x 0.015	1.250 x 0.012
1.350 x 0.015	1.100 x 0.015	1.350 x 0.015	1.100 x 0.012
1.250 x 0.015	0.950 x 0.015	1.250 x 0.015	0.950 x 0.012
1.100 x 0.015	0.800 x 0.015	1.100 x 0.015	0.800 x 0.012
0.950 x 0.015	0.800 x 0.020	0.950 x 0.015	0.875 x 0.100 (Back Up)
0.800 x 0.015	0.800 x 0.020	0.800 x 0.015	0.875 x 0.100 (Back Up)
1.570 x 0.128 (Top Out)	0.875 x 0.100 (Back Up)	1.570 x 0.128 (TO)	

SHOCK SERVICE

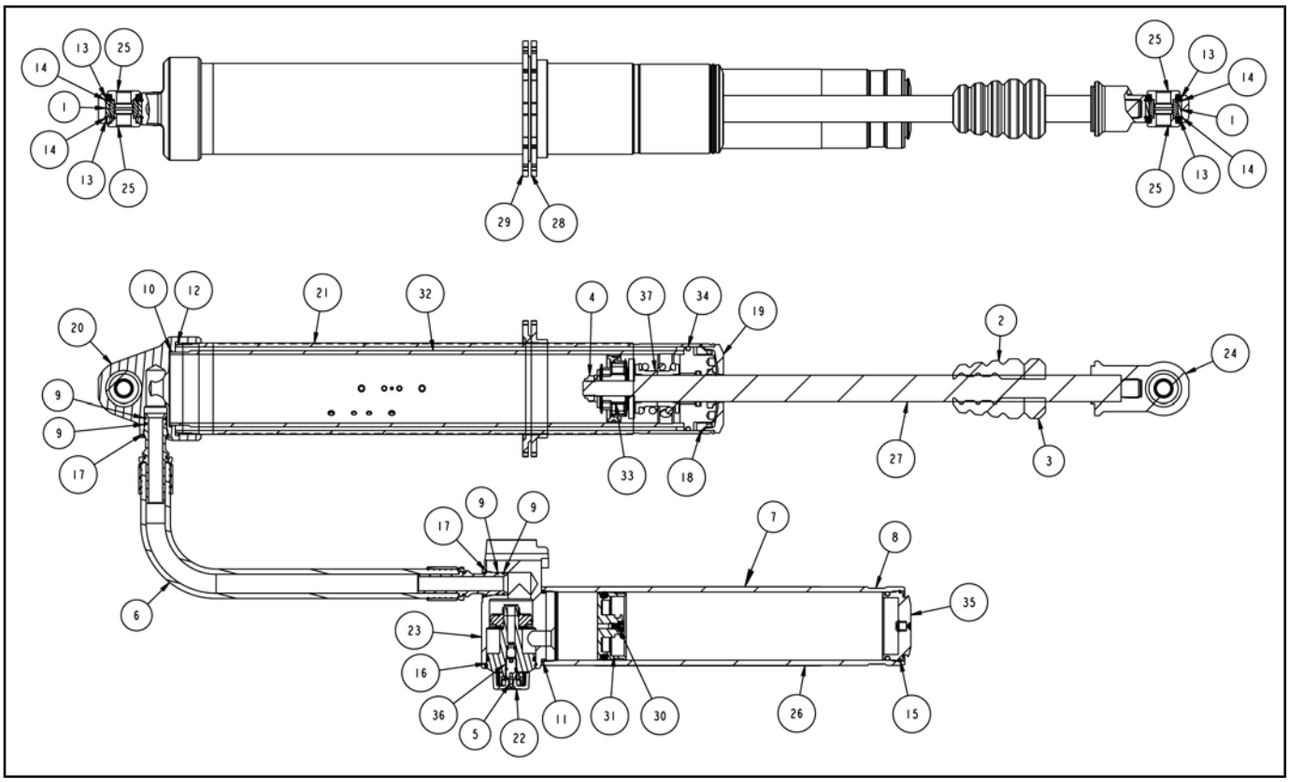
FOX SHOCK SERVICE

FOX 2.5" O.E. PODIUM BYPASS



① Spherical Bearing	⑰ Low Speed Adjuster Knob
② Bumper	⑱ Eyelet
③ Lock Nut	⑲ Reducer
④ Screw	⑳ Reservoir
⑤ Reservoir Decal	㉑ Shaft
⑥ Band Decal	㉒ Spring Adjuster Ring
⑦ O-ring	㉓ Spring Adjuster Ring Backup
⑧ O-ring	㉔ Screw Assembly
⑨ O-ring	㉕ Piston Assembly
⑩ O-ring	㉖ Internal Bypass Body Assembly
⑪ Retaining Ring	㉗ Valving Assembly
⑫ Retaining Ring	㉘ Bearing Assembly
⑬ Retaining Ring	㉙ Reservoir End Cap Assembly
⑭ Bearing Cap	㉚ Damping Adjust Assembly
⑮ Body Cap	㉛ Sparing Hardware Assembly
⑯ Body	

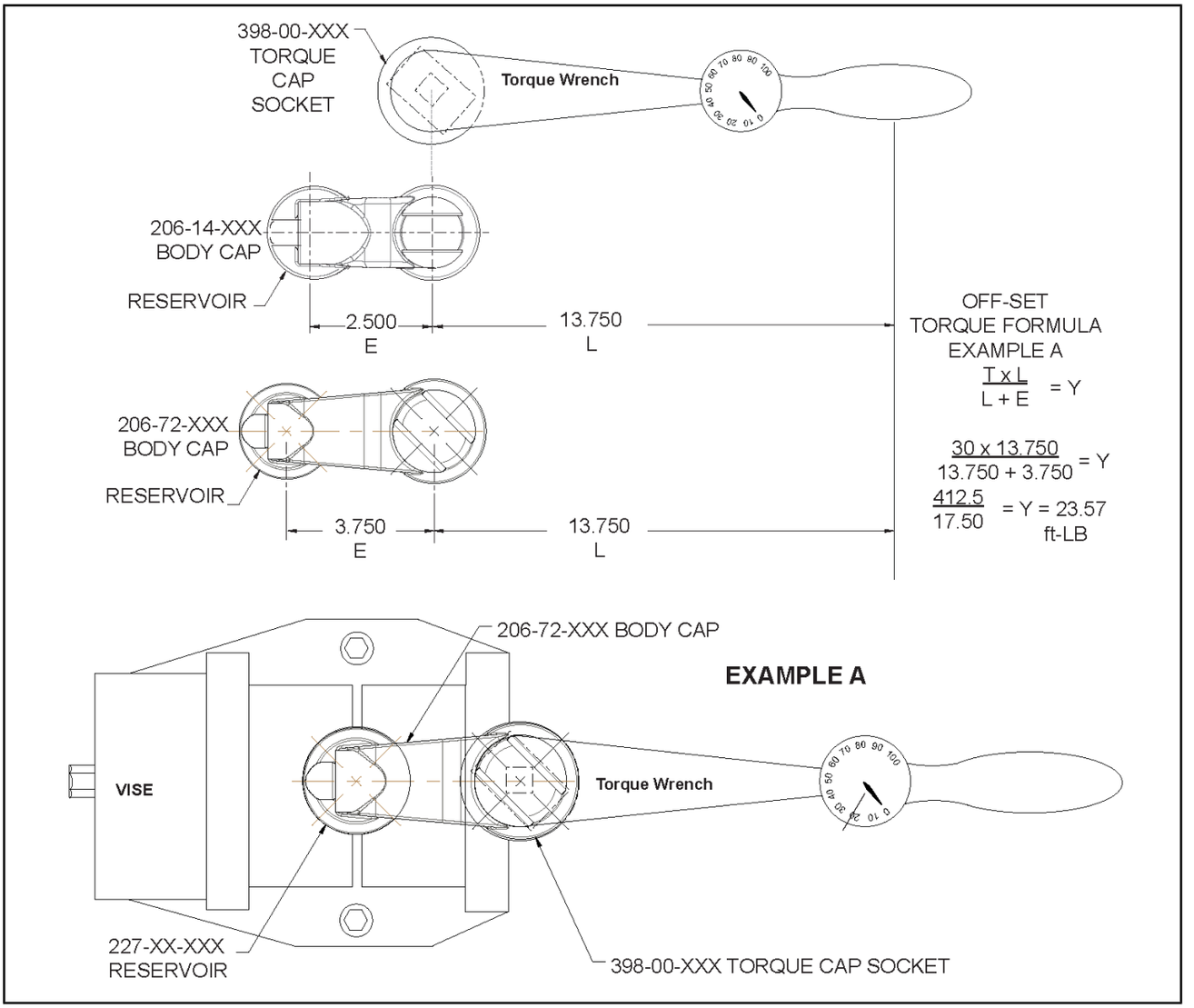
FOX 3.0" O.E. PODIUM BYPASS



① Spherical Bearing	⑭ Retaining Ring	㉗ Shaft
② Upper Bumper	⑮ Retaining Ring	㉘ Spring Adjuster Ring
③ Lower Bumper	⑯ Retaining Ring	㉙ Spring Adjuster Ring Backup
④ Lock Nut	⑰ Retaining Ring	㉚ Screw Assembly
⑤ Screw	⑱ Retaining Ring	㉛ Piston Assembly
⑥ Hose	⑲ Bearing Cap	㉜ Internal Bypass Body Assembly
⑦ Reservoir Decal	⑳ Body Cap	㉝ Valving Assembly
⑧ Band Decal	㉑ Outer Body	㉞ Bearing Assembly
⑨ O-ring	㉒ Low Speed Adjuster Knob	㉟ Reservoir End Cap Assembly
⑩ O-ring	㉓ Remote Reservoir Adjust Port	㊱ Damping Adjust Assembly
⑪ O-ring	㉔ Eyelet	㊲ Spring Hardware Assembly
⑫ O-ring	㉕ Reducer	
⑬ O-ring	㉖ Reservoir	

OFFSET TORQUE FORMULA

For example, if you had to torque a reservoir body on a Body Cap 206-72-XXX to 30 ft-lb
Run down Body Cap on Reservoir.
Place reservoir in Body Clamps 803–00–XXXX in a Vise.
Use Body Cap Socket 398–00–XXX to torque the body cap with a torque wrench to 24 ft-lb of torque.



Torque (T) = 30 ft-lb of desired torque	Example A
Y = Unknown Torque Value	Set Torque Wrench to 24 ft-lb
L = 13.750″	Will equal 30 ft-lb of torque applied to the reservoir.
E = 3.750″ or 2.500″ **depending on body cap*	

FOX SHOCK DISASSEMBLY

A training video is available on University of Polaris (https://lms.latitudelearning.com/home/main.aspx) for disassembly of Podium Internal Bypass shocks. Search for “Podium Internal Bypass Shock”.

⚠ CAUTION

Always wear safety glasses and read directions completely before disassembling the shock

IMPORTANT

Inspect the shock for signs of oil leakage prior to any disassembly or cleaning.

Cleanliness is critical; make sure your work area is clean and organized prior to starting work.

Contamination of the shock will lead to premature wear and poor function of your shocks.

When replacing a seal during a service, make sure the new seal is the same size, shape, and material as the one you are replacing. In some cases, there may be two or more seals in the rebuild kit that look similar.

In this manual we will completely disassemble the entire shock. Many shock services may not require complete disassembly of some components. Example if the eyelet is tight to the shaft it may not require removal or if the shock body and body cap do not show any signs of oil leakage and they are tight, they may not require removal.

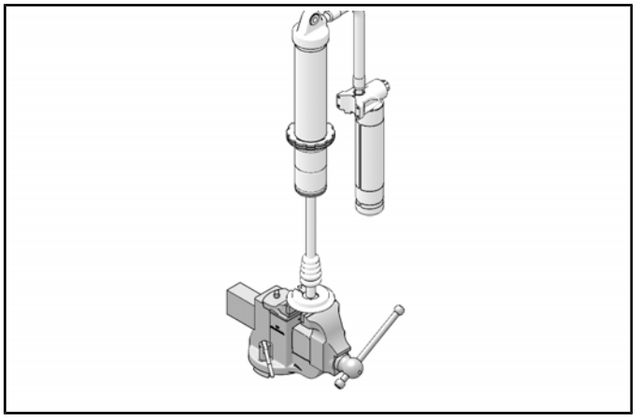
Record compression adjuster settings by counting the number of clicks in (clockwise) until the adjuster stops. Once you have recorded the numbers, back all adjusters out counter clockwise to the (full soft) position.

Record spring length preload distance prior to spring removal. To remove spring back preload collars off enough to remove spring retainer.

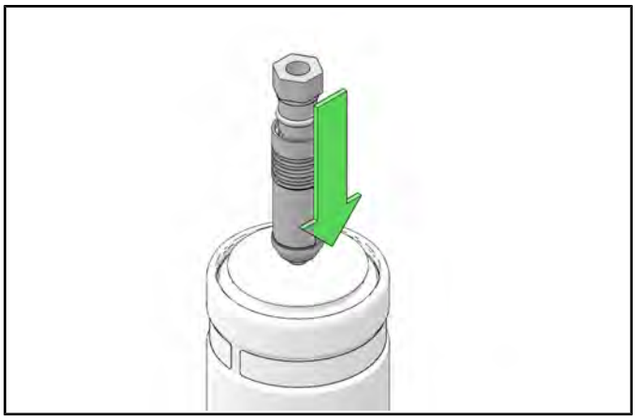
Clean the entire shock assembly with soapy water or mild solvent. Rinse and dry shock.

Ensure you have obtained the correct rebuild kit and oil prior to disassembly.

1. Clamp the shock body securely in a vice.

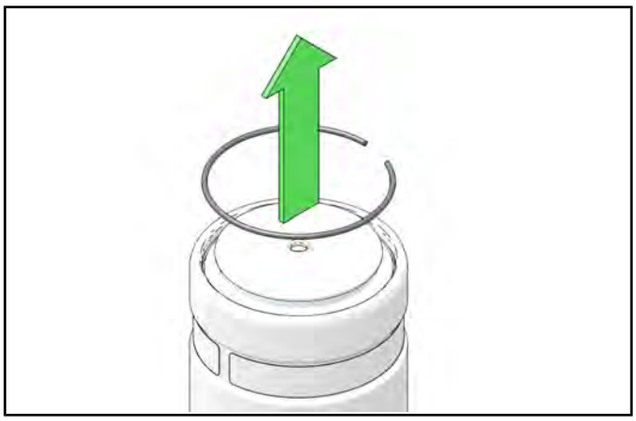


2. Discharge nitrogen pressure from reservoir using the gas fill tool needle.

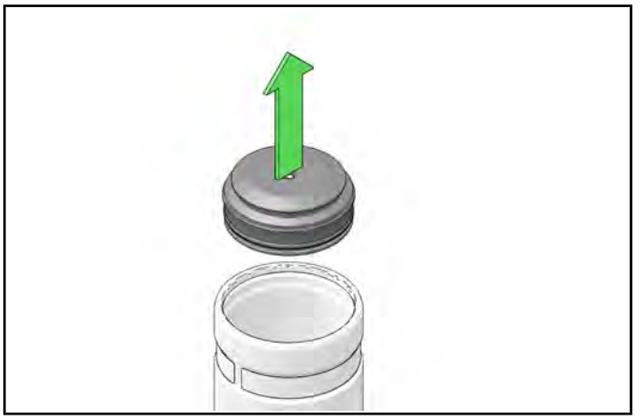


Gas Fill Tool:
PS-45259

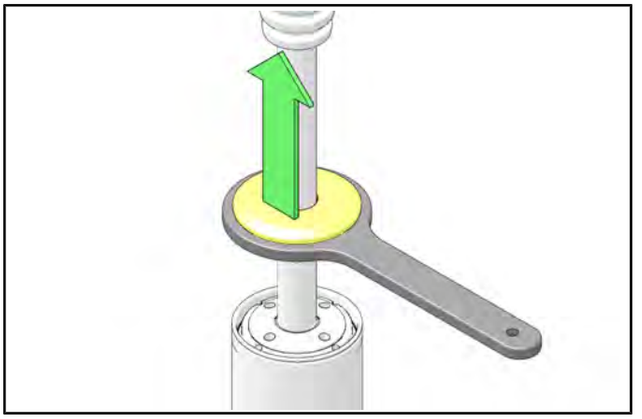
3. Once the nitrogen has been released, depress reservoir cap and remove retaining ring. Typically, a valve shim can be used.



4. Remove reservoir end cap from reservoir.



5. Slide body cap removal tool over body and place the retaining ring from the reservoir end cap around the body cap. Slide the tool up to the retaining ring and tap with hammer to remove.

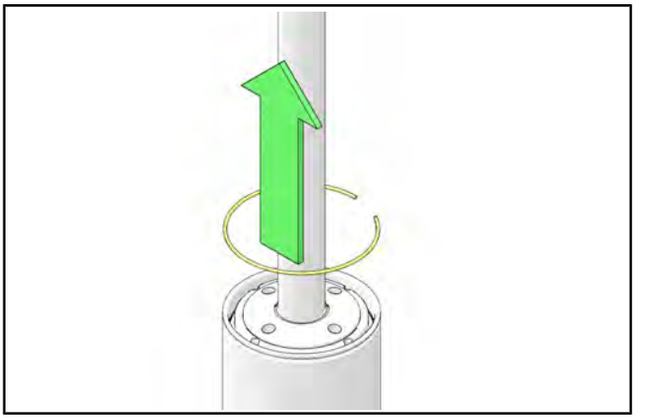


6. Once the cap is removed it will expose the bearing assembly. On 2.5 diameter shocks, you will need to apply a sufficient amount of heat to the bearing assembly to break the Loctite bond between the cinch ring and the bearing assembly.

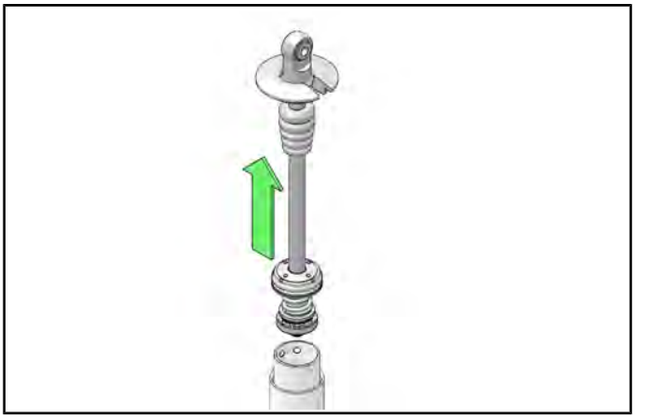
NOTICE
The seal will be destroyed from the heat and must be replaced.

7. Hold cinch ring with spanner and rotate bearing assembly counter-clockwise to release pressure on retaining ring.

8. Press down on bearing assembly and remove retaining ring.



9. Remove the shaft assembly and body assembly.



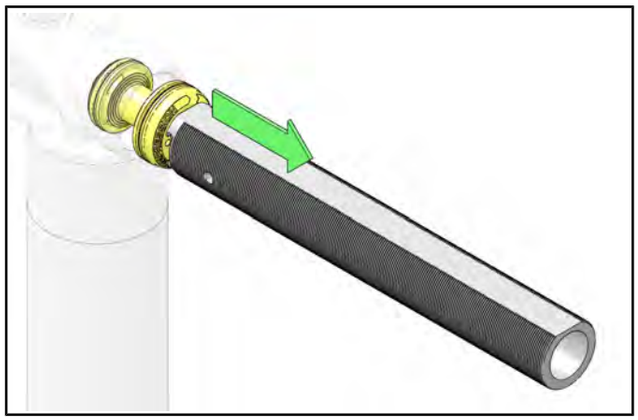
10. Use the IFP tool to hold the IFP.

IFP Tool: **commercially available** *also available from FOX 398-00-394*

11. Remove bleed screw and o-ring with extra long 1/8" hex wrench.

12. Remove IFP.
13. Dump out used shock oil.
14. Using a #10 Torx screwdriver remove screw from LSC.

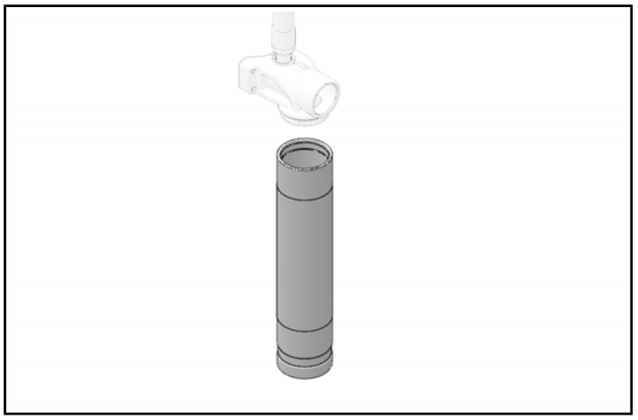
15. Push in on LSC and remove retaining ring.



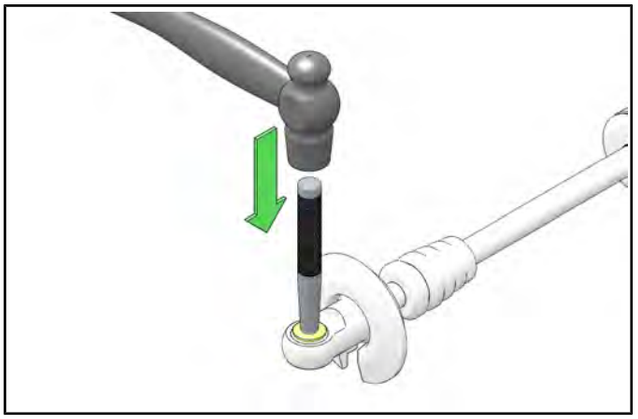
16. Use the IFP tool to remove LSC.

IFP Tool:
commercially available
also available from FOX 398-00-394

17. Use a strap wrench to remove the reservoir.

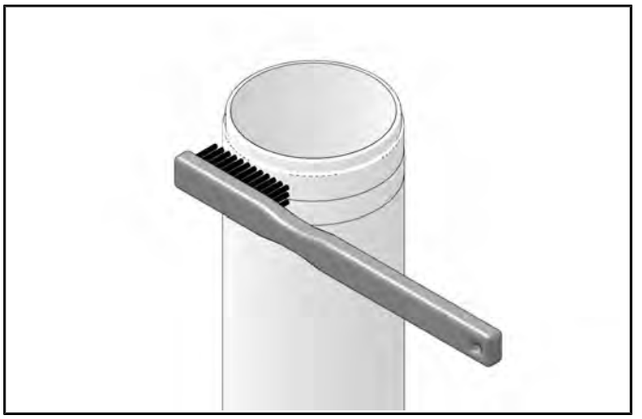


18. To remove pressed in reducers, use a tapered pin punch and hammer. Drive pin punch into reducer with a couple of medium taps with the hammer. Tap the pin punch out and remove the reducer from the tapered pin punch.

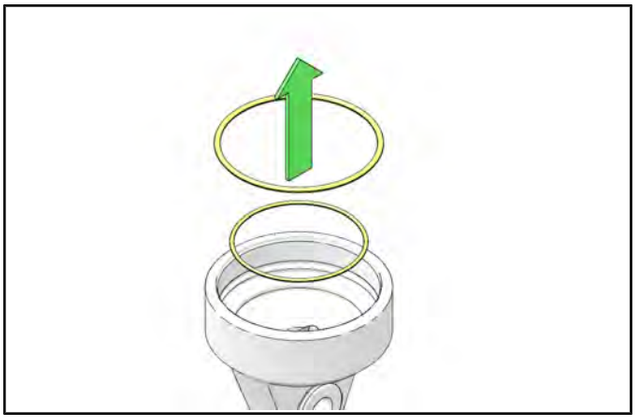


19. Remove both internal retaining rings.
20. Press out the spherical bearing with mandrel or socket, press only on the bearing race.
21. Ensure reservoir o-ring has been removed.
22. With the body of the shock placed in clamp block and secured in vise, apply a sufficient amount of heat to the body cap with a propane torch to remove the body cap with the correct body cap socket.

23. Use a wire brush, heat and a pick to remove any Loctite residue left on body threads. Clean thoroughly with contact cleaner and lint-free towel inside and out.

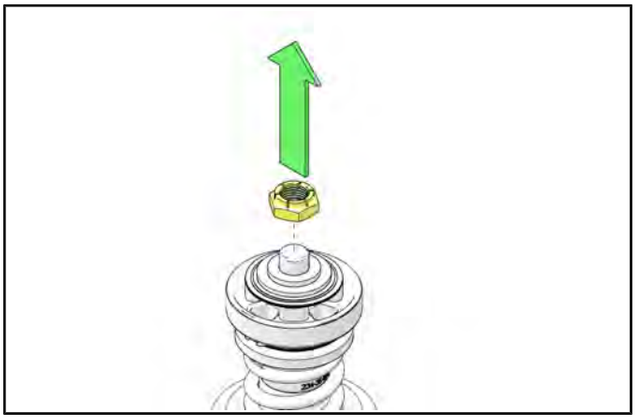


24. Remove both internal o-rings.

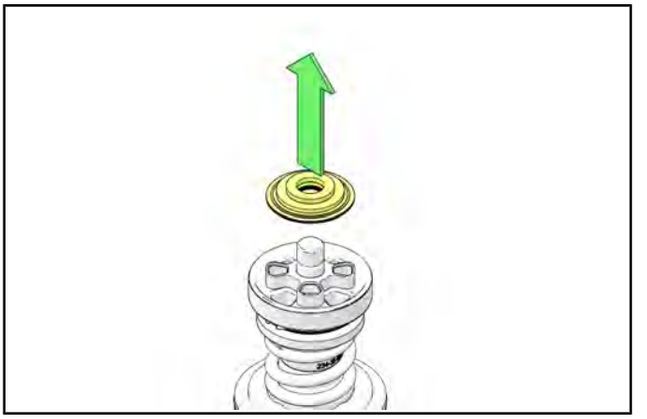


25. Use a wire brush, heat and a pick to remove any Loctite residue left on body cap threads. Clean thoroughly with contact cleaner and lint-free towel inside and out.

26. Remove lock nut from the shaft assembly.



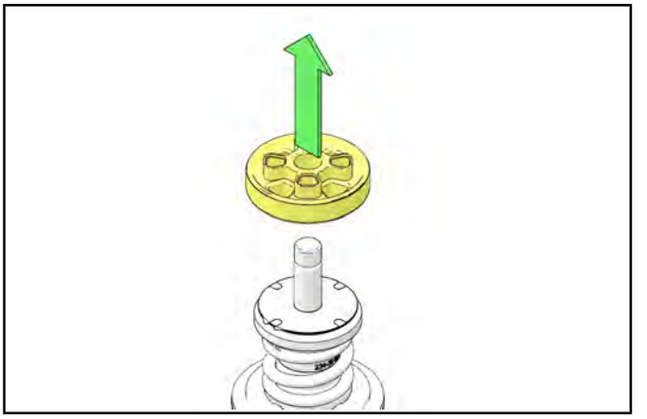
27. Remove rebound valve stack from the assembly and cable tie together. Clean with contact cleaner.



NOTICE

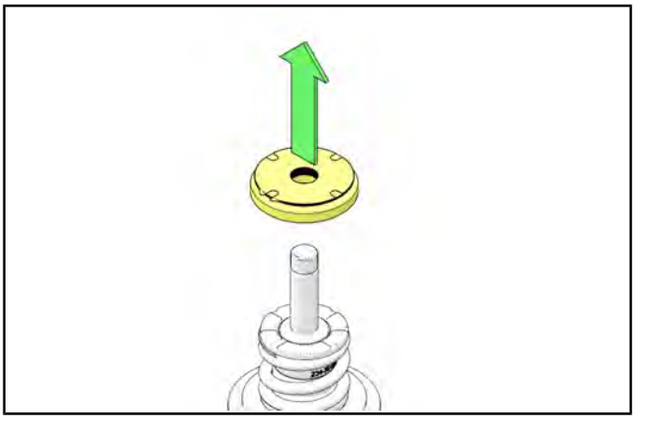
Damping pistons are directional. Rebound side shown.

28. Remove damping piston.

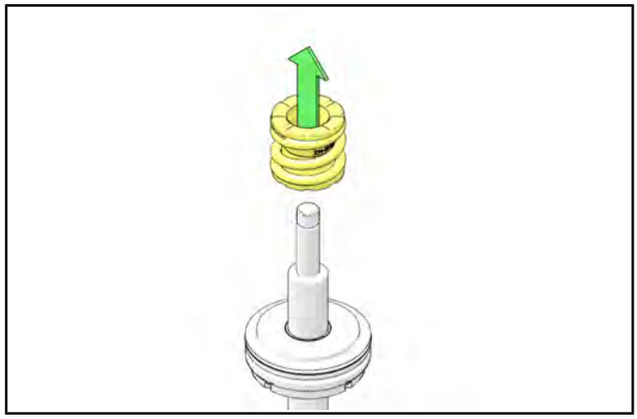


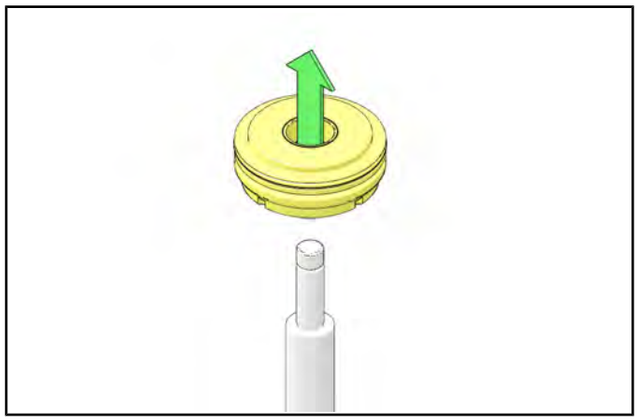
29. Note the bleed shim orientation on compression valve stack.

30. Remove compression valve stack and cable tie together. Clean with contact cleaner.



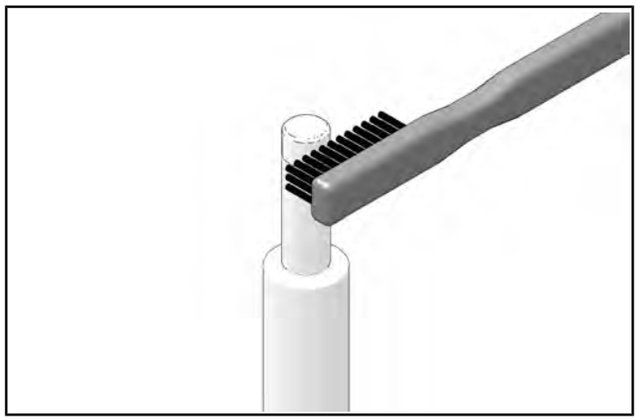
31. Remove negative spring assembly, bearing assembly, and bumper.



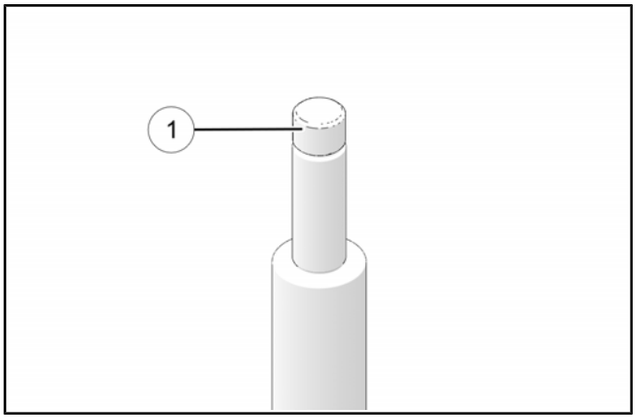


32. With the shaft assembly placed in clamp block and secured in vise, apply a sufficient amount of heat to the eyelet with a propane torch to remove the eyelet with the correct body cap socket.

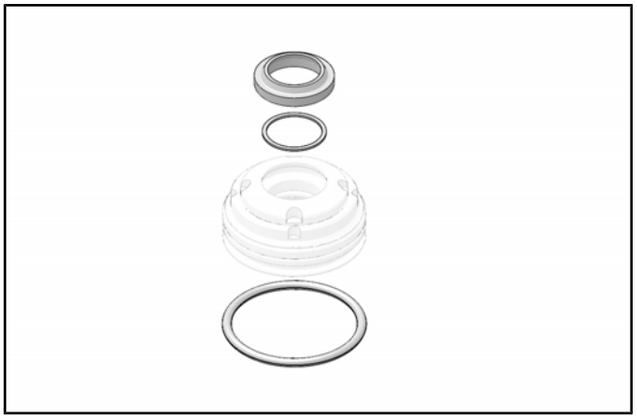
33. Use a wire brush, heat, and a pick to remove any Loctite residue left in the eyelet and shaft threads. Clean thoroughly with contact cleaner and lint-free towel.



34. Apply Loctite primer 7649 to eyelet threads ①. Wipe over-spray off any external surface.



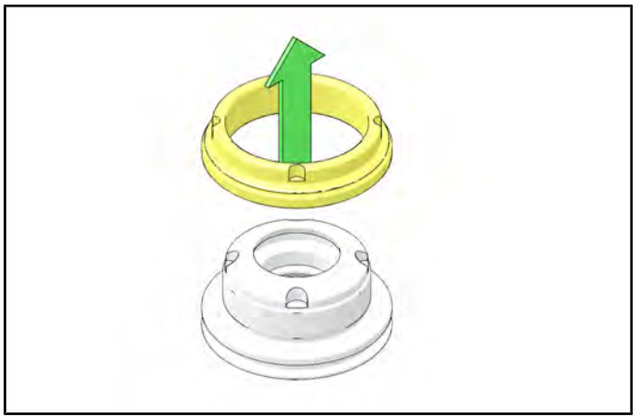
35. Remove all seals and o-rings from bearing assembly.



NOTICE

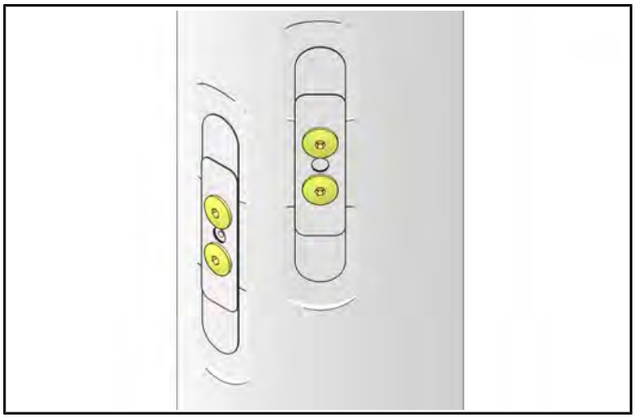
If the DU bearing needs replacement, replace the complete bearing assembly.

36. Clean all surfaces of the bearing housing and cinch ring.



Bypass internal body assembly

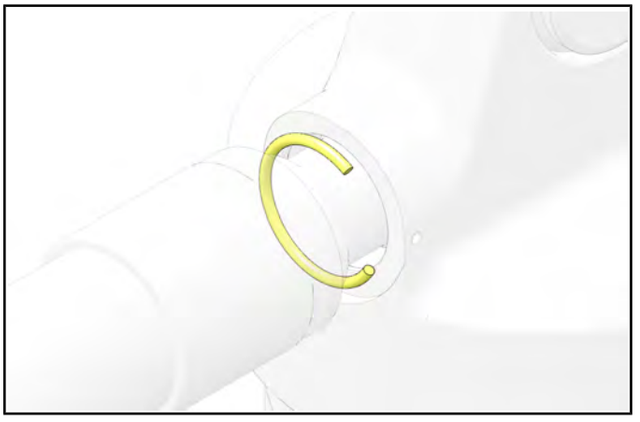
37. Remove screws using a 5/64" hex wrench.



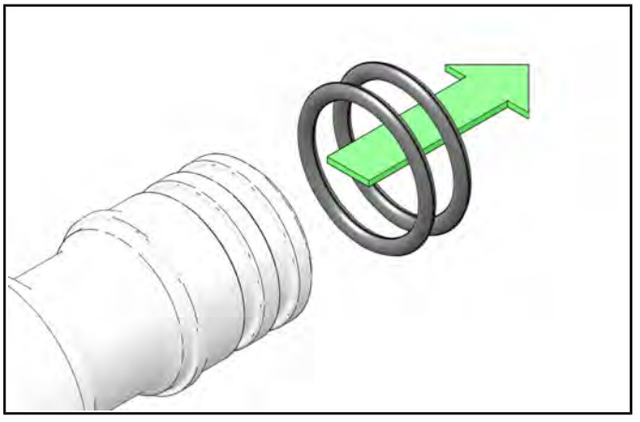
NOTICE

Observe location, size and thickness of bypass valves.

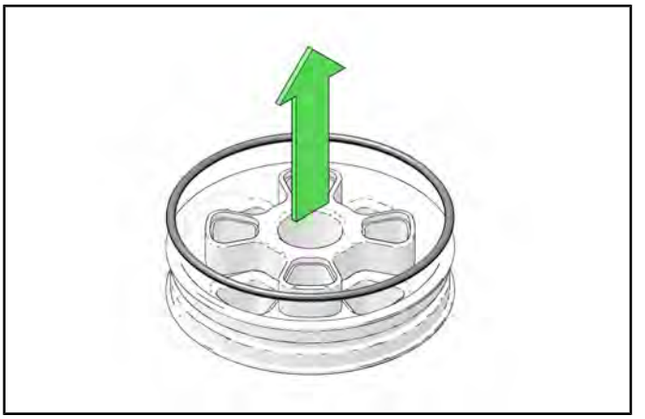
38. To remove the remote hose assembly, de-pressurize reservoir, push hose in and remove retaining ring with a small pick.



39. Remove hose o-rings.

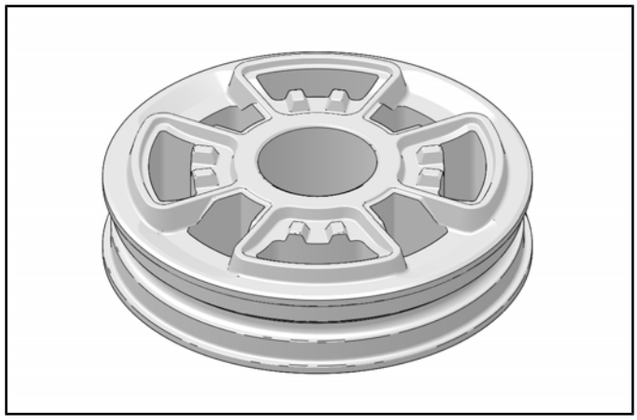


40. Pistons are equipped with an energizing o-ring under piston bearing. Clean the surface with contact cleaner.

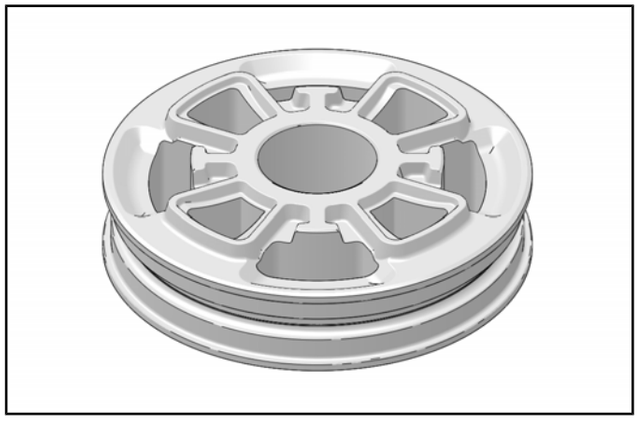


2.5 Bypass Piston

Compression Side



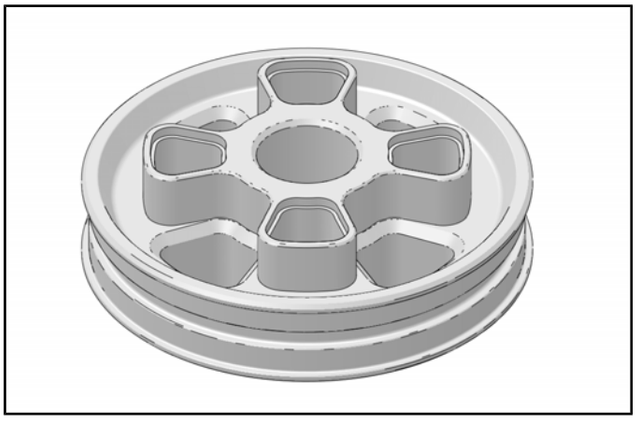
Rebound Side



3.0 Bypass Piston

Compression Side

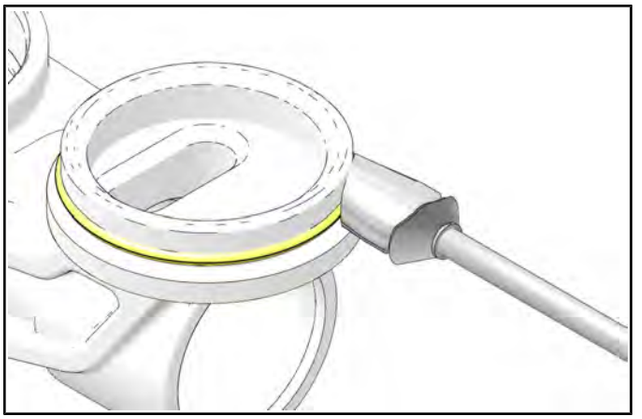
Rebound Side



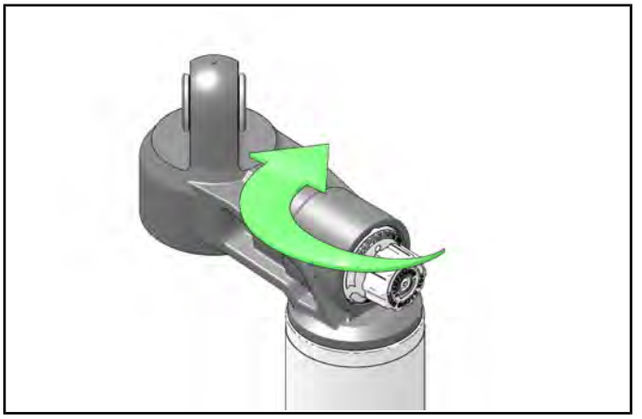
FOX SHOCK ASSEMBLY

A training video is available on University of Polaris (https://lms.latitudelearning.com/home/main.aspx) for assembly of Podium Internal Bypass shocks. Search for “Podium Internal Bypass Shock”.

1. Install reservoir o-ring and apply a thin layer of slick honey on o-ring.



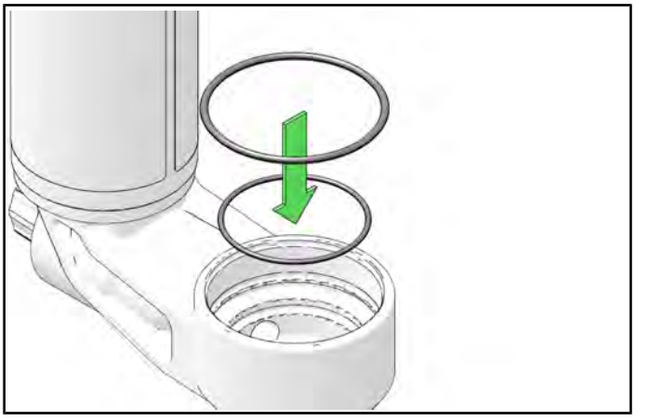
2. Using clamp blocks to secure reservoir in vise, torque body cap to specification using the offset formula. See Offset Torque Formula page 9.30.



TORQUE
Body Cap (step 1): **30 ft-lb (42 Nm)**

3. With body prepared with Loctite primer add a layer of Loctite 638 2 threads up, 2 threads wide 360°.

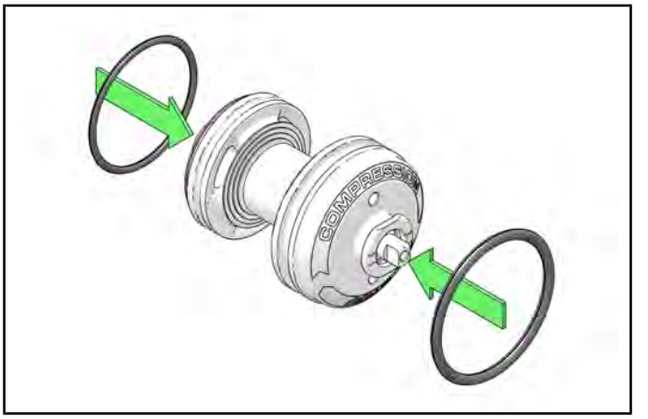
4. Apply a thin layer of Slick Honey to body cap o-rings.



5. Install both o-rings in body cap. Ensuring no Slick Honey is on threads.
6. Torque body cap to final specified torque with body cap socket.

TORQUE
Body Cap (step 2): **100 ft-lb (135 Nm)**

7. Apply Slick honey to LSC o-ring and install.



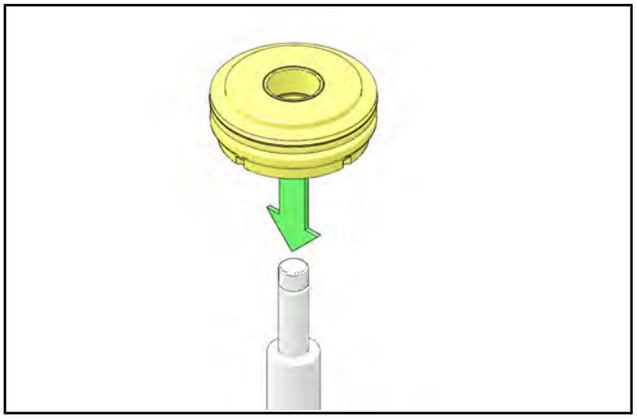
8. Install LSC and retaining ring.

9. With the retaining ring fully installed, position LSC with IFP tool.
10. Install retaining ring.
11. Press spherical bearing into position.
12. Install retaining ring.
13. Apply Loctite 638 to shaft, 2 threads up, 2 threads wide 360°.
14. Torque eyelet to specification with shaft secured in clamp blocks.

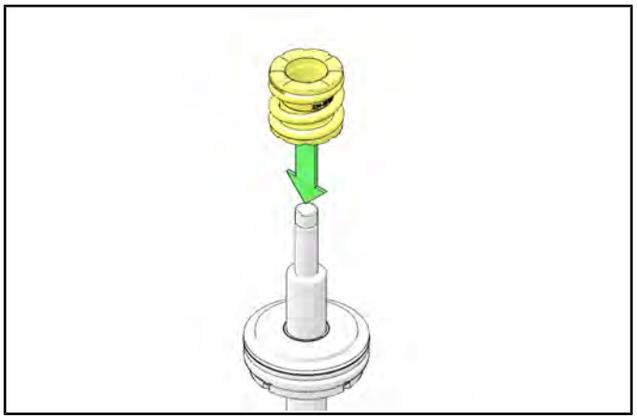
TORQUE
Shock Eyelet: **50 ft-lb (68 Nm)**

15. Install 398-00-095-B Bullet tool on shaft to install bumper.
16. Install body cap.
17. Install T-seal.
18. Install 1st T-seal back-up ring.
19. Install 2nd T-seal back-up ring
20. Install wiper seal.
21. Lubricate all seals with Slick Honey.
22. Install external o-ring.

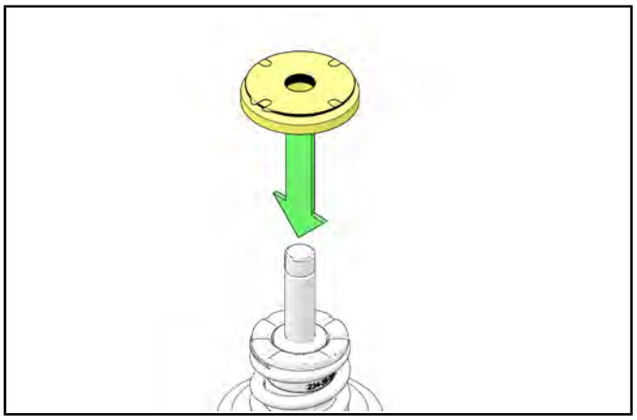
23. Install bearing assembly with cinch ring.



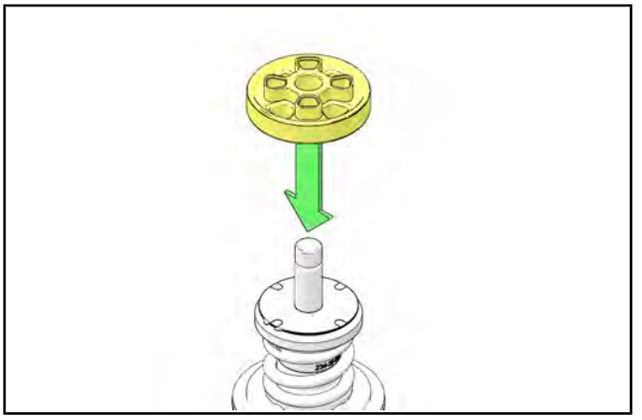
24. Install negative spring assembly.



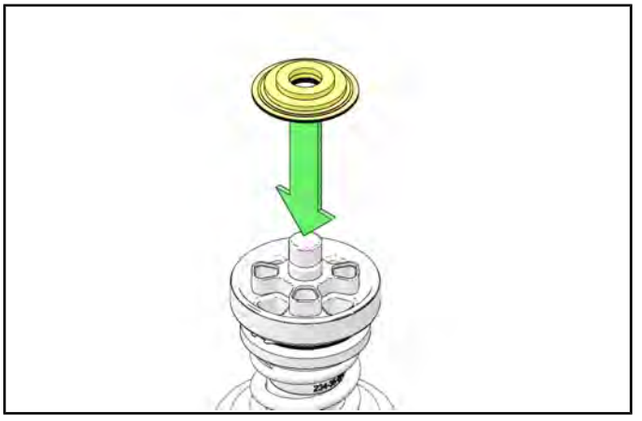
25. Install compression valve stack.



26. Install piston with compression port in-line with bleed shim.

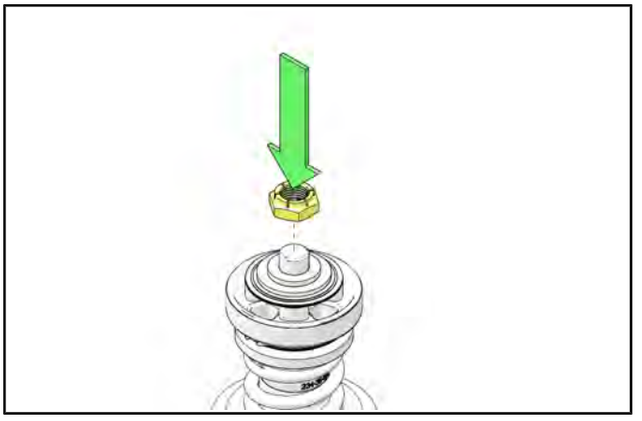


27. Install rebound valve stack.



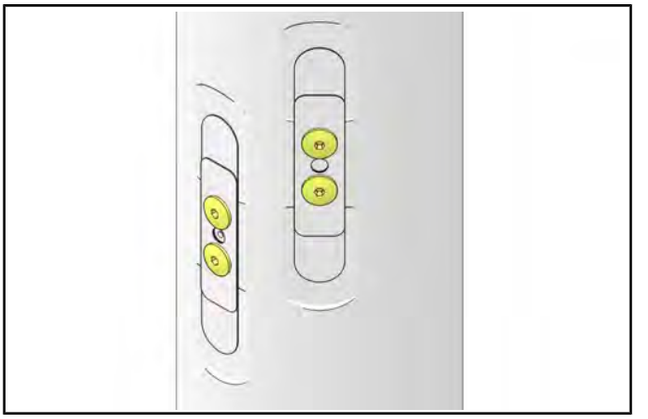
28. Install shaft nut and torque to specification.

TORQUE
Shaft Nut: **22 ft-lb (30 Nm)**



29. Install all Bypass check valves.

30. Use Loctite 242 (Blue) on bypass screws. Torque bypass screws to specification.

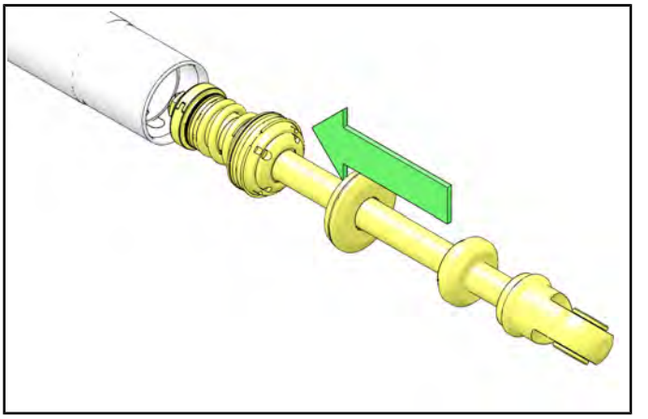


TORQUE
Bypass Screw: **14 in-lb (2 Nm)**

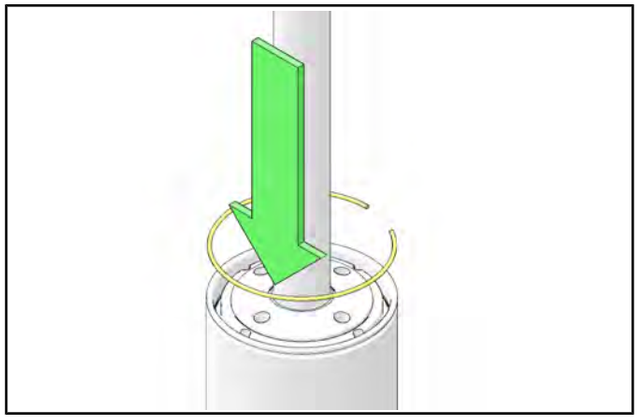
31. Install assembled internal body. Ensure that body is seated properly in body cap.
32. Fill reservoir assembly with oil and install lubricated IFP.
33. Ensuring oil level is above IFP, install bleed screw with o-ring. Torque bleed screw to specification.

TORQUE
Bleed Screw: **14 in-lb (2 Nm)**

34. Install shaft assembly into inner body.



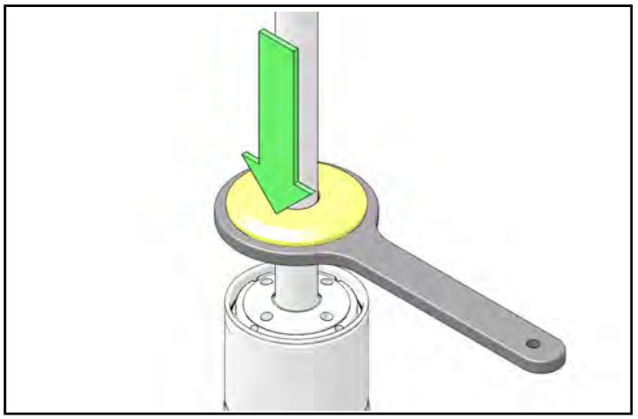
35. Depress shaft assembly deep enough so that negative spring assembly is just below inner body top.



36. Slide bearing assembly into position seated on inner body.
37. Remove cinch ring from assembly and wipe out all oil residue.
38. Clean cinch ring thoroughly.

39. Run cinch ring down to the bottom thread on bearing assembly.
40. Install retaining ring, ensuring that it is fully seated in ring gland.
41. Holding cinch ring spanner, torque bearing assembly to specification.

TORQUE
Shock Bearing Assembly: **35 ft-lb (47 Nm)**

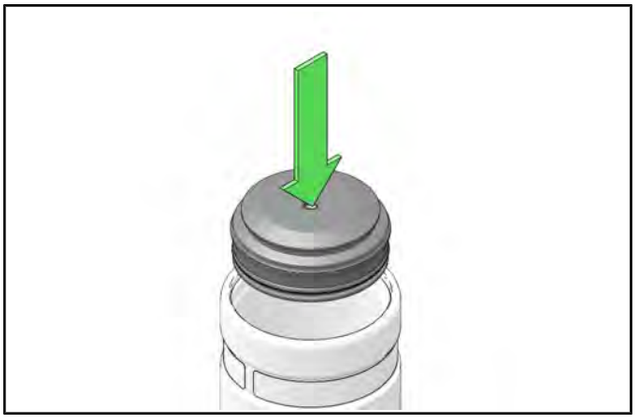


42. On 2.5 Bypass shocks with Aluminum body, apply 290 wicking Loctite to bearing assembly threads. 3.0 Bypass shocks with steel outer bodies do not require 290 Loctite on the bearing assembly threads.

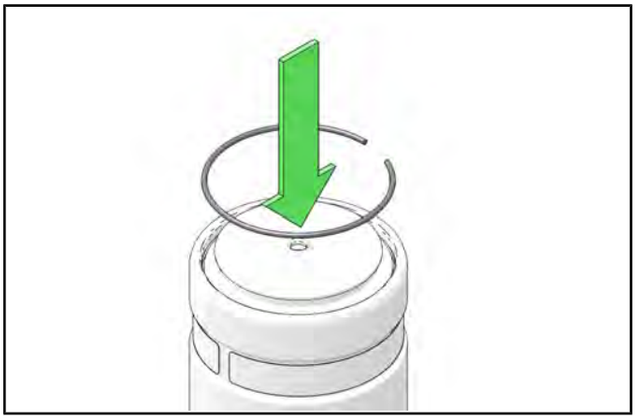
NOTICE
On remote reservoir assemblies, lubricate o-rings with Slick Honey prior to installing hose assembly. With hose fully seated install retaining ring, Ensure retaining ring is fully seated by pulling back on hose.

43. With shaft full extended, remove bleed screw and o-ring.
44. Always set IFP with a down motion of IFP tool. (oil should be above IFP when completed). Refer to the Shock Specifications tables at the beginning of this section for proper IFP depth.
45. After setting IFP depth, install Bleed screw with o-ring.

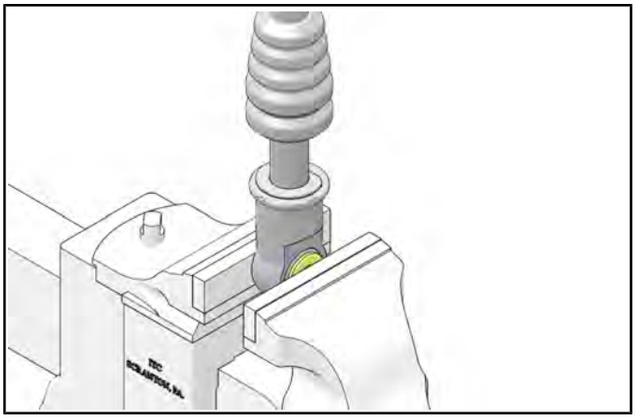
46. Install reservoir end cap o-ring and lubricate with Slick Honey.



47. Install retaining ring, ensure that it is fully seated in ring gland.

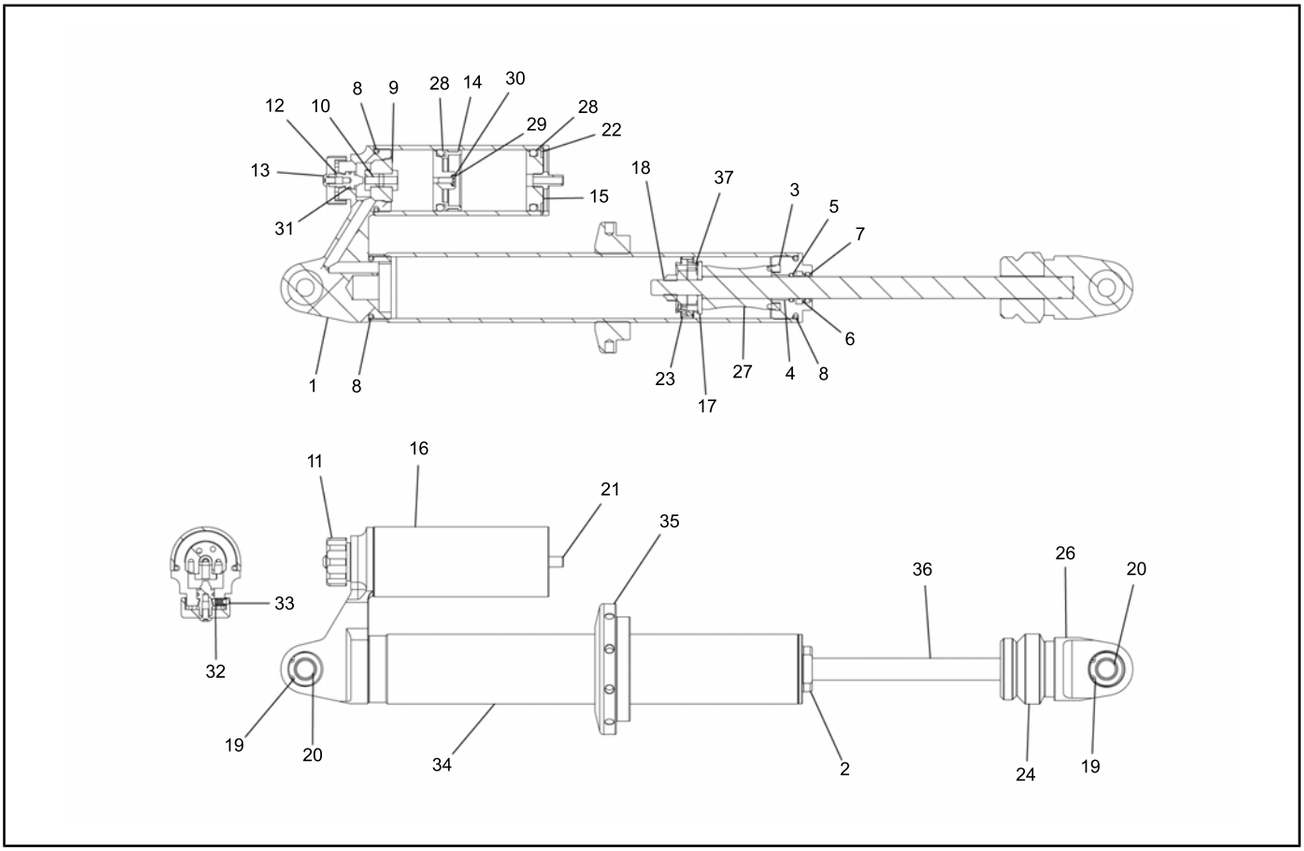


48. Fill reservoir with specified nitrogen pressure.
49. Stroke shock absorber and inspect shock for leaks.
50. Install body cap.
51. Clean oil residue from shock.
52. Install o-ring and reducers in eyelet and body.



WALKER EVANS SHOCK SERVICE

WALKER EVANS™ 2.0" FRONT SHOCK / 2.5" REAR SHOCK



REF	DESCRIPTION	REF	DESCRIPTION	REF	DESCRIPTION
1.	Body Cap Asm.	14.	Piston Asm, Floating (IFP)	27.	Shaft Spacer (1.235" x 1.985")
2.	Seal Head Asm.	15.	Reservoir End Cap	28.	O-Ring
3.	Internal Bump Stop	16.	Reservoir Body	29.	Screw (8/32")
4.	Shaft Bushing (0.625")	17.	Washer (1.50" x 0.125" x 0.348")	30.	O-Ring
5.	O-Ring	18.	Crimp Nut (7/16")	31.	O-Ring
6.	Seal	19.	Snap Ring	32.	Detent Spring
7.	Wiper	20.	Spherical Bearing	33.	Detent Ball
8.	O-Ring	21.	Schraeder Valve	34.	Shock Body
9.	Piston, Clicker	22.	Snap Ring	35.	Spring Adjustment Nut
10.	Clicker Bolt	23.	Piston Wear Band (1.750" OD)	36.	Shaft, Chrome
11.	Clicker Knob	24.	Bump Stop	37.	2-Piece Piston Asm.
12.	Clicker Stud	25.	N/A		
13.	Screw (10/32")	26.	Shaft Loop		

GENERAL SERVICE INFORMATION

Recommended Service Intervals

Walker Evans™ Racing Shocks will perform the best if serviced at regular intervals:

- Every ride - Wash and dry the vehicle and suspension
- Every 100 hours - Visually inspect shock seals
- Every 1500 miles or Annually - Change shock oil and replace seals

NOTICE

If leakage from a remote shock reservoir hose fitting is evident, check for a loose fitting and seal threads with Three Bond 1215 (PN 2871557)

SPRING ADJUSTMENT (WALKER EVANS)

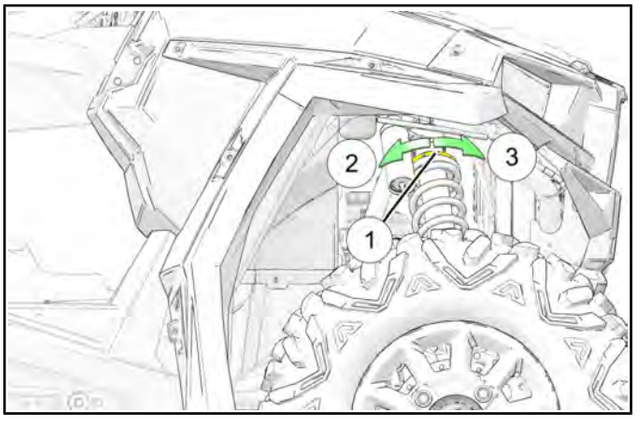
The front and rear shocks have a ride height adjustment. Suspension springs may be adjusted to suit different riding conditions or vehicle payloads.

⚠ WARNING

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

The factory setting is appropriate for nearly all riding conditions. If desired, the spring setting may be adjusted to maintain vehicle clearance height when carrying loads.

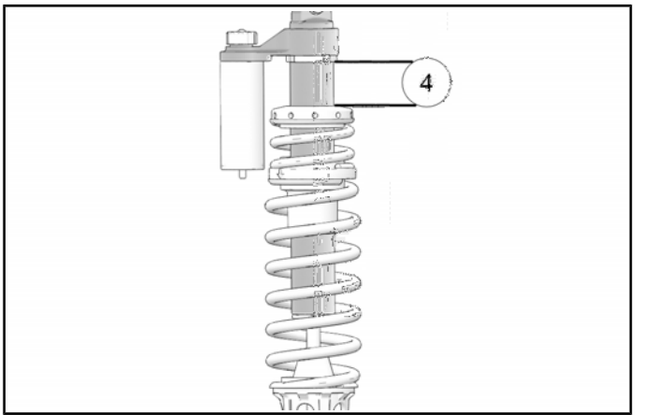
1. Raise and safely support front or rear of the vehicle off the ground to allow the suspension to fully extend.
2. Using the shock spanner/spreader tool included in the vehicle's tool kit, turn the adjustment collar ① to increase ② or decrease ③ ride height.



Shock Spanner / Clutch Spreader Tool:
2878925

NOTICE

Polaris does not recommend increasing the spring adjustment by more than one inch (25.4 mm) over the factory setting ④ as it may negatively impact vehicle stability. Always return the spring preload to the factory setting after the load is removed from the vehicle.



SPRING ADJUSTMENT - FACTORY SETTING (APPROX.)

MODEL	FRONT	REAR
RZR XP 1000	0.80″	7.97″
RZR XP 4 1000	2.04″	5.13″

MODEL	FRONT	REAR
RZR XP 1000 LE Matte Gold Metallic	1.30″	8.17″
RZR XP 1000 High Lifter	1.46″	6.32″
RZR XP 4 1000 High Lifter	2.19″	8.05″

WALKER EVANS™ SHOCK REBUILD INFORMATION

When performing maintenance on Walker Evans™ shocks, use the Gas Shock Recharging Kit (PN 2200421), as it contains the necessary valves, pressure gauge, and fittings to deflate and pressurize shocks.

⚠ WARNING

Walker Evans™ shocks contain high pressure nitrogen gas. Extreme caution must be used while handling and working with Walker Evans™ shocks and related high pressure service equipment. The pressure must be released from the shock before disassembly. It is strongly recommended you wear safety glasses and ear protection during these procedures.

SPECIAL TOOLS

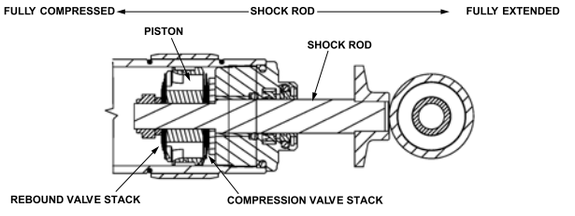
PART NUMBER	DESCRIPTION
2200421	Gas Shock Recharging Kit
PS-45908	IFP Tool
PU-50979	Shock Body Holding Tool - Front
PU-50938	Shock Body Holding Tool - Rear
2872429	Shock Rod Holding Tool - Front
PS-50931	Shock Rod Holding Tool - Rear
PU-50939	Shock Seal Protector Sleeve - Front
PU-50952	Shock Seal Protector Sleeve - Rear

VALVE SHIM ARRANGEMENT

Shown below is an example of how valving stacks are arranged.

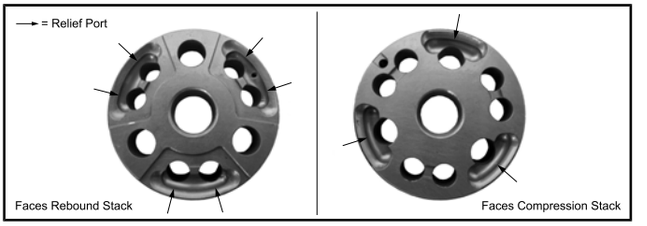
NOTICE

The rebound and compression valve stacks will always be positioned as shown in the illustration, regardless of how the shock assembly is installed.



SHOCK PISTON ORIENTATION

The face of the piston with the greater number of relief ports will always face the rebound valve stack.



WALKER EVANS™ SHOCK DISASSEMBLY

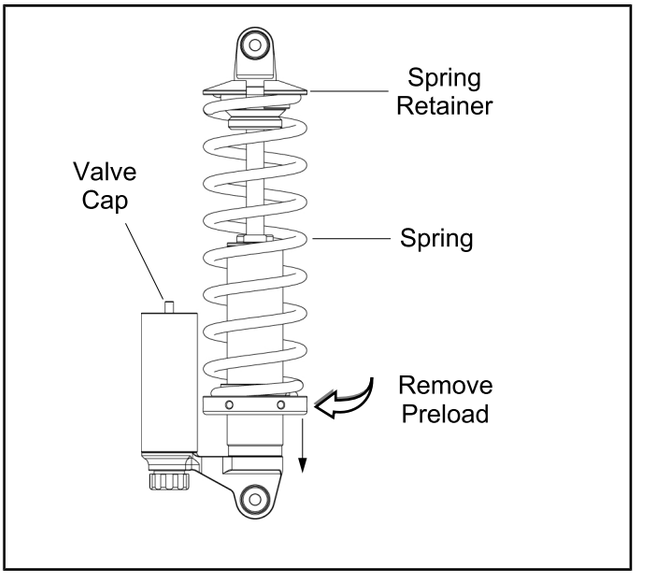
NOTICE

To prevent damage or marks to the shock, the use of special tools and a soft jaw vise is recommended.

⚠ WARNING

Walker Evans™ shocks contain high pressure nitrogen gas. Extreme caution must be used while handling and working with Walker Evans™ shocks and related high pressure service equipment. The pressure must be released from the shock before disassembly. It is strongly recommended you wear safety glasses and ear protection during these procedures.

1. Clean and carefully remove shock from the vehicle.
2. Back preload adjuster all the way down and carefully remove spring retainer and spring(s).



3. Use the appropriate shock body holding tool to properly secure the shock assembly into a vice for service.

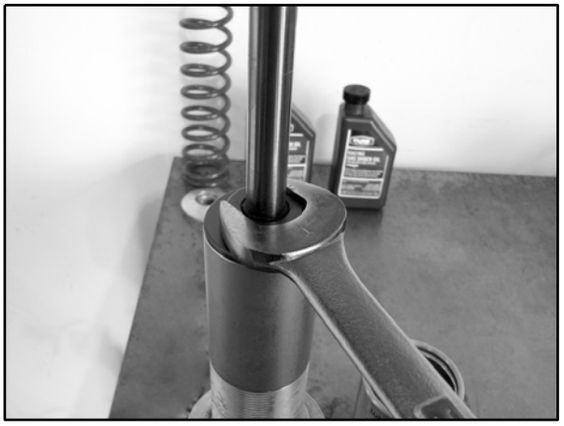
Front Shock Body Holding Tool: PU-50979 Rear Shock Body Holding Tool: PU-50938

4. Remove the valve cap from the valve fitting on the top of the reservoir.
5. Carefully depressurize the shock.

6. Using a snap ring pliers, remove the retaining ring from the reservoir.

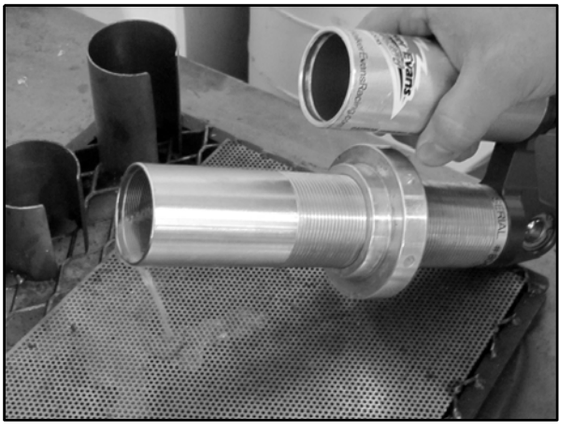
7. Carefully remove the cap from the reservoir body.

8. Using a 1" open-end wrench or adjustable wrench, loosen and remove the bearing cap from the shock body.



9. Slowly lift up and remove the shock rod assembly from the shock body.

10. Remove and properly dispose of the oil from the shock body.



NOTICE

Insert the IFP Tool (PS-45908) and cycle the Internal Floating Piston (IFP) a few times to purge the shock oil from the reservoir.

11. Remove the floating piston from the shock reservoir using the IFP Tool (PS-45908).

12. Clean and inspect ALL parts and replace as needed.

NOTICE

Seal kits are available and should be installed at this time if seals or O-rings are damaged or worn.

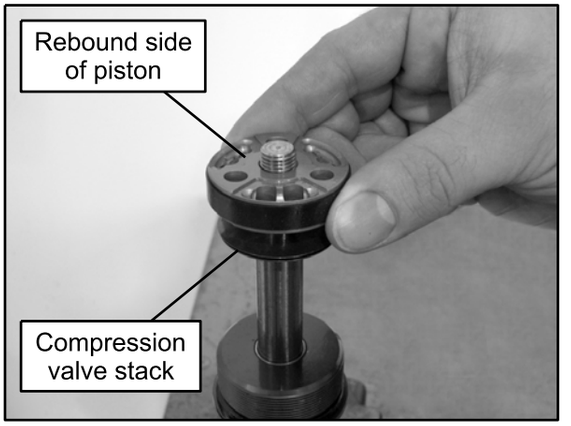
13. Use the appropriate shock rod holding tool and a vise to mount the shock rod vertically with the threaded end upward.

Front Shock Rod Holding Tool: 2872429
Rear Shock Rod Holding Tool: PU-50931

14. Using an 11/16" socket, remove the nut retaining the valve stack and piston.

NOTICE

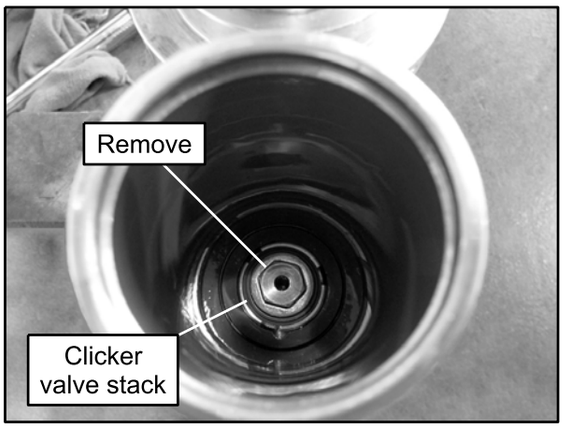
Keep the rebound and compression valve stacks in the order they were removed. If unsure of order, refer to “Shock Valving” under the “Shock Service Information” provided earlier in this section.



15. Place the valve stack on a clean shop towel in order of removal.
16. Inspect the valves for kinks, waves, pits or foreign material.
17. Inspect the piston wear band and replace if damaged or worn.
18. Use the appropriate shock body holding tool to properly secure the shock assembly into a vice for service.

Front Shock Body Holding Tool: PU-50979
Rear Shock Body Holding Tool: PU-50938

19. **Front Shocks Only**: Using a 9/16" socket w/ extension, remove the fastener retaining the clicker valve stack. Place the valve stack on a clean shop towel in order of removal.



NOTICE
Keep the valve stack in the order it was removed. If unsure of order, refer to “Shock Valving” under the “Shock Service Information” provided earlier in this section.

20. Inspect the valves for kinks, waves, pits or foreign material
21. Thoroughly clean all shock components and shock body prior to assembly.

WALKER EVANS™ SHOCK ASSEMBLY

1. Install new seals and O-rings on the seal head assembly.
2. Use the appropriate shock rod holding tool and a vise to mount the shock rod vertically with the threaded end upward.

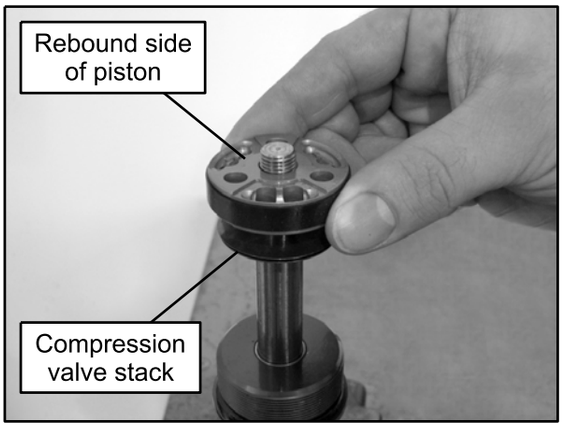
Front Shock Rod Holding Tool: 2872429 Rear Shock Rod Holding Tool: PU-50931

NOTICE
If the shock rod or the mounting eyelet end is being replaced, apply red Loctite to the threads of the shock shaft prior to installation. Not using Loctite may allow the shaft to loosen from the eyelet.

3. Install the appropriate Shock Seal Protector Sleeve over the shaft threads.

Front Shock Seal Protector Sleeve: PU-50939 Rear Shock Seal Protector Sleeve: PU-50952

4. Install seal head assembly onto the shock shaft.
5. Remove the Shock Seal Protector Sleeve.
6. Place the compression valve stack on the rod in the reverse order of disassembly.
7. Place valve piston on top of the compression stack.



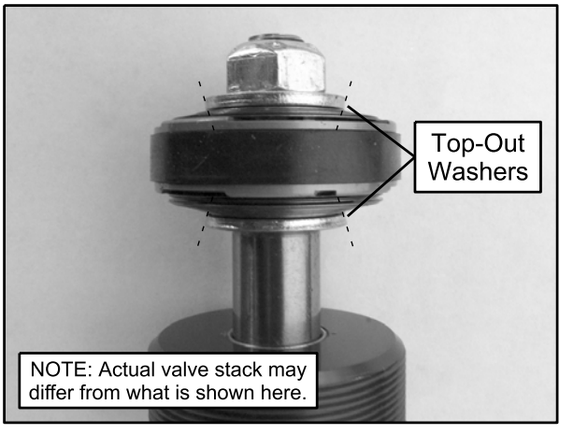
NOTICE
If unsure of the valve stack order, refer to “Shock Valving” under the “Shock Service Information” provided earlier in this section.

8. Place a new lock nut onto the shock rod. Torque the new lock nut to specification.

NOTICE
Do not over torque the nut or damage to the valve stack can occur.

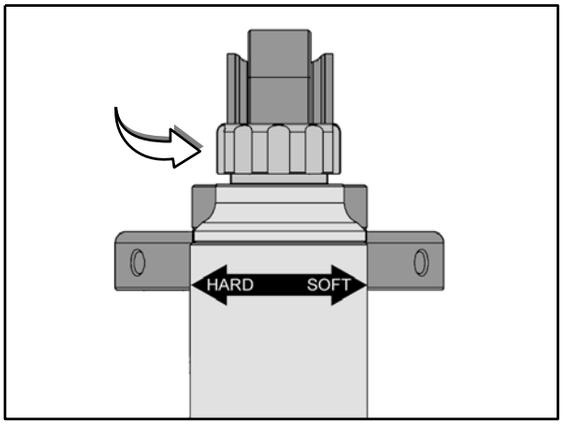
TORQUE
Shock Rod Lock Nut: **14 ft-lbs (19 N·m)**

NOTICE
Make sure “Top-Out” washers are orientated as shown.



9. **Front Shocks Only:** Assemble the clicker valve stack on top of the fastener and install the assembly into the reservoir body. Tighten the valve stack fastener securely.

10. Turn the compression adjuster knob counter-clockwise (soft) until it stops, so damping is in the full open position.



11. Use the appropriate shock body holding tool to properly secure the shock assembly into a vice for service.

Front Shock Body Holding Tool: PU-50979 Rear Shock Body Holding Tool: PU-50938

12. Fill the shock body and remote reservoir 1/2 full of the recommended gas shock oil.

FLUID CAPACITY
Recommended Shock Oil: Racing Gas Shock Oil (PN 2874124) (Quart) 10 Weight for Walker Evans Shocks

13. Using a 3/32" Allen wrench, remove IFP bleed screw.

14. Apply a thin film of oil to IFP O-ring and wear band. Insert IFP into reservoir until completely submerged. Allow air to escape as you install the piston.

15. Screw IFP Tool (PS-45908) onto the floating piston.

16. Slowly cycle the IFP up and down.

- Be sure to bottom out piston in the reservoir body.
- Allow time for the bubbles to dissipate.
- Repeat the process until all air has been removed.

17. Pull IFP up until its top is approximately 1" (2.54 cm) from top of reservoir and remove the IFP Tool. Using a 3/32" Allen wrench, install the IFP bleed screw.

NOTICE
When the IFP Tool is removed, the IFP must remain submerged in shock oil to prevent air from getting under the floating piston.

18. Fill the shock body with oil approximately 1/4" below the threads.

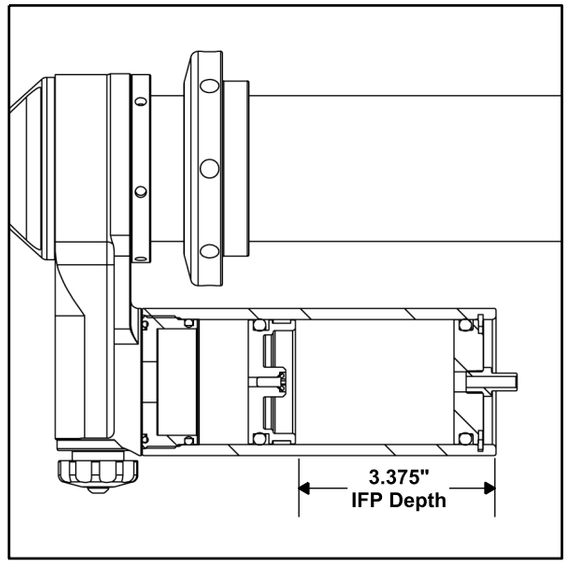
19. Apply a thin film of oil to the wear band on the damping piston. Slowly insert the shock rod assembly into the body until the damping piston assembly is approximately 1" below the oil surface.

- Move rod up and down slowly over a range of about 1" until no air bubbles rise from damping piston. Be careful to keep damping piston at least 1/4" below the surface of the oil during this process.
- While holding the shock rod, apply 2 - 3 sharp blows to the rod eyelet with a rubber mallet driving the piston down into the shock body. This opens the valves on the damping piston. You will see the released air bubbles come to the surface of the oil.

20. Add oil to the body tube until the surface of the oil is at the top of the shock body threads.

NOTICE
During installation, some shock oil will over flow. Wrap a shop cloth around the shock body to catch any oil overflow.

21. Pull the damping piston up until it is just below the surface of the oil.
22. Hold the rod eyelet with one hand. With other hand, slide the bearing cap down the shaft until contact with the body is made. Oil will overflow from around the bearing cap.
23. Screw the bearing cap assembly into the shock body by hand, holding the rod up so that the bearing cap is in contact with the bottom of the damping piston assembly. Be careful not to cross-thread the bearing assembly.
24. Using a 1" open-end wrench, tighten the bearing cap.
25. Using a 3/32" Allen wrench, remove the IFP bleed screw.
26. Set the IFP depth to the specified length from the top of the reservoir.



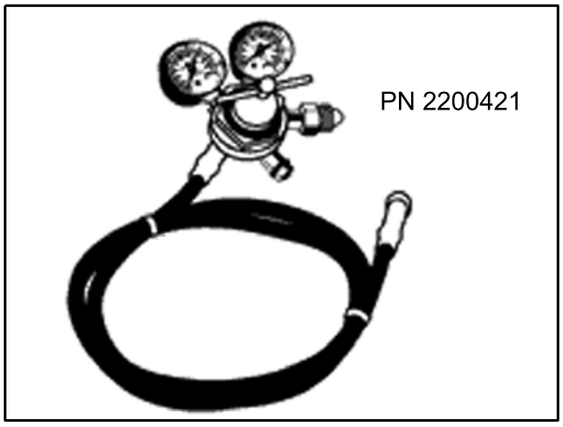
MEASUREMENT
IFP Depth: **FRONT** : 2.875″ (73.02 cm) **REAR *RZR* XP 1000**: 6.25″ (158.8 mm) **REAR *RZR* XP 4 1000**: 7.25″ (184.2 mm)

27. Using a long 3/32” Allen wrench, install the IFP bleed screw.

NOTICE
Apply grease to the end of the Allen wrench so the bleed screw sticks to it during installation.

28. Pour the residual shock oil out of the reservoir into a proper disposal container.
29. Install the reservoir cap. Push down on the reservoir cap using even pressure until the retaining ring groove is exposed.
30. Install the retaining ring and check to make sure retaining ring is seated properly.
31. Push the shock rod assembly completely into the shock body. It should go all the way down smoothly without interference. If it does not, disassemble and reassemble per this procedure.
32. Secure the shock body in a vise by its lower mount.

33. Pressurize the shock reservoir through the Schrader® valve using the Gas Shock Recharging Kit (PN 2200421).



34. Continue filling until the shaft has fully extended and the reservoir pressure is at 125 psi.

Nitrogen Pressure (Front and Rear):
125 psi (862 kPa) +/- 5%

⚠ WARNING

CHARGE THE SHOCK USING NITROGEN GAS ONLY. DO NOT FILL WITH ANY OTHER GASES. Doing so compromises the performance of the shock and may be EXTREMELY DANGEROUS!

35. Reinstall the valve cap.
36. Clean all oil residue from the shock and reservoir with solvent, and dry with low pressure compressed air in a well ventilated area.
37. Check shock for any leaks.

NOTICE

If leakage from a remote shock reservoir hose fitting is evident, check for a loose fitting and seal threads with Three Bond 1215 (PN 2871557)

38. Reinstall the compression spring and the spring retainer.
39. Thread the spring preload adjuster down against the spring and set the preload to the specified measurement (see Chapter 2 – Spring Adjustment).
40. Set the compression adjuster knob to the recommended setting or the original setting upon removal (see Chapter 2 – Shock Compression Adjustment).
41. Remove the shock from the vise.
42. Reinstall spherical bearing O-rings and polyurethane bushings.

NOTICE

After installation, be sure to RIDE SLOWLY initially to ensure the shock and the vehicle's suspension is performing correctly.

DYNAMIX ACTIVE SUSPENSION (IF EQUIPPED)

DYNAMIX SHOCKS DISASSEMBLY / ASSEMBLY

While the Dynamix Shocks come apart similar to a FOX Podium Bypass shock, there are several differences. Refer to the training on University of Polaris (https://lms.latitudelearning.com/home/main.aspx) and do a search for “Live Valve Shock” for complete disassembly and assembly of a Dynamix shock.

DYNAMIX OVERVIEW

The suspension control screen provides additional information about the operation of the DYNAMIX™ Active Suspension system.

① Current Suspension Ride Mode

② Accelerator Pedal Position

③ Vehicle Speed

④ Brake Status

⑤ Current Damping Setting (shown as both a bar gauge and an integer for each shock)

⑥ Active Vehicle Event State Pop-ups (Cornering, Braking, Accelerating, Airborne)

⑦ Steering Angle

⑧ G-Meter (vehicle lateral and longitudinal acceleration)

NOTICE
Obtain the latest maps and trails data by going to www.ridecommand.polaris.com for updates.

DEMONSTRATION MODE

When the vehicle is first keyed on, and the shift lever is in the Park (P) position with the engine not running, the SCM will enter a demonstration mode. The suspension will react to the operator inputs as if the vehicle was being driven. After a period of time (5 minutes), the SCM will exit demonstration mode and stop driving the shocks to conserve vehicle power. The vehicle will enter normal operation if the engine is started.

NOTICE
The vehicle will enter demonstration mode any time the shift lever is in the park position (P), the engine speed is at 0 rpm, and the vehicle speed is at 0 mph. Demonstration mode will time out after 5 minutes.

NOTICE
Demonstration mode exaggerates responses for the purpose of demonstration. Actual usage requires real speed and dynamic events to illicit the same visual response in the interface.

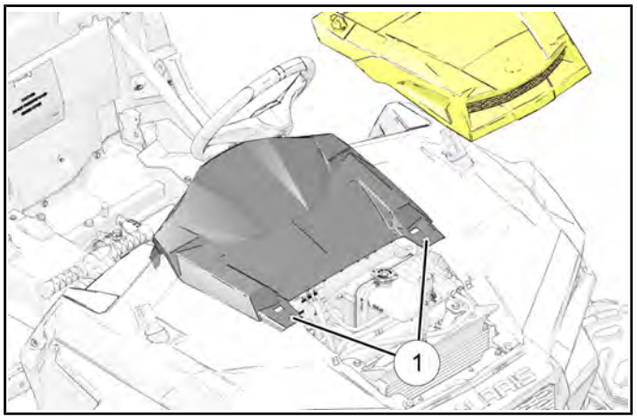
SUSPENSION CONTROL MODULE (SCM)

The Suspension Control Module (SCM) contains the logic for suspension control, including communications, operator inputs, and shock drivers, to execute the suspension control algorithms. The SCM also has an internal 6-axis inertial measurement unit which is used to monitor the performance of the vehicle by the suspension control algorithms.

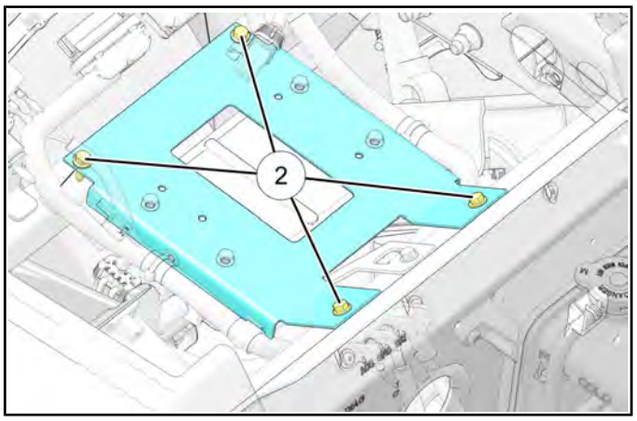
CAUTION
Moving or altering the orientation of the SCM may have an adverse effect on vehicle handling. Never move the SCM from it's factory mounting location.

SCM REPLACEMENT

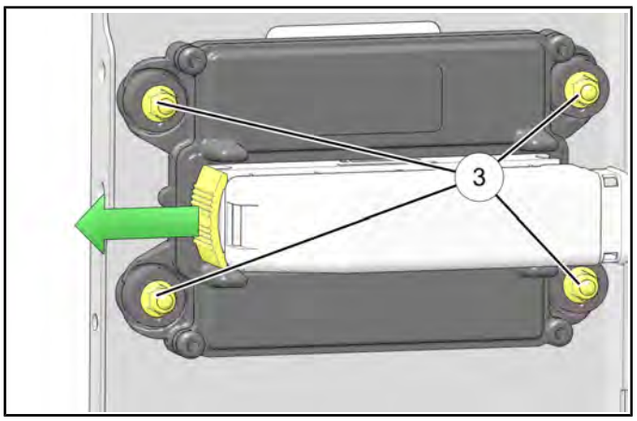
1. Remove the hood.
2. Remove the two fasteners ① retaining the instrument panel cover. The cover does not need to be removed, just moved to access underneath it.



3. Remove the four fasteners ② retaining the SCM mounting plate to the frame.



4. Unlock the connector from the SCM by sliding the tab outward, as shown, then pull the connector off the SCM.



5. Remove the 4 fasteners ③ retaining the SCM to the mounting plate.

6. The SCM **MUST** be mounted with FRONT label properly facing the front of the vehicle when installed. Failure to do this will have an adverse effect on vehicle handling.
7. Install the SCM on the mounting plate. Torque mounting fasteners to specification.

TORQUE
SCM Mounting Fasteners: **8 ft-lb (11 Nm)**

8. Install the harness onto the SCM. Slide the tab inward to lock the harness to the SCM. Lightly pull on the connector to ensure it is retained.
9. Install the SCM / mounting plate assembly into the vehicle. Torque mounting fasteners to specification.

IMPORTANT
A sticker with an arrow on the SCM indicates which side MUST face the front of the vehicle.

TORQUE
SCM Mounting Plate Fasteners: **8 ft-lb (11 Nm)**

10. Install the instrument panel cover. Torque fasteners to specification.

TORQUE
Instrument Panel Cover Fasteners: **8 ft-lb (11 Nm)**

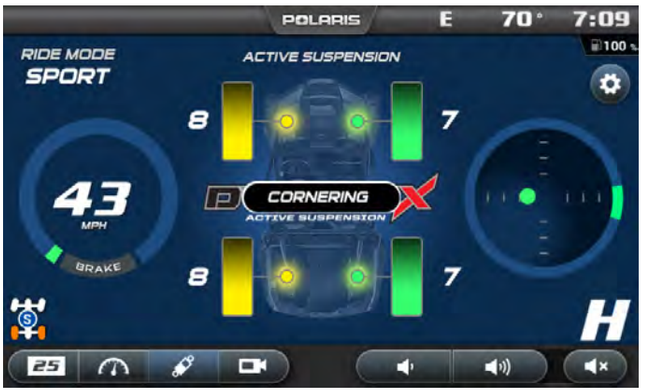
DYNAMIX™ SYSTEM FEATURES

VEHICLE SPEED SENSITIVITY

The system continuously monitors the speed of the vehicle and adjusts to a base level of damping for a given vehicle speed depending on the mode selected by the user.

CORNERING CONTROL

The system continuously monitors steering angle, lateral acceleration, and vehicle yaw rate to provide enhanced cornering control, reducing body motion for maximum performance.



BRAKING

The system continuously monitors the brake switch status and vehicle deceleration rate, reducing body motion, and increasing available compression travel for braking into harsh terrains.

ACCELERATION

The system continuously monitors vehicle speed, accelerator pedal position, and vehicle speed to increase damping of the rear shocks under certain acceleration conditions to reduce squat.

AIRBORNE DETECTION

The system continuously monitors the state of the vehicle using its 6-axis inertial measurement unit. When low-g situations are encountered, the system provides maximum damping until the low-g situation is no longer present, after which it reverts back to the user-selected drive mode.

9

ADVANCED DIAGNOSTICS

The system continuously monitors the health and state of all input and output signals. If a fault is detected, the system reverts to a safe operating state and alerts the operator of a component or system problem via the SCM diagnostic indicator on the RideCommand™ display.

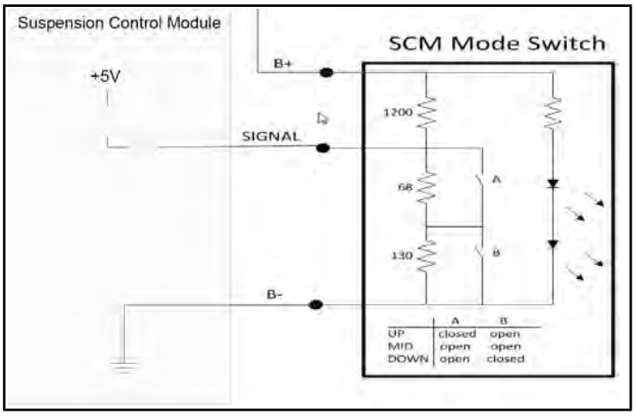
Suspension activity notifications can be turned enabled/ disabled from the vehicle the setting menu.

PROCESSING CAPABILITY

DYNAMIX™ Active Suspension controls current to the shock valve 1000 times per second, performs vehicle dynamics calculations 200 times per second, and can actuate a shock from soft to firm approximately 20 times per second.

SUSPENSION MODE SWITCH (DYNAMIX MODELS)

For more information on the Dynamix suspension system, refer to the Steering / Suspension chapter - Dynamix Overview page 9.54



SWITCH POSITION	CONTACT A	CONTACT B	PINS 1 TO 7
Comfort	Closed	Open	1270 Ω
Sport	Open	Open	1400 Ω
Firm	Open	Closed	1330 Ω

DYNAMIX TROUBLESHOOTING

SHOCK VALVE POWER SUPPLY

Use the following diagnostic list when any of the following codes are present:

- SPN 516110 FMI 3 or 4

1. Record SCM trouble codes and clear the codes.
2. Turn key off, wait 2 seconds, turn key back on. If no codes are present, spend 5 seconds in each mode to verify no codes come back. SCM codes will not clear unless the key has been cycled for at least two seconds before turning back on.
3. If code(s) still active, bypass the shock relay.
4. Disconnect SCM and shock relay. Check continuity from SCM pin 6 to Fuse box pin 36 (pk/bk). Verify wire is not shorted to power or ground.
5. Reflash SCM. Turn key off, wait 2 seconds, turn key back on. If no codes are present, spend 5 seconds in each mode to verify no codes come back. SCM codes will not clear unless the key has been cycled for at least two seconds before turning back on.

SCM SYSTEM VOLTAGE

Use the following diagnostic list when any of the following codes are present:

- SPN 516126 FMI 0, 1, 16, or 18

1. Connect to Digital Wrench and verify if the ECU has system voltage codes present. If other codes are present, verify good battery connections and chassis grounds, charge the battery and ensure the vehicle is charging properly.
2. Verify battery voltage is not intermittently less than 9v or above 17v.
3. Verify battery positive and negative terminals are tight and not corroded.
4. Inspect the SCM fuse. Replace if blown or corroded.
5. Bypass SCM relay. Replace relay if system operates normally when bypassed.
6. Unplug SCM and inspect for damaged pins and connector.
7. Turn key on and measure voltage between SCM pin 60 and pin 68. Should be within 1 volt of battery voltage.
8. Measure resistance between pin 68 and battery (-) negative. Resistance should be less than 5 Ω.
9. Measure resistance between pin 60 and battery (+) positive. Resistance should be less than 5 Ω.
10. Reflash SCM

SCM SHOCK VALVE DIAGNOSTICS

Use the following diagnostic list when any of the following trouble codes are present:

- SPN 516106 FMI 3
- SPN 516107 FMI 3
- SPN 516108 FMI 3
- SPN 516109 FMI 3
- SPN 516111 FMI 11
- SPN 516112 FMI 11
- SPN 516113 FMI 11
- SPN 516114 FMI 11

1. Connect to Digital Wrench and record SCM trouble codes; then clear the codes.
2. Turn key off, wait 2 seconds, turn key back on. If no codes are present, spend 5 seconds in each mode to verify no codes come back. SCM codes will not clear unless the key has been cycled for at least two seconds before turning back on.
3. Verify the shock with the trouble code is properly plugged in and the terminal is clean.
4. Put vehicle into Sport or Comfort mode.
5. Disconnect the corresponding shock with the trouble code. Verify there is battery voltage between pin 1 and battery (-) ground.

NOTICE
When a code is set, key off for 2 seconds then key on. Power should be delivered to the shocks until a DTC sets. You MUST have the mode selector in Comfort or Sport mode.

6. If no power is found, check for a blown Shocks fuse in the main fuse box and bypass the relay if necessary.
7. If power is found at the shock, inspect SCM and shock connectors for damaged pins.
8. Check shock coil resistance. Resistance should be approximately 7.28 Ω +/– 20% taken with the shock at room temperature (70° F).
9. Check continuity between the shock plug and the SCM. Refer to the wiring diagram.
10. If continuity is good, measure voltage between shock plug signal and battery (-) ground with SCM unplugged. The wires should not be shorted to ground.
11. Measure voltage between shock plug signal and battery (+) power with SCM unplugged. The wires should not be shorted to battery voltage
12. Reflash the SCM.

SCM MODE SWITCH

Use the following diagnostic list when any of the following are present:

- SPN 516098 FMI 3 or 4
- Stuck in a particular suspension mode
- Mode changes when not requested

1. Verify the switch is properly connected to the vehicle harness. Ensure connection is clean.
2. Measure the voltage between pin 7 (B+) and pin 1 (B-) on the switch connector. You should see battery voltage. If the voltage is low, check the shock fuse and the continuity of the wiring.
3. Verify continuity between switch connector pin 6 (signal) and SCM pin 34.
4. With the SCM unplugged, measure for short to ground and short to power on the signal wire. They should both read 0 volts.
5. Replace the switch.
6. Reflash the SCM.

SCM CAN DIAGNOSTICS

Use the following diagnostic list when any of the following trouble codes are present:

- SPN 516116 FMI 9
- SPN 516117 FMI 9
- SPN 516118 FMI 9
- SPN 516120 FMI 9
- SPN 516121 FMI 9
- SPN 516123 FMI 2, 20 or 21
- SPN 516125 FMI 11
- SPN 520572 FMI 2
- SPN 520574 FMI 2
- SPN 524000 FMI 2
- SPN 524114 FMI 2

1. If code **SPN 516125 FMI 11** is set, try to connect to Digital Wrench. If Digital Wrench will not connect to the SCM, check continuity on SCM CAN Hi (pin 14 - yellow) to diagnostic plug (pin H - yellow) as well as SCM CAN Lo (pin 15 - green) to diagnostic plug (pin G - green). If these test ok, reflash SCM.
2. If a TIMEOUT DTC is set (516116/17/18/19), verify proper connections and that the ECU is not damaged. Look for aftermarket ECU.
3. Is it speed sensor related? Check for speed input on Data Display screen. Possible speed sensor/circuit issue. Reflash ECU
4. Is it steering related? Perform EPS centering procedure. Reflash EPS
5. If **SPN 520572 FMI 2** is present, check brake switch input on data display. ECU pin 135.
6. If **SPN 520574 FMI 2** or **SPN 524000 FMI 2** is present, reflash ECU.

SCM STEERING ANGLE ADAPTED OFFSET DIAGNOSTICS

Use the following diagnostic list when any of the following trouble codes are present:

- SPN 516122 FMI 15 or 17

1. Inspect the vehicle for steering / suspension alignment issues. Repair any issues found.
2. Drive straight and verify that the reported steering angle from the EPS is centered (+/– 5°)
3. If the steering is properly centered, perform SCM Steering Angle Adaptation Value Reset procedure, found in Steering / Suspension System Utilities on the Special Tests menu in Digital Wrench.
4. If the steering is NOT properly centered, perform the EPS Steering Angle Centering procedure. Refer to Steering Angle Sensor Centering (Dynamix) page 12.35, then perform SCM Steering Angle Adaptation Value Reset procedure, found in Steering / Suspension System Utilities on the Special Tests menu in Digital Wrench.

SCM / INERTIAL MEASUREMENT UNIT

Use the following diagnostic list when any of the following trouble codes are present:

- SPN 516115 FMI 12
- SPN 516124 FMI 12

1. Connect to Digital Wrench and record SCM trouble codes; then clear the codes.
2. Turn key off, wait 2 seconds, turn key back on. If no codes are present, spend 5 seconds in each mode to verify no codes come back. SCM codes will not clear unless the key has been cycled for at least two seconds before turning back on.
3. If the code(s) is still active, reflash the SCM.
4. If the code(s) is still present after reflashing, replace the SCM.

NOTES

CHAPTER 10
BRAKE SYSTEM

9930585 RO1 - 2019–2020 *RZR* XP Turbo / XP4 Turbo Service Manual

GENERAL INFORMATION

SPECIAL TOOLS

PART NUMBER	DESCRIPTION
2870975	Mity Vac™

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

BRAKE SYSTEM SPECIFICATIONS

FRONT BRAKE SYSTEM

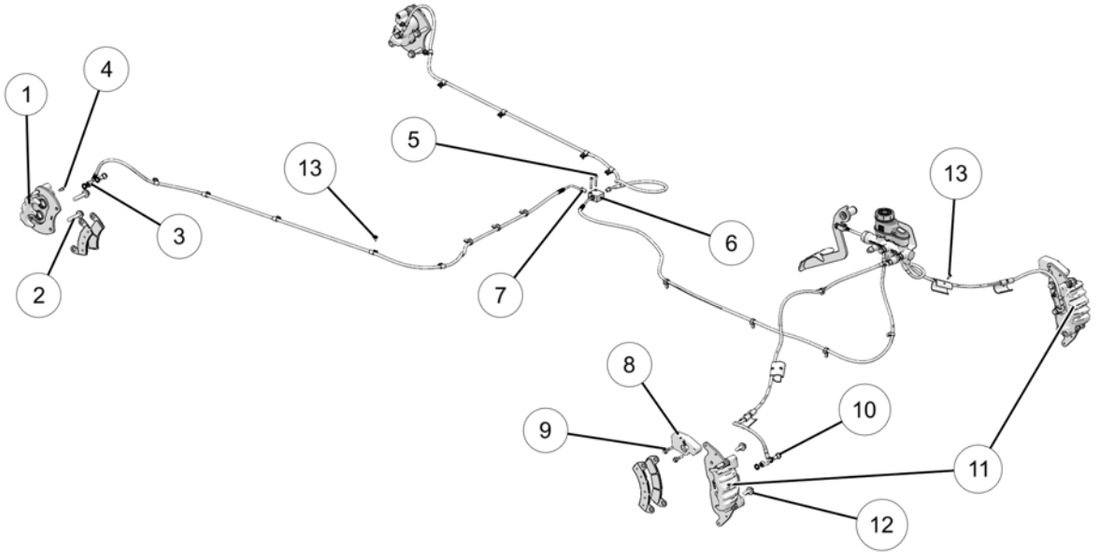
ITEM	STANDARD	SERVICE LIMIT
Front Pad Thickness	**.296 ± .007″ (7.53 ± .19 mm)**	**.180″ (4.6 mm)**
Front Disc Thickness	**.295 ± .008″ (7.5 ± .2 mm)**	**.268″ (6.8 mm)**
Front Disc Runout	–	**.010″ (0.25 mm)**

REAR BRAKE SYSTEM

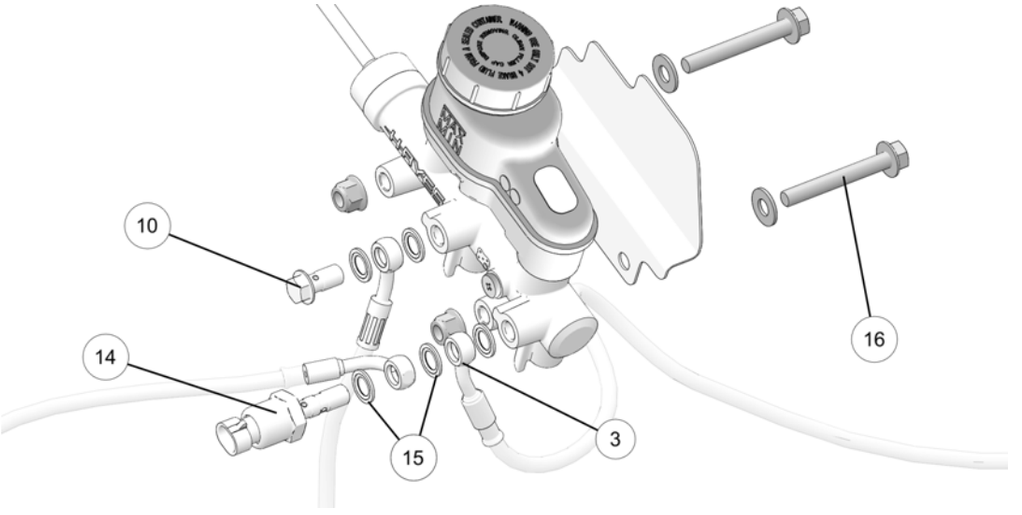
ITEM	STANDARD	SERVICE LIMIT
Rear Pad Thickness	**.296 ± .007″ (7.53 ± .19 mm)**	**.180″ (4.6 mm)**
Rear Disc Thickness	**.295 ± .008″ (7.5 ± .2 mm)**	**.268″ (6.8 mm)**
Rear Disc Runout	–	**.010″ (0.25 mm)**

BRAKE SYSTEM OVERVIEW

BRAKE SYSTEM VIEW

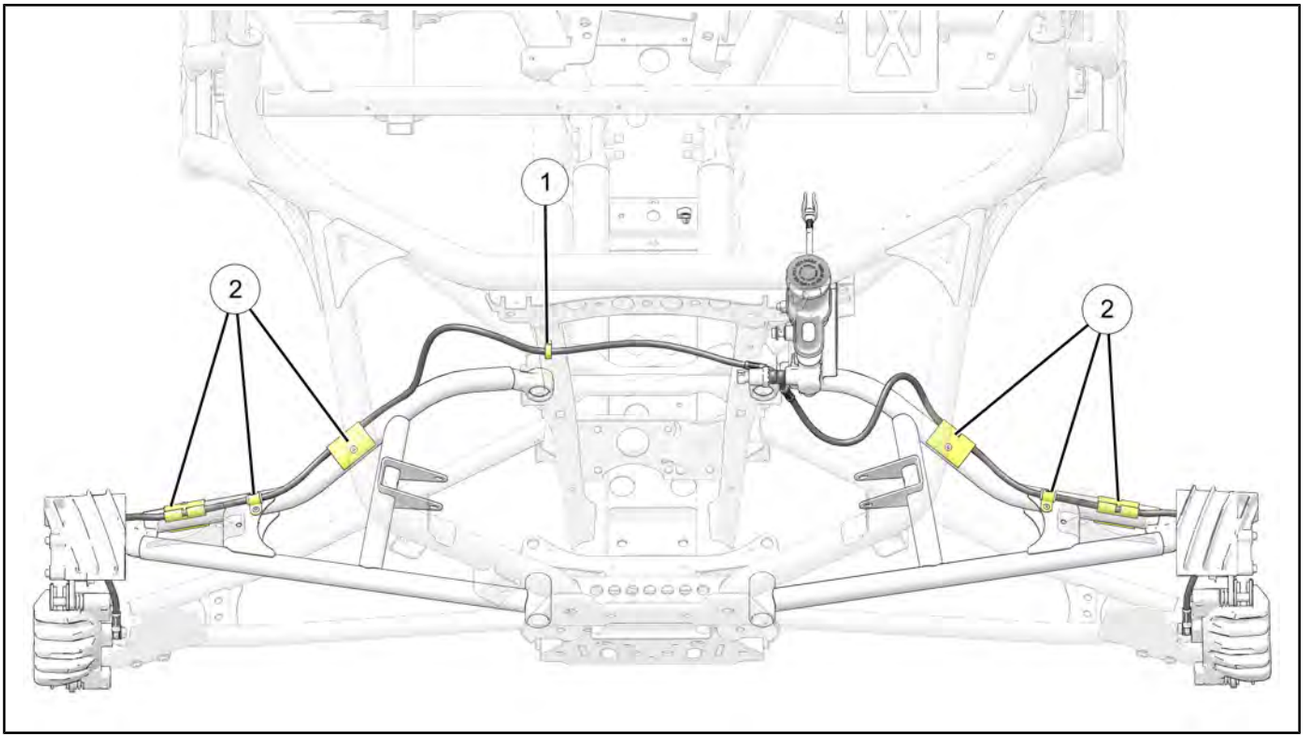


① Rear Brake Caliper	⑨ Scraper Bolts **7 ft-lb (11 Nm)**
② Rear Caliper Bolts **46 ft-lbs (62 Nm)**	⑩ Banjo Bolt **15 ft-lbs (20 Nm)**
③ Banjo Fitting	⑪ Front Brake Caliper
④ Brake Bleeder Screw **48 in-lb (5 Nm)**	⑫ Front Caliper Bolts **30 ft-lbs (42 Nm)**
⑤ Brake Junction Block Fasteners **35 in-lb (4 Nm)**	⑬ Brake Line Retainer **35 in-lb (4 Nm)**
⑥ Brake Junction Block	⑭ Brake Pressure Switch **15 ft-lbs (20 Nm)**
⑦ Brake Line Fitting **15 ft-lbs (20 Nm)**	⑮ Sealing Washer
⑧ Brake Disc Scraper	⑯ Master Cylinder Mounting Bolts **23 ft-lbs (31 Nm)**



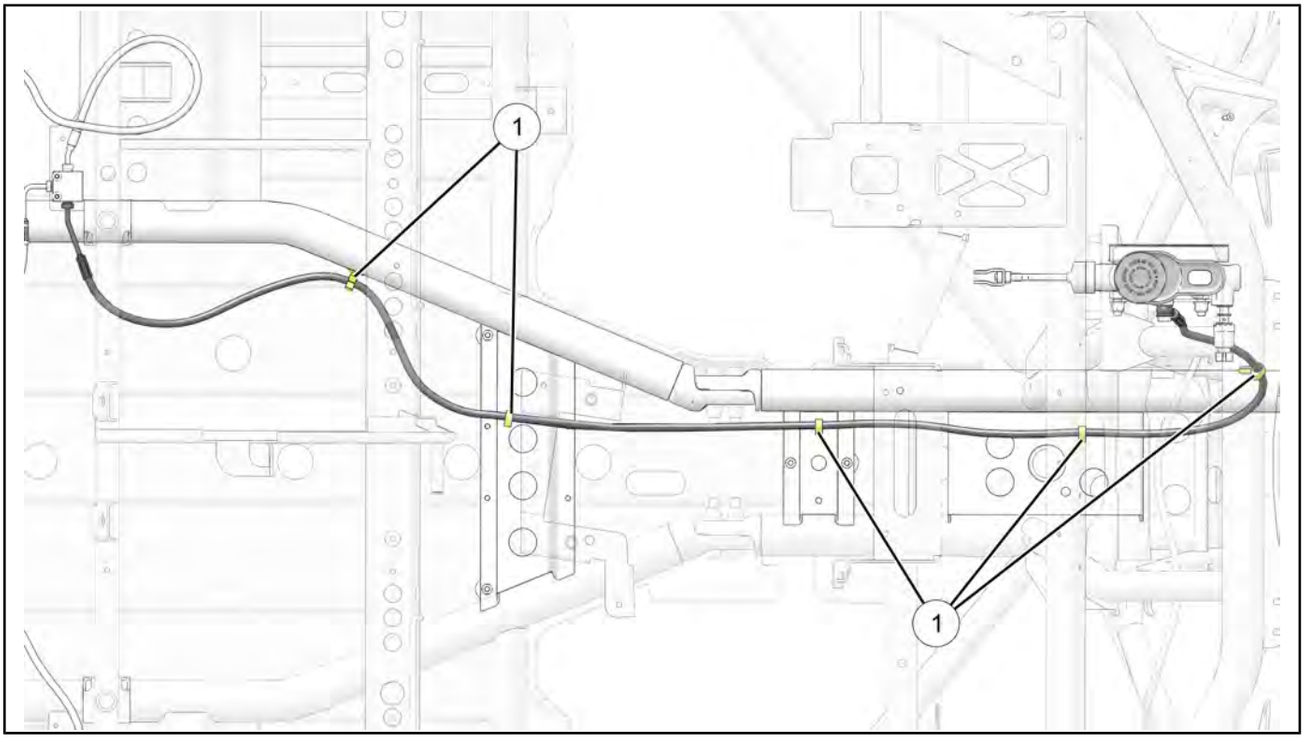
BRAKE LINE ROUTING / RETENTION

FRONT BRAKE LINES TO MASTER CYLINDER



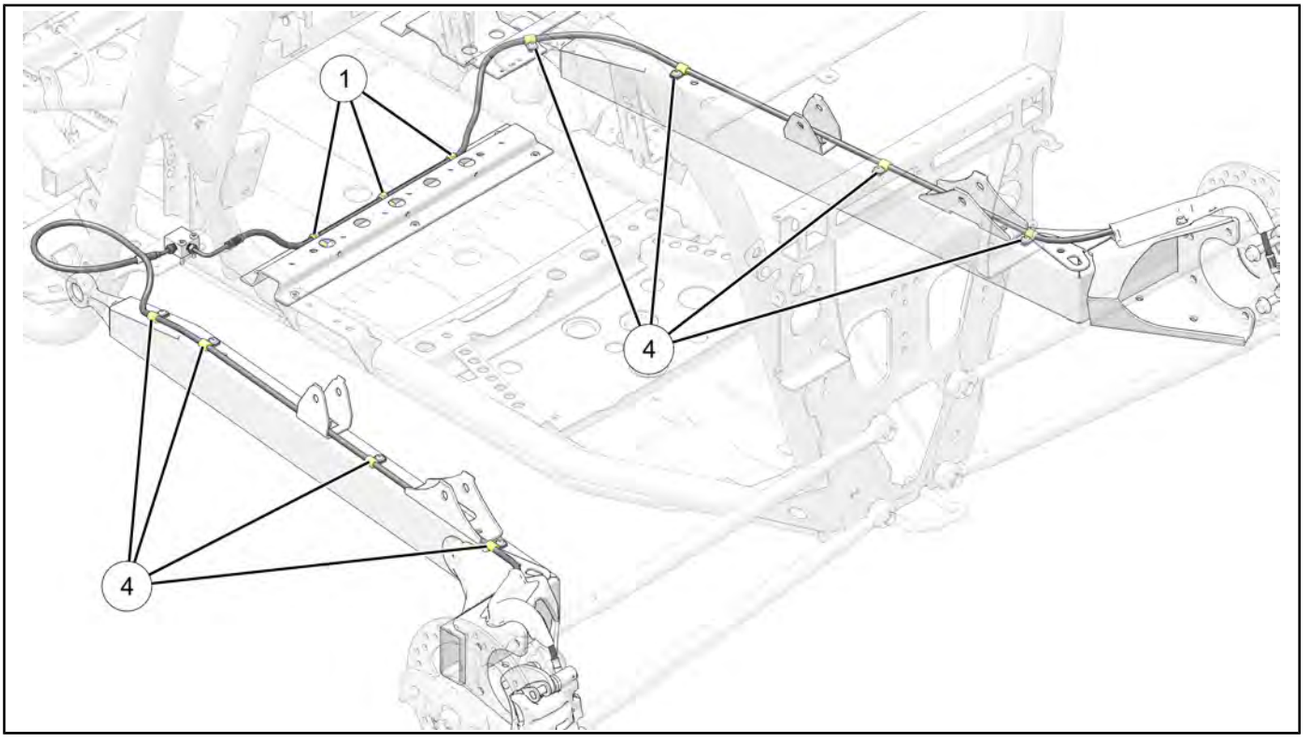
① Brake Line Retaining Clip	② Control Arm Brake Line Retainer

REAR BRAKE LINE - MASTER CYLINDER TO JUNCTION BLOCK



① Brake Line Retaining Clip

REAR BRAKE LINES - JUNCTION BLOCK TO CALIPERS



NOTICE
Brake lines route inside the stabilizer bar and shock mounts as shown.

① Brake Line Retaining Clip	④ Trailing Arm Brake Line Retainer

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)**.

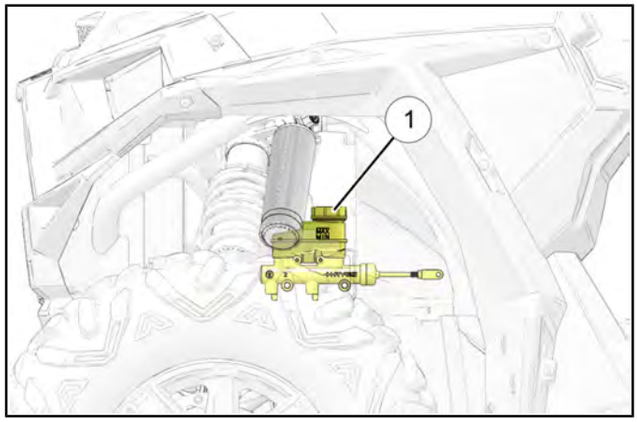
⚠ WARNING

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.

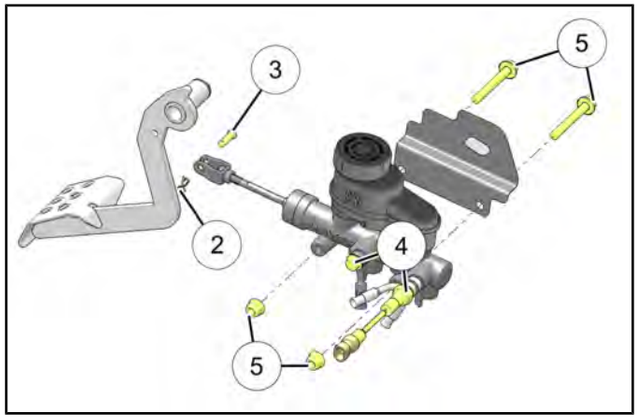
MASTER CYLINDER

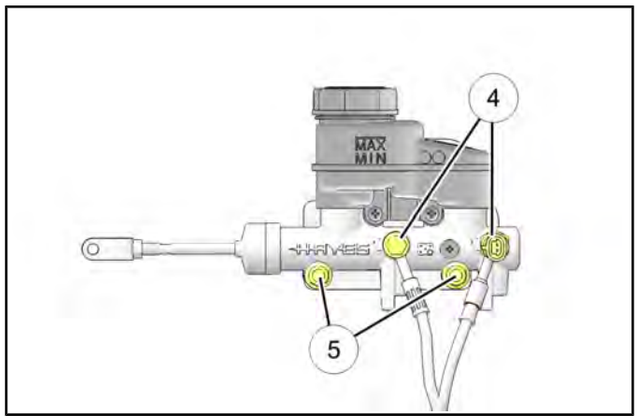
MASTER CYLINDER REMOVAL

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.

NOTICE

Make note of front and rear brake line locations to master cylinder.

4. Loosen the brake line banjo bolts and allow fluid to drain.

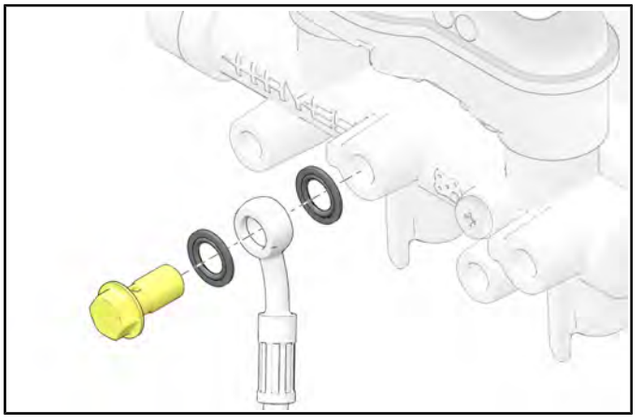
NOTICE

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. Install new stat-o-seal, rear brake line banjo fitting, new stat-o-seal and banjo bolt to the rear port on the master cylinder.

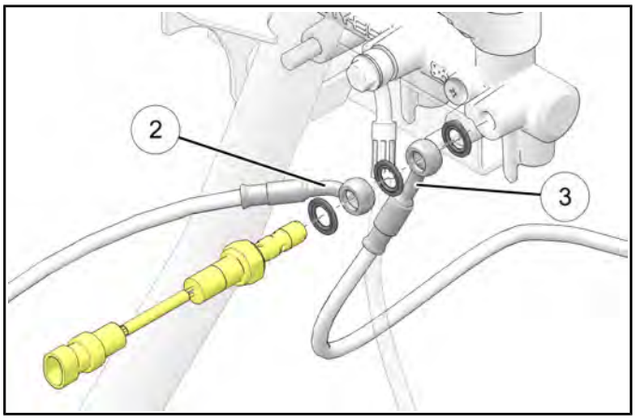


IMPORTANT

Lubricate seals with a thin film of DOT 4 brake fluid prior to installation.

10

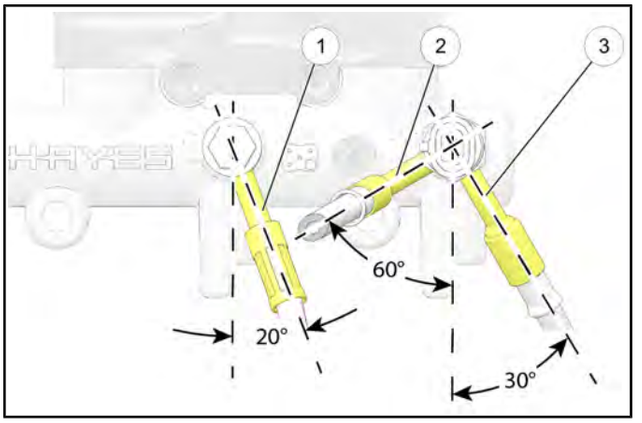
2. Install new stat-o-seal, front left brake line banjo fitting ③, new stat-o-seal, front right brake line banjo fitting ②, new stat-o-seal, and brake pressure switch to the front port on the master cylinder.



IMPORTANT

Lubricate seals with a thin film of DOT 4 brake fluid prior to installation.

3. Rotate the brake lines until they are orientated as shown. Torque banjo bolt and brake pressure switch to specification.

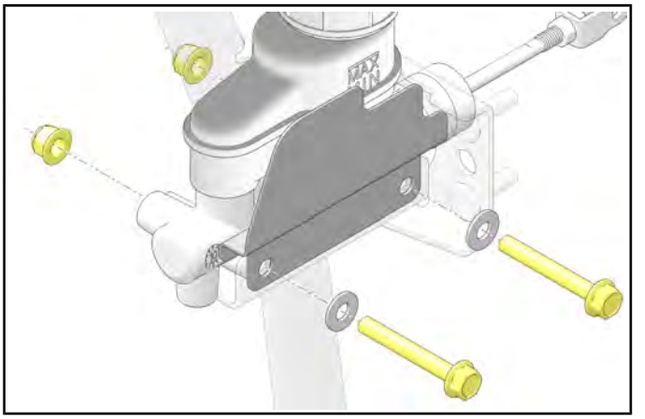


ITEM	DESCRIPTION	ANGLE
①	Rear Brake Line	20°
②	Front Right Brake Line	60°
③	Front Left Brake Line	30°

TORQUE

Banjo Bolt / Brake Pressure Switch:
15 ft-lbs (20 N·m)

4. Install the master cylinder shield and master cylinder retaining bolts and nuts. Torque bolts to specification.



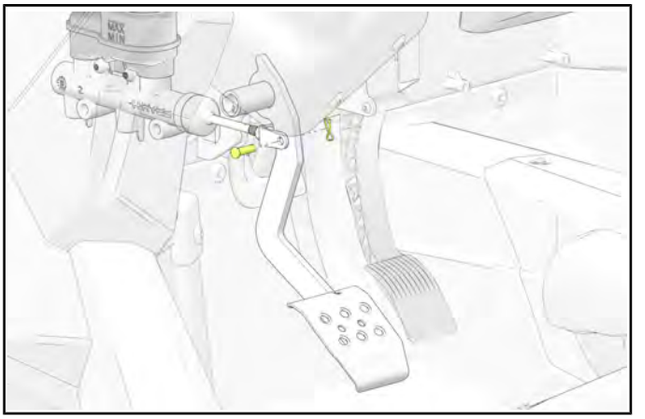
NOTICE

Hardened washer goes under the head of the bolt not the nut. Tighten bolt from head side.

TORQUE

Master Cylinder Mounting Bolts:
17 ft-lbs (23 N·m)

5. Reconnect the main harness to the brake pressure switch.
6. Align the operating rod clevis to the brake pedal. Install the operating rod pin and clip to retain the operating rod to the pedal.



7. Perform the BRAKE BLEEDING / FLUID CHANGE page 10.11 procedure.

BRAKE BLEEDING / FLUID CHANGE

IMPORTANT

Bleed the right rear caliper first, followed by the left rear, front right, and finally the front left caliper.

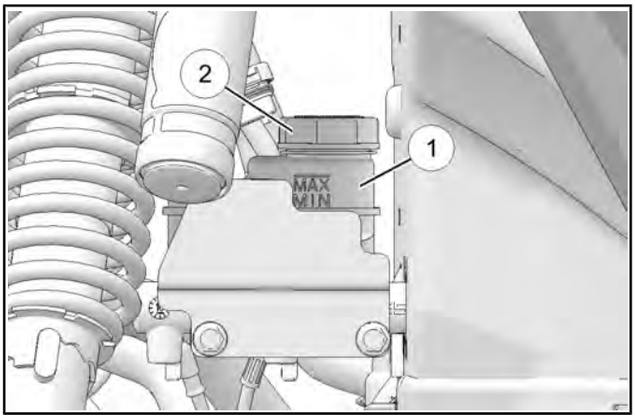
⚠ CAUTION

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.

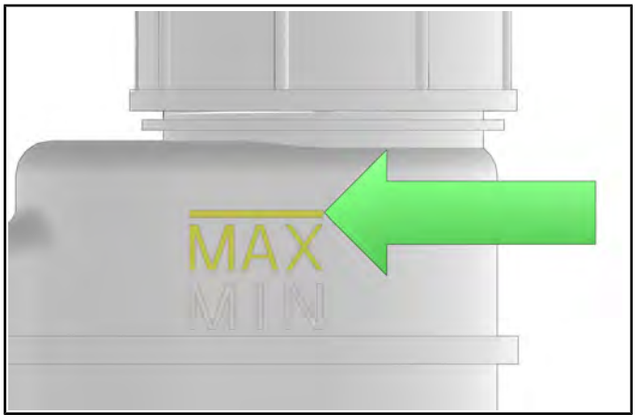
1. Clean master cylinder reservoir cover thoroughly and remove the cover ②.



2. If changing fluid, remove old fluid from reservoir ① with a Mity Vac™ pump or similar tool.

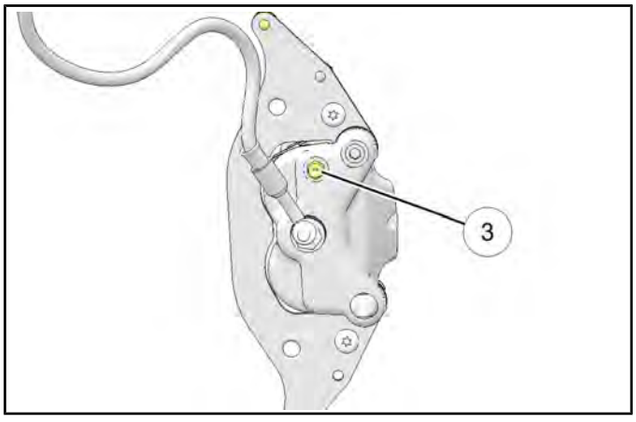
Mity Vac™:
2870975

3. Add brake fluid to the indicated MAX level of reservoir.



Polaris DOT 4 Brake Fluid
2872189

4. Bleed the brakes in the following order: right rear, left rear, right front and finally the left front. 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 one full turn. Close bleeder screw and release pedal.



NOTICE

Do not release foot pedal before bleeder screw is tight or air may be drawn into the brake system.

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.

IMPORTANT
Do not allow the brake fluid level in the reservoir to drop below the MIN line to prevent air from entering the master cylinder.

NOTICE
There is a rib within the reservoir that separates fluid between front and rear brake systems. It may appear that there is fluid in the reservoir even if the rear half of the reservoir is empty.

8. Tighten bleeder screw securely and remove bleeder hose. Torque bleeder screw to specification.

TORQUE
Bleeder Screw: **47 in-lbs (5 N·m)**

9. Repeat steps 5 - 8 for the remaining calipers.
10. Add brake fluid to MAX level on reservoir.

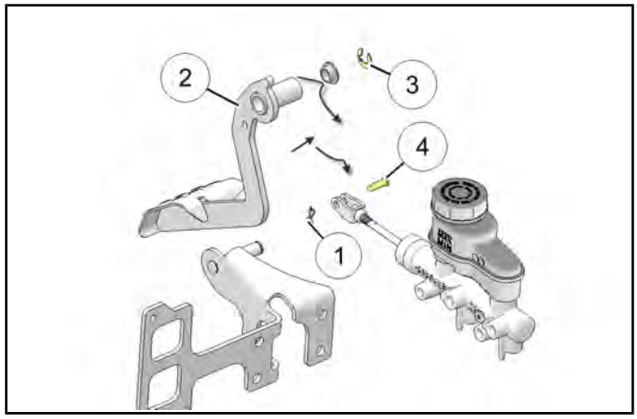
Master Cylinder Fluid Level
Between MIN and MAX lines on reservoir.

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 PEDAL

BRAKE PEDAL 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 ② from the vehicle.



BRAKE PEDAL INSTALLATION

1. Reverse the “Removal” steps to install brake pedal lever. Compare brake pedal free-play to specification.

Brake Pedal Free-play:
0.090” (2.28 mm)

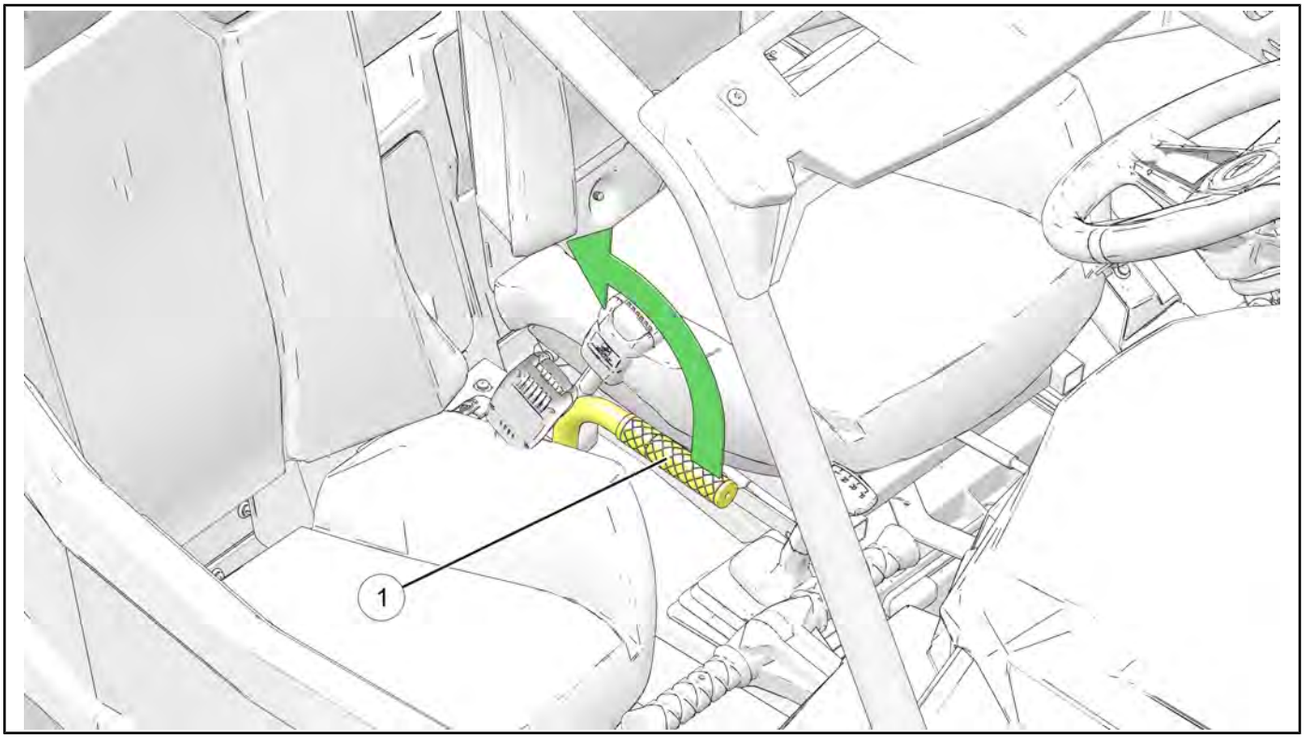
SECONDARY HAND BRAKE (INT'L)

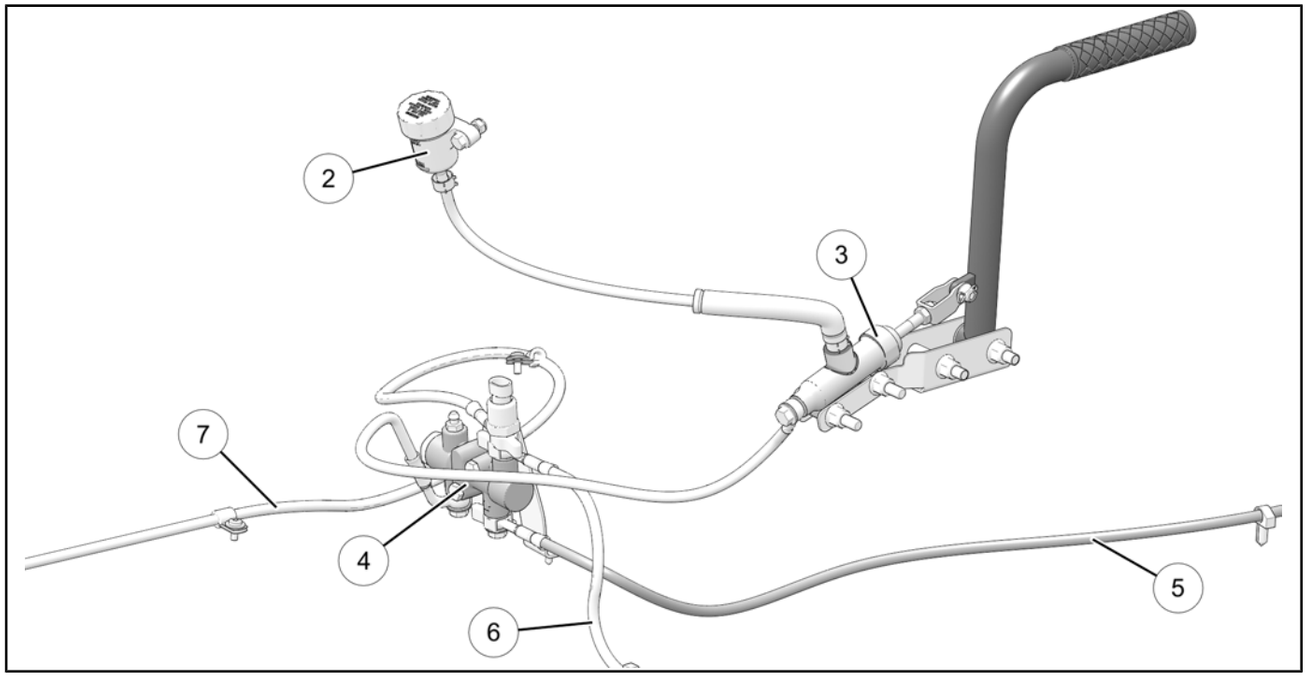
SECONDARY BRAKE SYSTEM OVERVIEW

NOTICE
Using the secondary service brake is not as efficient as using the foot brake.

The secondary service brake ① is an alternative hand-controlled hydraulic braking system. To apply the secondary service brake, simply pull the lever upwards and hold. Release the lever when ready to release brake force. When applied, the secondary service brake applies braking force to the rear wheel brake calipers only.

⚠ CAUTION
The secondary service brake is NOT a parking brake. There is no locking mechanism to hold the braking force. A braking force is applied only when the lever is pulled upward.

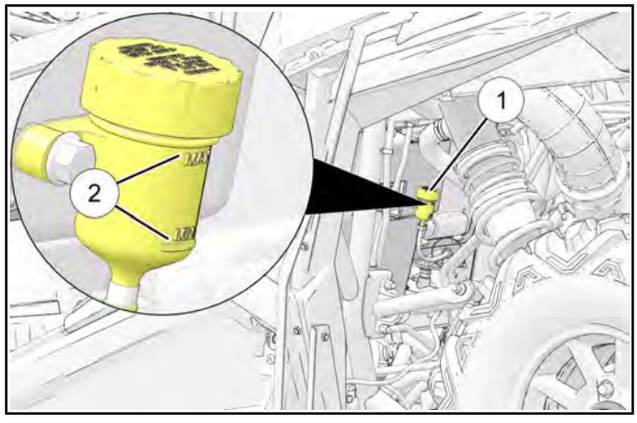




② Secondary Brake Reservoir	④ Junction Block	⑥ Right Rear Brake Line
③ Secondary Brake Master Cylinder	⑤ Brake Line (from pedal master cylinder)	⑦ Left Rear Brake Line

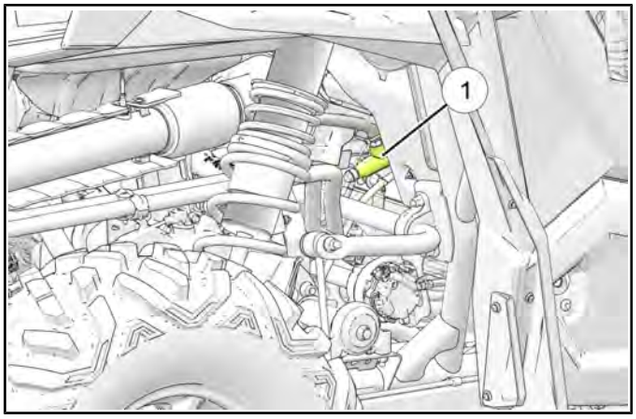
SECONDARY BRAKE FLUID RESERVOIR

The secondary brake fluid reservoir ① may be found on the engine side of the panel between the driver and the engine. To reduce the possibility of air getting into the brake system, the fluid level MUST be maintained between the MAX and MIN marks ② on the reservoir.



SECONDARY BRAKE MASTER CYLINDER

The secondary brake master cylinder ① is located on the engine side of the panel separating the passenger and engine compartments. This master cylinder controls only the rear brakes when the secondary brake lever is pulled.



FRONT BRAKE SERVICE

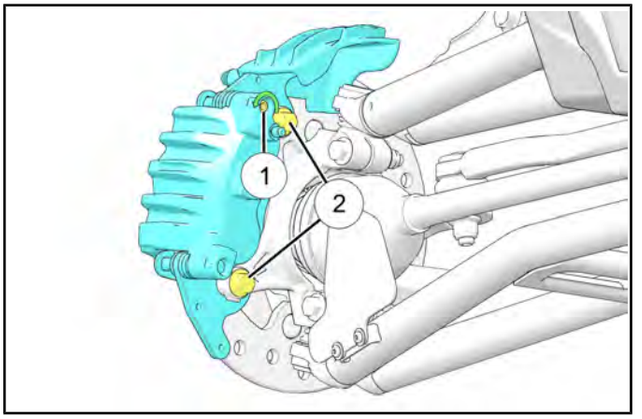
BRAKE CALIPER / PAD REMOVAL

1. Elevate and support the front of the vehicle.

⚠ WARNING

Always properly support a vehicle that is raised so it does not tip or fall. Severe injury or damage may occur if the machine tips or falls.

2. Remove the wheel nuts and front wheel.
3. Loosen the brake pad adjuster screw ① 2-3 turns [counter-clockwise].

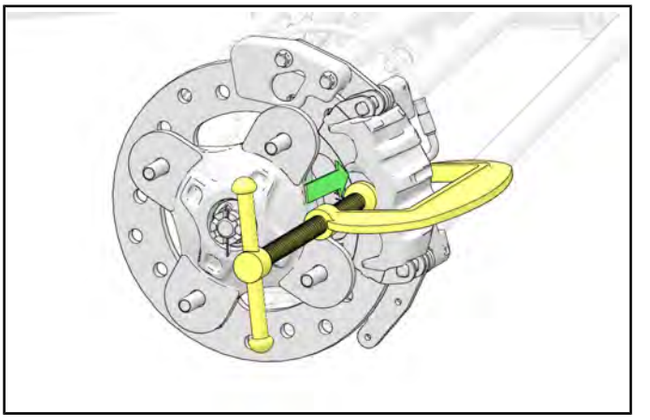


4. Remove the upper and lower caliper mounting bolts ② and remove the caliper from the front hub.

NOTICE

When removing the caliper, be careful to not damage the brake line. Support the caliper with a wire hangar or rope to avoid kinking or bending the brake line.

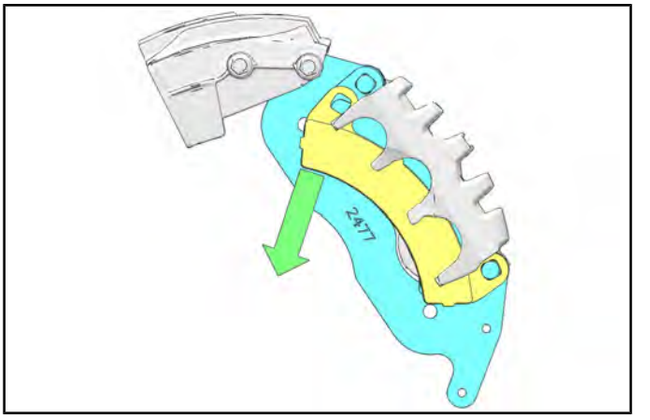
5. Push caliper piston into the caliper bore slowly using a C-clamp or locking pliers with the pads installed.



NOTICE

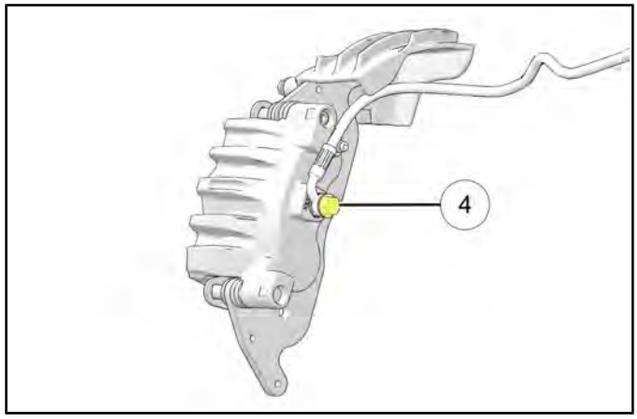
Brake fluid will be forced back into the master cylinder fluid reservoir when the piston is pushed back into the caliper. Remove excess fluid from reservoir as required so it does not overflow.

6. Push the mounting bracket ③ inward and slip the outer brake pad out between the bracket and caliper body.

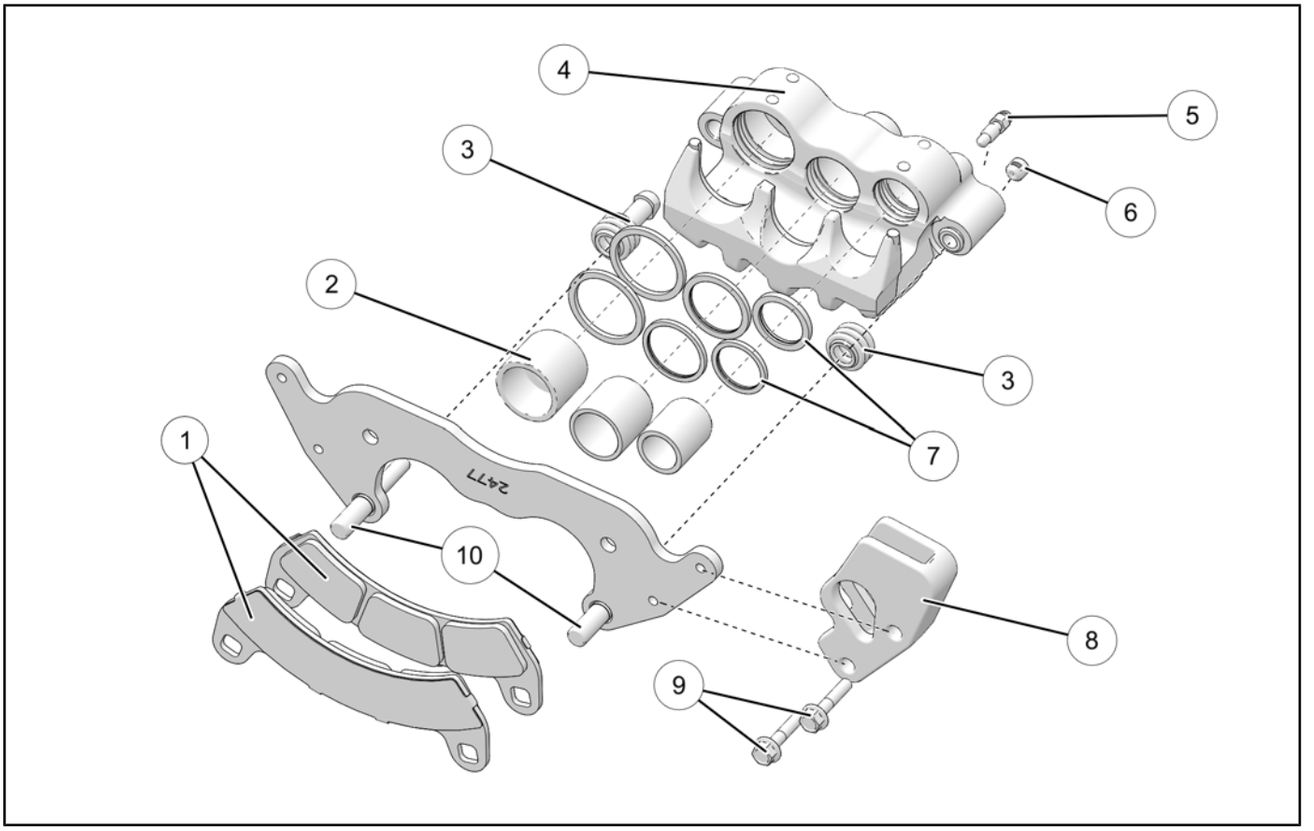


7. Remove the inner pad from the bracket and caliper.
8. **TO REMOVE CALIPER:**
   Place a catch pan under the brake caliper.

9. Remove the bolt ④ retaining the brake line to the caliper.



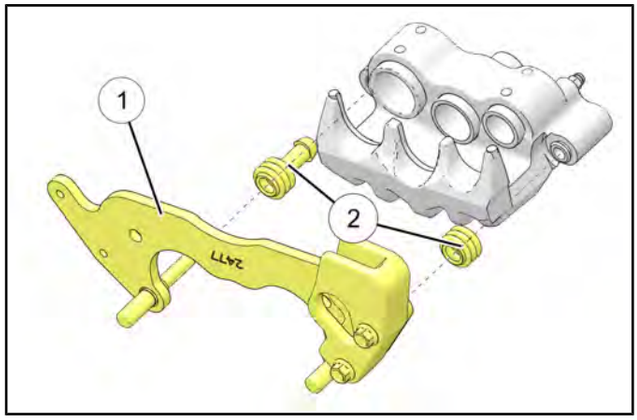
FRONT CALIPER ASSEMBLY VIEW



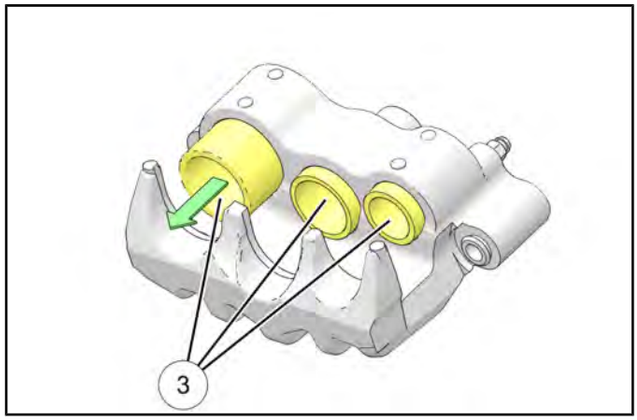
① Brake Pads	⑥ Set Screw
② Pistons *lubricate with DOT 4 Brake Fluid*	⑦ Piston O-Rings *lubricate with DOT 4 Brake Fluid*
③ Boots	⑧ Brake Scraper
④ Caliper Assembly	⑨ Scraper Bolts **48 in-lb (5 Nm)**
⑤ Bleeder Screw **48 in-lb (5 Nm)**	⑩ Mount Pins *apply Silicone Grease on install*

FRONT CALIPER DISASSEMBLY / INSPECTION

1. Remove the mount bracket assembly ① and dust boots ②.



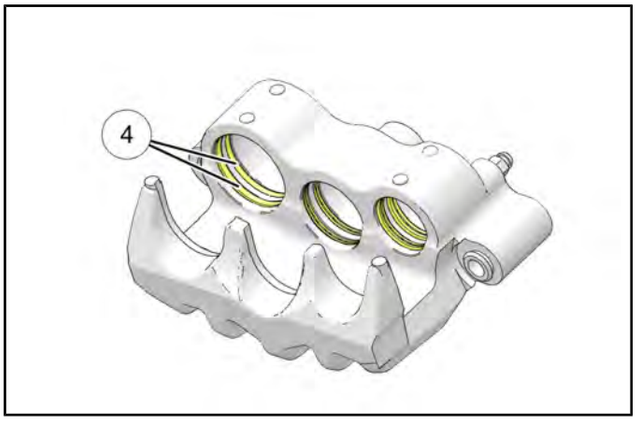
2. Thoroughly clean the caliper before disassembly and prepare a clean work area for disassembly.
3. Use a commercially available caliper piston pliers to extract the pistons ③ from the caliper



IMPORTANT

Do not remove the caliper pistons with a standard pliers. The piston sealing surface will become damaged if a standard pliers is used.

4. Once the pistons are removed, use a pick to carefully remove the o-rings ④ from the caliper. O-rings should be replaced during caliper service.



5. Clean the caliper body, pistons, and retaining bracket with brake cleaner or alcohol.

NOTICE

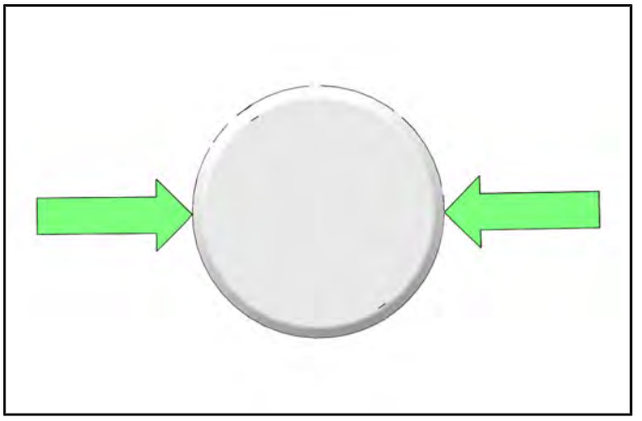
Be sure to clean all the seal grooves in the caliper body.

6. Inspect caliper body for nicks, scratches, pitting or wear.
7. Measure bore size and compare to specifications. Replace if damaged or worn beyond service limit.

MEASUREMENT
Front Caliper Piston Bore I.D.: **Large Bore: 1.375″ (34.93 mm)** **Medium Bore: 1.188″ (30.18 mm)** **Small Bore: 1.000″ (25.4 mm)**

8. Inspect piston for nicks, scratches, pitting or wear.

9. Measure piston diameter and replace if damaged or worn beyond service limit.

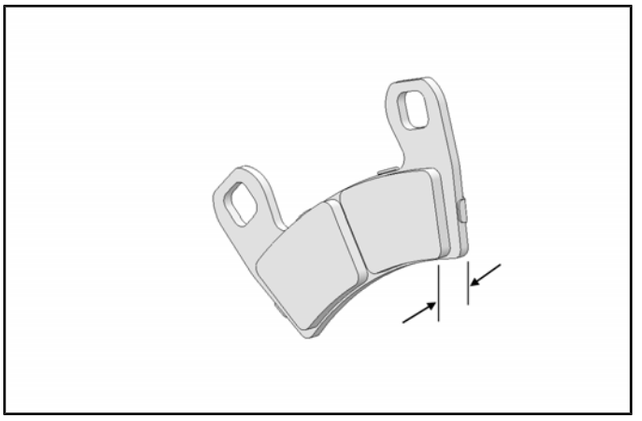


MEASUREMENT
Front Caliper Piston O.D.: **Large: 1.3685-1.3700″ (34.76-34.80 mm)** **Medium: 1.1860-1.1875″ (30.12-30.16 mm)** **Small: .9985-1.000″ (25.36-25.40 mm)**

10. Inspect the brake disc and pads as outlined in this chapter.

BRAKE PAD INSPECTION

Measure the thickness of the pad material and backing plate with a caliper. Replace pads if worn beyond the service limit.



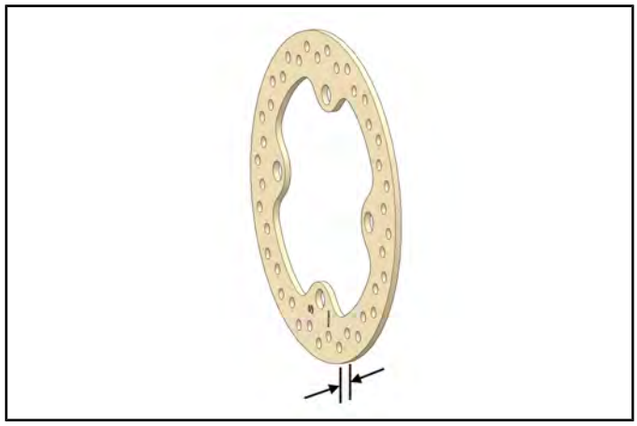
MEASUREMENT
Brake Pad Thickness: **.296 ± .007″(7.53 ± .19 mm)** **.180″ (4.6 mm)**

FRONT CALIPER ASSEMBLY

1. Coat piston with clean Polaris DOT 4 Brake Fluid **(PN 2872189)**. Install piston with a twisting motion while pushing inward. Piston should slide in and out of bore smoothly with light resistance.
2. Install new sealing o-rings inside the caliper.
3. Carefully press the pistons into the caliper.
4. Install the mount bracket assembly and dust boots.
5. 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.

BRAKE DISC INSPECTION

1. Visually inspect disc for scoring, scratches and gouges. Replace disc if deep scratches are evident.
2. Using a micrometer, measure disc thickness at eight different points around the pad contact surface.



MEASUREMENT
Brake Disc Thickness **.295 ± .008″(7.5 ± .2 mm)** Service Limit: **.268″ (6.8 mm)** Brake Disc Thickness Variance: **Service Limit: 0.002″ (0.051 mm)**

3. Mount a dial indicator. Slowly rotate the disc and read runout on the dial indicator Replace disc if runout exceeds specifications.

MEASUREMENT
Brake Disc Runout: **.010″ (0.25 mm)**

FRONT BRAKE DISC REPLACEMENT

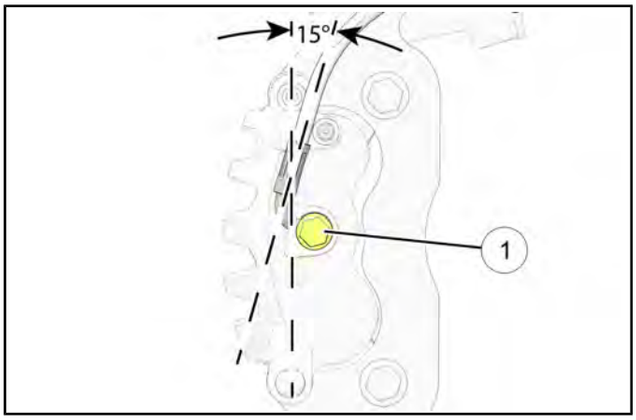
1. Remove the hub cotter pin, castle nut and washers.
2. Remove the wheel hub assembly from the vehicle by pulling straight out.
3. Press out the four studs retaining the disc to the hub.
4. Replace the brake disc with a new one.
5. Press in new wheel studs to retain the disc to the hub.
6. Install hub onto the vehicle. Install the two washers and new castle nut. Torque fastener to specification.

TORQUE
Wheel Hub Castle Nut: **180 ft-lbs (244 Nm)**

7. Install new cotter pin into castle nut and install wheel cap.

BRAKE CALIPER / PAD INSTALLATION

1. Install the bolt ① retaining the brake line fitting to the caliper. Properly orient the brake line fitting to the caliper as shown. Torque banjo bolt to specification.



NOTICE
The vertical centerline used for measurement is based on the caliper pin locations.

TORQUE
Brake Line Banjo Bolt: **15 ft-lbs (20 Nm)**

2. Install the inner pad on the bracket and caliper.
3. Install the outer brake pad between the bracket and caliper body.
4. Install the caliper on the knuckle. Torque mounting fasteners to specification.

TORQUE
Brake Caliper Mounting Bolts: **70 ft-lbs (95 Nm)**

5. 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.
6. Install the adjustment set screw and turn clockwise until stationary pad contacts disc, then back off 1/2 turn (counterclockwise).

7. Install the front wheel and the wheel nuts.

TORQUE
Wheel Lug Nuts: **120 ft-lbs (163 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)**.

REAR BRAKE SERVICE

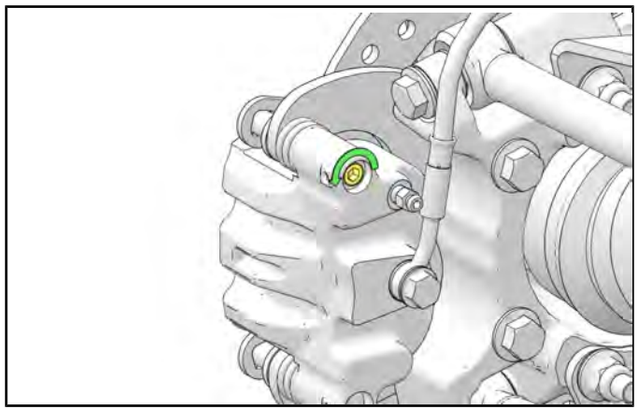
BRAKE CALIPER / PAD REMOVAL

1. Elevate and support rear of vehicle.

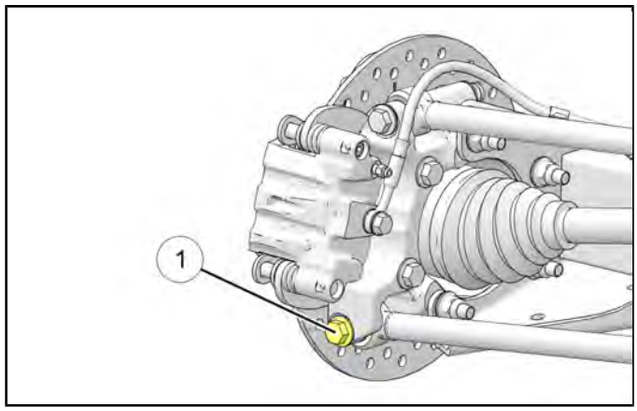
CAUTION

Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur if machine tips or falls.

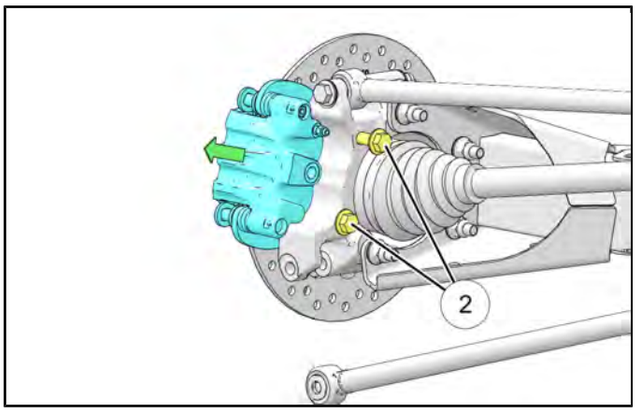
2. Remove the rear wheel.
3. Loosen pad adjuster screw 2-3 turns.



4. Remove the lower radius rod outer mounting bolt ①, nut and washer from the bearing carrier. Swing radius rod down. Discard the nut.



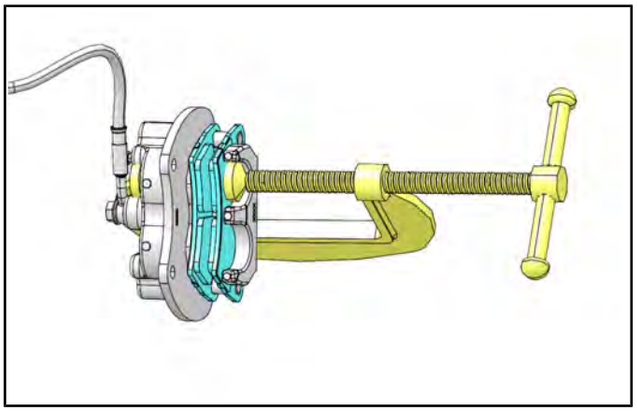
5. Remove the two caliper mounting bolts ② and lift caliper off the brake disc.



NOTICE

When removing caliper, be careful not to damage brake line. Support caliper to avoid kinking or bending brake line.

6. Push caliper piston into the caliper bore slowly using a C-clamp or locking pliers with pads installed.

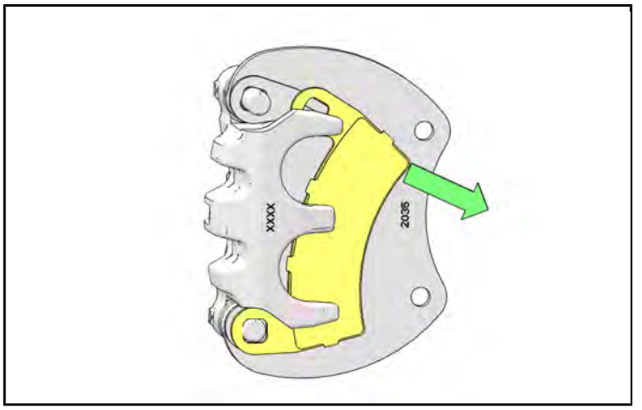


NOTICE

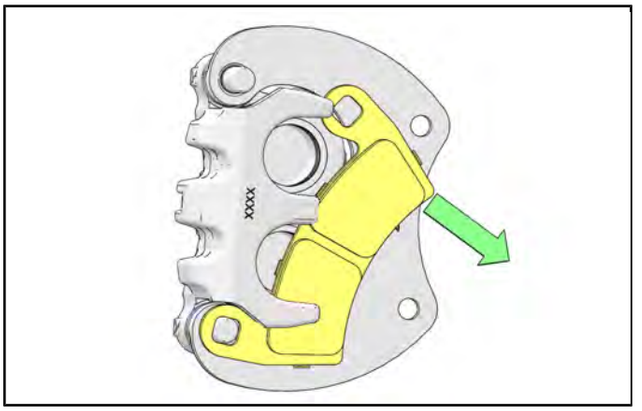
Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

10

7. Push caliper mounting bracket inward and slip outer brake pad past the edge to remove.



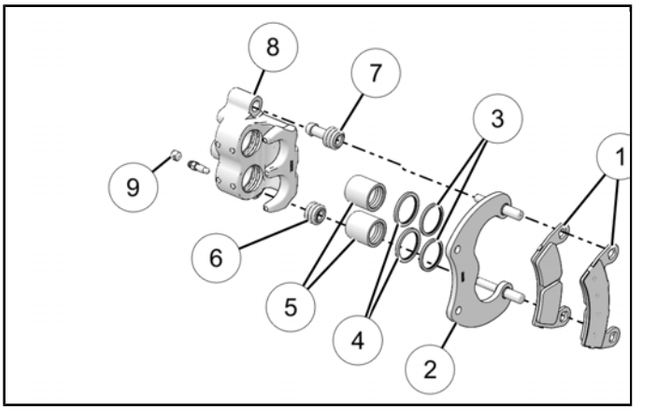
8. Remove the inner brake pad.



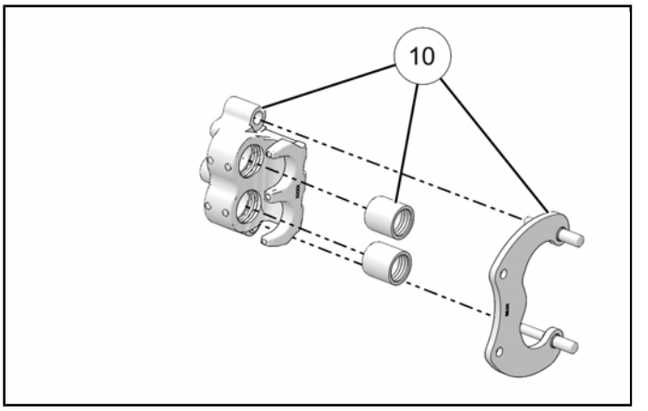
9. **To remove the brake caliper:** place a catch pan under the brake caliper and remove the banjo bolt retaining the brake line to the caliper.

REAR CALIPER DISASSEMBLY / INSPECTION

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 & ⑦.



4. Using piston pliers, remove the piston 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.



NOTICE
Be sure to clean caliper body seal grooves.

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.

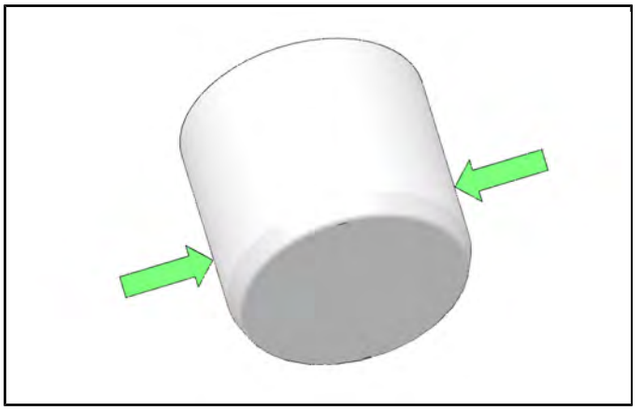
XP Turbo S / XP Turbo S Velocity:

MEASUREMENT
Rear Caliper Piston Bore I.D.: **Standard: 1.505″ (38.23 mm)** **Service Limit: 1.507″ (38.28 mm)**

XP 4 Turbo S / XP 4 Turbo S Velocity:

MEASUREMENT
Rear Caliper Piston Bore I.D.: **Large: 1.375″ (34.93 mm)** **Service Limit: 1.377″ (34.98 mm)** **Small: 1.188″ (30.18 mm)** **Service Limit: 1.190″ (30.23 mm)**

2. Inspect piston for nicks, scratches, wear or damage. Measure diameter and replace if damaged or worn beyond service limit.

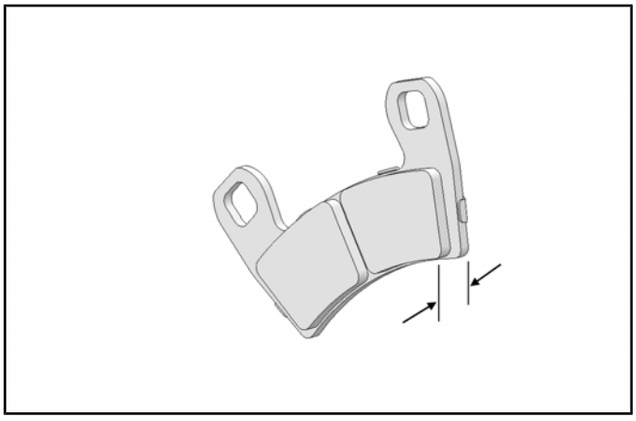


MEASUREMENT
Rear Caliper Piston Bore I.D.: **Large: 1.375″ (34.93 mm)** **Service Limit: 1.377″ (34.98 mm)** **Small: 1.188″ (30.18 mm)** **Service Limit: 1.190″ (30.23 mm)**

3. Inspect the brake disc and pads as outlined in this chapter.

BRAKE PAD INSPECTION

Measure the thickness of the pad material and backing plate with a caliper. Replace pads if worn beyond the service limit.

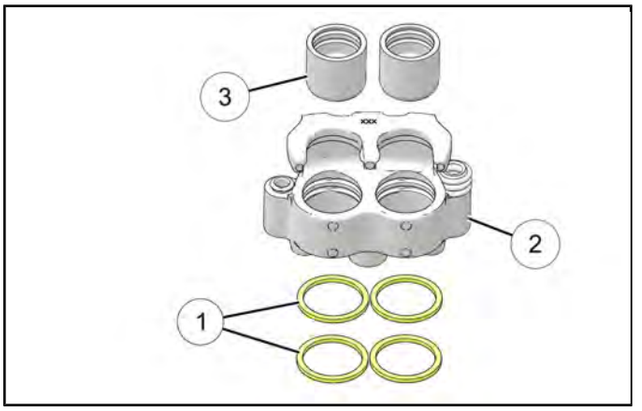


MEASUREMENT
Brake Pad Thickness: **.296 ± .007″(7.53 ± .19 mm)** **.180″ (4.6 mm)**

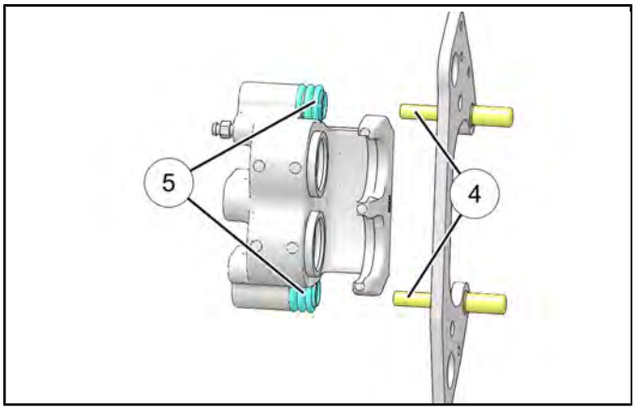
10

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.



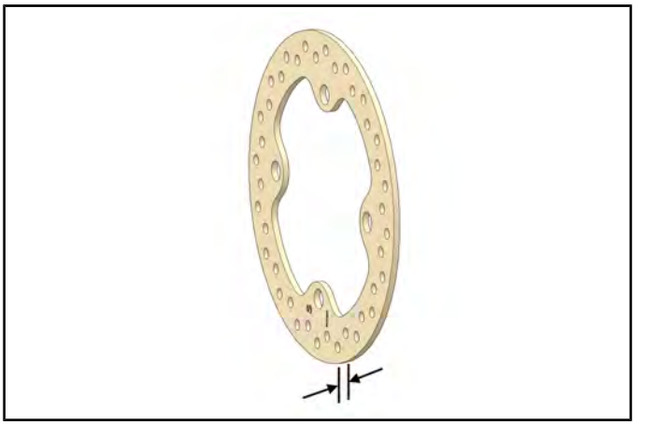
2. Coat piston with clean Polaris DOT 4 Brake Fluid **(PN 2872189)**. Install piston ③ with a twisting motion while pushing inward. Piston should slide in and out of bore smoothly with light resistance.
3. Lubricate the mounting bracket pins ④ with silicone grease and install the rubber dust seal boots 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 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
.295 ± .008″(7.5 ± .2 mm)
.268″ (6.8 mm)

Brake Disc Thickness Variance:
Service Limit: 0.002″ (0.051 mm)

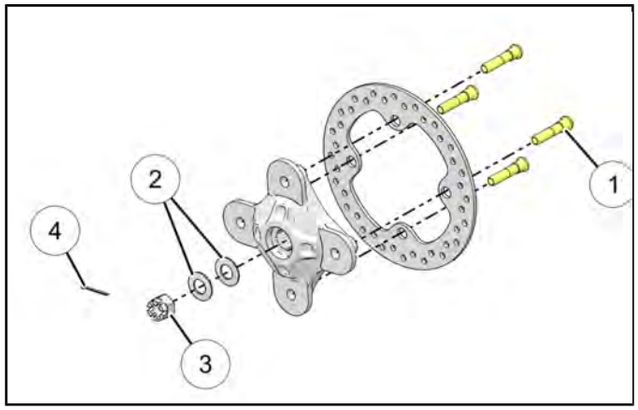
3. Mount a dial indicator and measure disc runout. Slowly rotate the disc and read total runout on the dial indicator. Replace the disc if runout exceeds specifications.

Brake Disc Runout:
.010″ (0.25 mm)

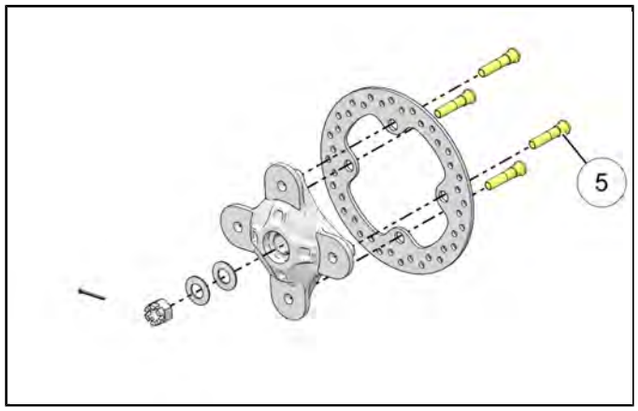
REAR BRAKE DISC REPLACEMENT

1. Remove rear brake caliper (see Brake Caliper / Pad Removal page 10.23).
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 studs ① retaining the disc to the hub.



4. Clean the wheel hub mating surface and install new disc on wheel hub.
5. Install new studs ⑤.



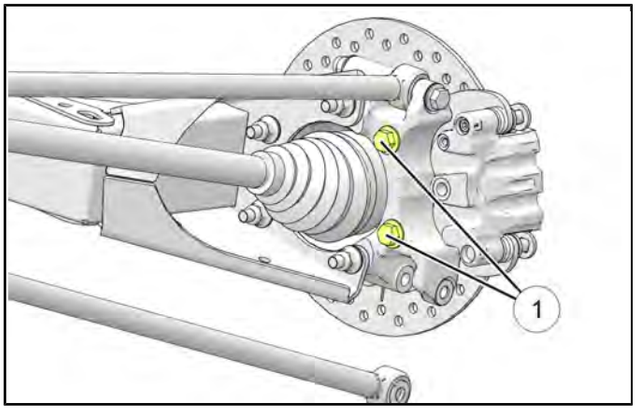
6. Install wheel hub assembly, washers, and castle nut. Torque castle nut to specification and install a new cotter pin.

TORQUE
Rear Wheel Hub Castle Nut: **180 ft-lbs (244 Nm)**

7. Install rear caliper (see Brake Caliper / Pad Installation page). Bleed the brake system. (See BRAKE BLEEDING / FLUID CHANGE page 10.11.
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.

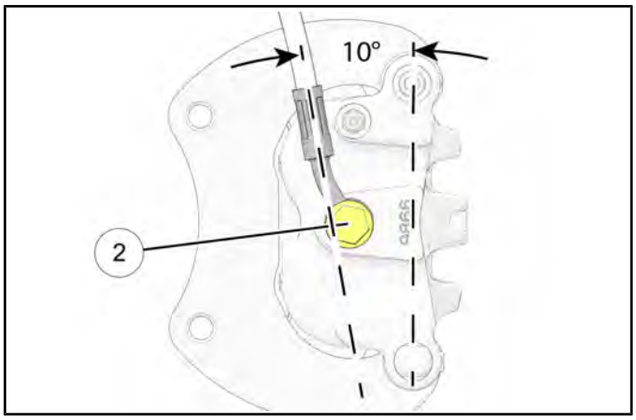
REAR BRAKE CALIPER / PAD INSTALLATION

1. Install the rear caliper with new mounting bolts. Torque mounting bolts ① to specification.



TORQUE
Rear Caliper Mount Bolt ①: **46 ft-lbs (62 Nm)**

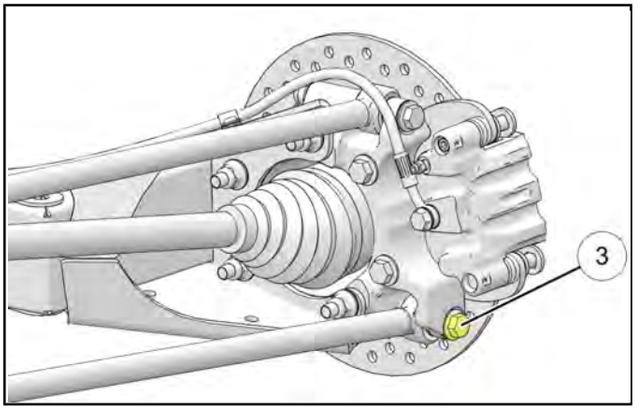
2. Install brake line banjo bolt ② retaining the brake line fitting to the caliper. Properly orient the brake line fitting to the caliper as shown. Torque banjo bolt to specification.



NOTICE
The vertical centerline used for measurement is based on the caliper pin locations.

NOTE
Banjo Bolts: **15 ft-lb (20 Nm)**

3. Install lower radius rod bolt, washer and new nut. Torque to specification.



TORQUE
Radius Rod to Bearing Carrier Bolt: **50 ft-lb (68 Nm) + 45°**

4. Install the pad adjustment screw and turn until stationary pad contacts disc, then back off 1/2 turn.
5. Follow bleeding procedure outlined earlier in this chapter.
6. Install wheel and torque wheel nuts to specification.

TORQUE
Wheel Nuts: **120 ft-lbs (163 Nm)**

NOTICE
If new pads are installed, refer to Brake Burnishing Procedure page 10.22.

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)**.

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.

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.
Pad(s) dragging on disc due to: 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 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. Check axle nut torque. Inspect/replace bearing if needed.
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

POOR BRAKE PERFORMANCE

POOR BRAKE PERFORMANCE	
• Air in system	• Incorrectly adjusted stationary pad
• Water in system (brake fluid contaminated)	• Worn or damaged master cylinder or components
• Caliper or disc misaligned	• Damaged break pad noise insulator
• Caliper dirty or damaged	• Brake pads dragging
• Brake line damaged or lining ruptured	• Brake caliper dragging
• Worn disc and/or friction pads	

BRAKE VIBRATION

PEDAL / LEVER VIBRATION *(VIBRATION IS ONLY FELT IN PEDAL OR LEVER WHILE BRAKING)*	
• Brake Disc worn (runout or thickness variance exceeds service limit) • Brake Disc damaged	• Brake Pad wear (uneven / unusual wear)

VEHICLE VIBRATION *(VIBRATION FELT THROUGH ENTIRE VEHICLE / CHASSIS WHILE BRAKING)*	
• Worn Suspension components	• Alignment issues

CALIPER OVERHEATS (BRAKES DRAG)

CALIPER OVERHEATS (BRAKES DRAG)	
• Compensating port plugged	• Parking brake left on (INT'L Model)
• Pad clearance set incorrectly	• Residue build up under caliper seals
• Parking brake lever incorrectly adjusted (INT'L Model)	• Operator riding brakes
• Brake pedal binding or unable to return fully	

CALIPER OVERHEATS (BRAKES DRAG)

CALIPER OVERHEATS (BRAKES DRAG)	
• Compensating port plugged	• Parking brake left on (INT'L Model)
• Pad clearance set incorrectly	• Residue build up under caliper seals
• Parking brake lever incorrectly adjusted (INT'L Model)	• Operator riding brakes
• Brake pedal binding or unable to return fully	

BRAKES LOCK

BRAKES LOCK	
• Alignment of caliper to disc	• Failed brake hose / line
• Caliper pistons sticking	• Improper assembly of brake system components
• Failed master cylinder	

BRAKE WARNING SYSTEM (INTL MODELS)

- This vehicle uses a brake monitoring system with half plausibility check. This system uses a brake pedal switch mounted to the pedal, and two brake pressure switches mounted on the master cylinder or after the ABS module.
- For this system to operate correctly. The Brake Pressure Switch has to be activated before the Brake Pedal Switch.
- These inputs can be monitored on Digital Wrench®. If the brake pedal is depressed slowly, you will be able to monitor the change in the Brake Pressure Switch before the Brake Pedal Switch if the system is operating correctly.

- If the Brake Pedal Switch becomes active and stays active for more than 3 seconds before the Brake Pressure Switch changes status, the Brake Warning Light will be illuminated indicating a concern with the system.

IMPORTANT

The Brake Warning Light may be illuminated giving a false warning if the Brake Pedal Switch becomes active but the system never builds pressure. This can be caused by a very light brake apply or if the pedal is depressed and the system never builds pressure.

- If the Brake warning light is active, refer toBrake Warning System (INTL Models) page 10.30 for testing procedures.

BRAKE WARNING SYSTEM INSPECTION (INTL MODELS)

1. Inspect the brake hydraulic system for any concerns. If any leaks or mechanical failures are found with the hydraulic system, concerns need to be repaired before proceeding.
2. Connect the vehicle to Digital Wrench® and select the Data Item Menu.
3. Add the Brake Switch and Foot Brake Switch inputs to the main table.
4. Slowly depress the brake pedal, and observe the switching point of the Brake Pressure Switch and the Brake Pedal Switch.
5. When the brake pedal is depressed the Brake Pressure Switches will become active before the Brake Pedal Switch.
6. If all the switches are not changing status, check the brake pedal (pay close attention to were the lever triggers brake pedal switch), inspect the pedal mount for mechanical damage, and check for free play.

NOTICE

A sticking brake pedal may also cause false brake warning alarms.

7. The Brake Warning message could also be caused by a failed sensor. If any of the three switches do not change status when monitoring on Digital Wrench®. Refer toBrake Light Switch page for Brake Pressure Switch testing. Refer toBrake Pedal Switch Inspection page 10.31 for Brake Pedal Switch testing.
8. If any of the three switches fail the testing procedure, check the electrical circuit for the sensor that has failed. It is possible that there could be a concern with the circuit. If a circuit concern is found, repair or replace as necessary.
9. If the electrical circuit passes testing the failed switch will require replacement.
10. If the concern is still present after previous testing has passed, suspect there is a fault within the ECU.

BRAKE PEDAL SWITCH INSPECTION

The Brake Pedal Switch is mounted near the Brake Pedal Assembly. When the brake pedal is depressed this switch will turn from active to inactive. This can be monitored using Digital Wrench ®. If the status does not switch when depressed, proceed with further testing.

1. Disconnect electrical connector from sensor.
2. Inspect sensor and connector for moisture or corrosion. If moisture or corrosion is found, clean first and re check.
3. With connector disconnected, check resistance across pins on the sensor. When switch is closed (brake pedal not depressed) resistance should be less than 0.5 ohms. With switch open (brake pedal depressed) resistance should show an open (OL).
4. If the sensor test fails, resistance is not within specification; the sensor should be replaced.
5. If the sensor test passes, resistance is within specification, inspect the circuit for correct operation. If there is a concern found with the circuit repair and recheck operation.
6. If the concern is still present, it is possible that there may be a concern with the ECU.

NOTES

CHAPTER 11
BODY / FRAME

GENERAL INFORMATION

SPECIAL TOOLS

PART NUMBER	DESCRIPTION
2876389	Multi-Function Pliers

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

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.

CAUTION

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.

CAUTION

Do not flame treat painted plastic components. Painted plastic surfaces should only be wiped clean prior to decal adhesion.

To flame treat the decal area:

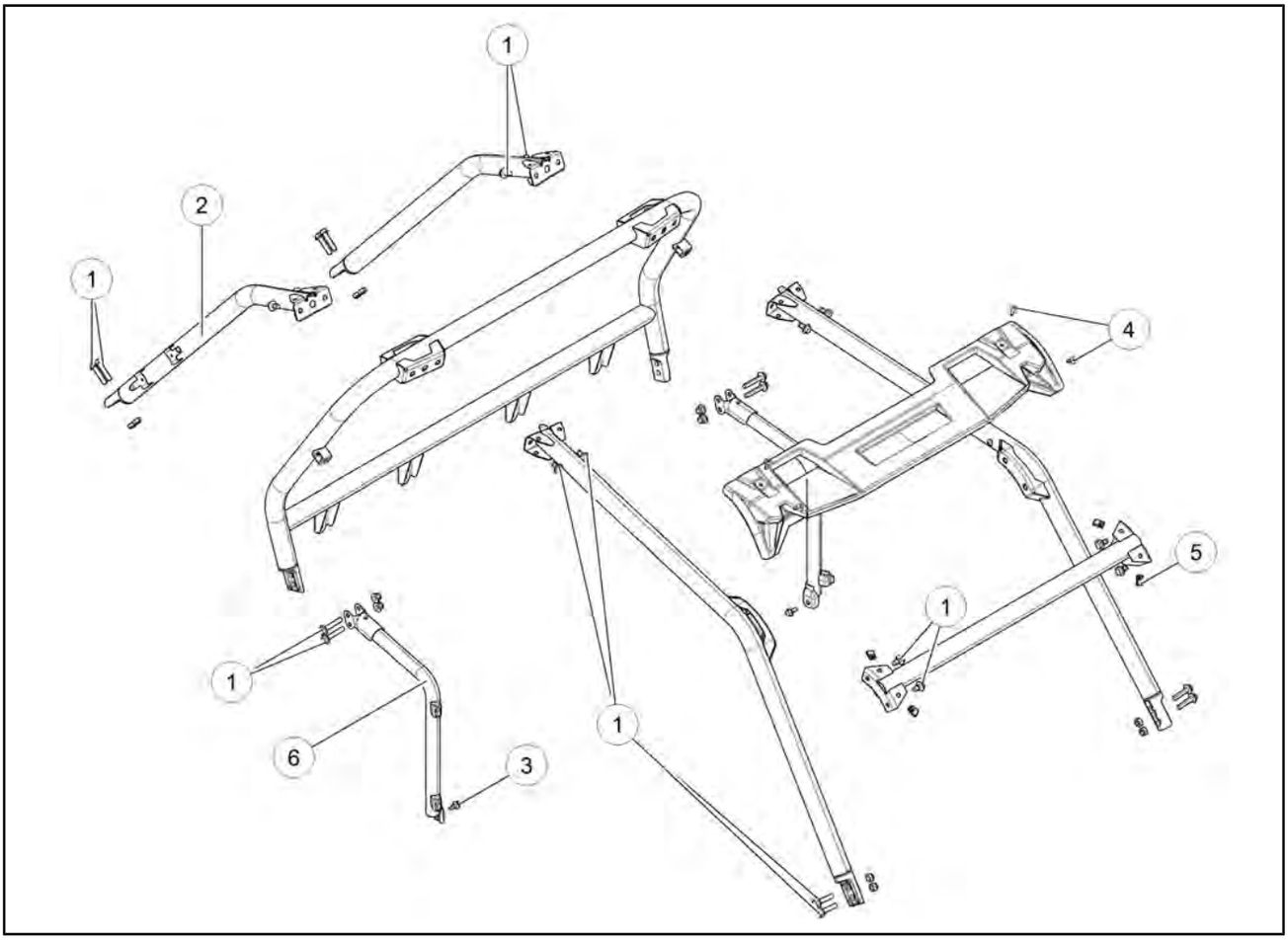
1. Pass the flame of a propane torch back and forth quickly over the area where the decal is to be applied until the surface appears slightly glossy. This should occur after just a few seconds of flame treating. Do not hold the torch too close to the surface (2-3 inches from the flame tip is recommended). 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.

BODY ASSEMBLY VIEWS

CAB FRAME ASSEMBLY XP

NOTICE
Finger tighten all components until cab frame is completely assembled on vehicle then tighten to specification.

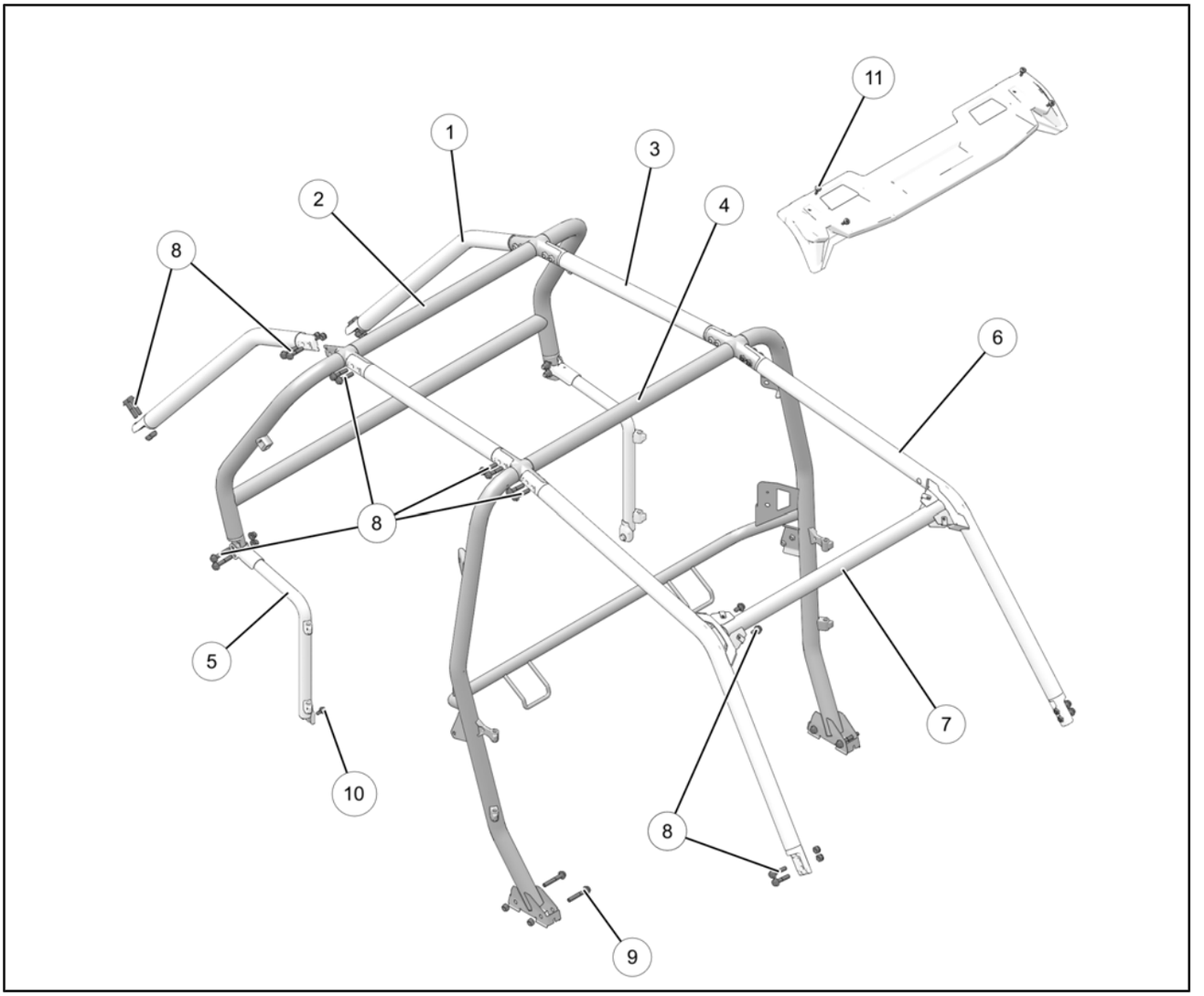
1. Install hip bolster and secure the bottom mount with M8 x 1.24 x 20 bolts. Torque bolts to **14 ft-lbs (19 N·m)**.
2. Install ROPS to hip bolster and frame with M10 x 1.25 x 55 bolts and nuts. Tighten fasteners to **40 ft-lbs (54 N·m)**
3. Install the front ROPS to the frame with M10 x 1.5 x 45 screws and nuts. Install front ROPS to ROPS hoop with M10 x 1.5 x 20 screws. Torque fasteners to **40 ft-lbs (54 N·m)**.
4. Install rear ROPS to the ROPS hoop with M10 x 1.5 x 25 screws. Install rear ROPS to frame with M10 x 1.5 x 45 screws and nuts. Torque fasteners to **40 ft-lbs (54 N·m)**.
5. Install visor on front ROPS with M10 x 1.25 x 20 bolts. Torque bolts to **8 ft-lbs (11 N·m)**



① Cab Frame Fasteners **40 ft-lbs (54 N·m)**	④ Visor Screws **8 ft-lbs (11 N·m)**
② Cab Frame Extenders	⑤ Front ROPS Bracket **40 ft-lbs (54 N·m)**
③ Hip Bolster Lower Fasteners **14 ft-lbs (19 N·m)**	⑥ Hip Bolster

CAB FRAME ASSEMBLY XP 4

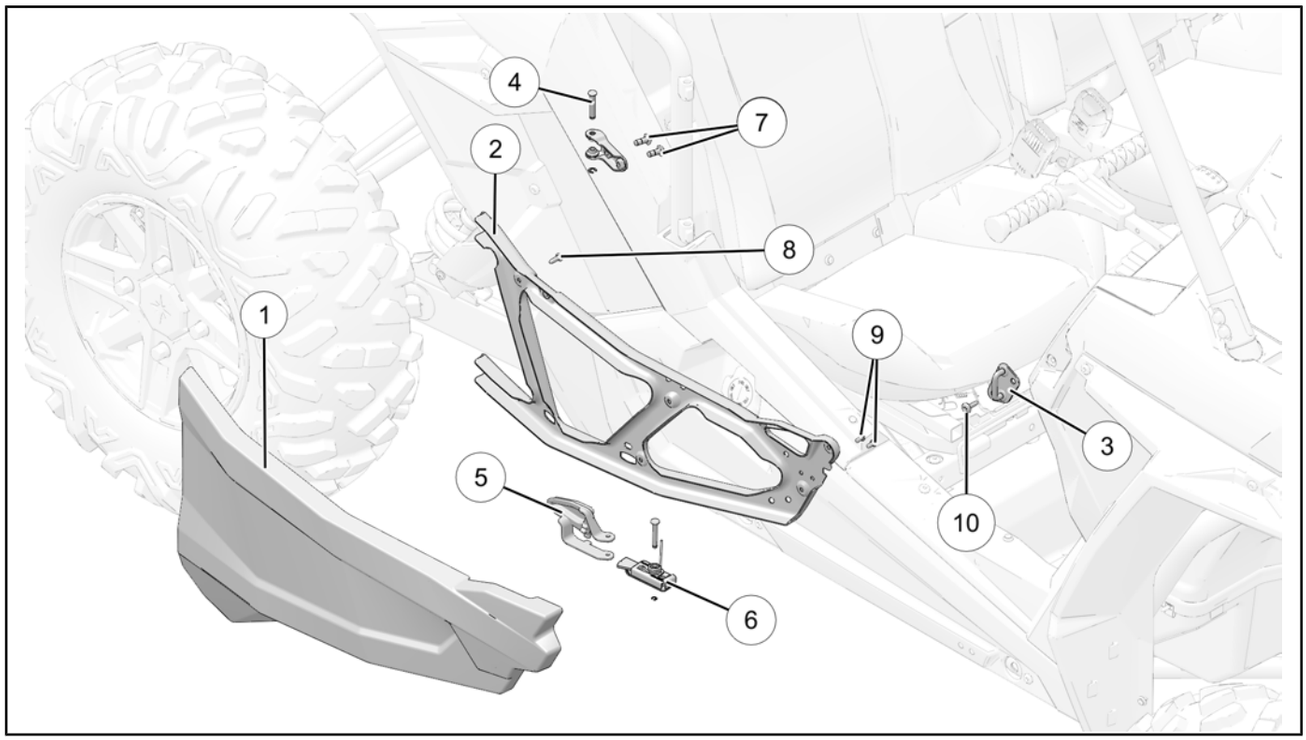
NOTICE
Finger tighten all components until cab frame is completely assembled on vehicle then tighten to specification.



① ROPS Rear	⑦ ROPS Front
② ROPS Rear Hoop	⑧ Cab Frame Fasteners **40 ft-lbs (54 N·m)**
③ ROPS Brace	⑨ Cab Frame Mid Hoop Mounting Fasteners **17 ft-lb (23 Nm)**
④ ROPS Mid Hoop	⑩ Hip Bolster Bottom Fasteners **14 ft-lbs (19 N·m)**
⑤ Hip Bolster	⑪ Visor Fasteners **8 ft-lbs (11 N·m)**
⑥ ROPS Main	

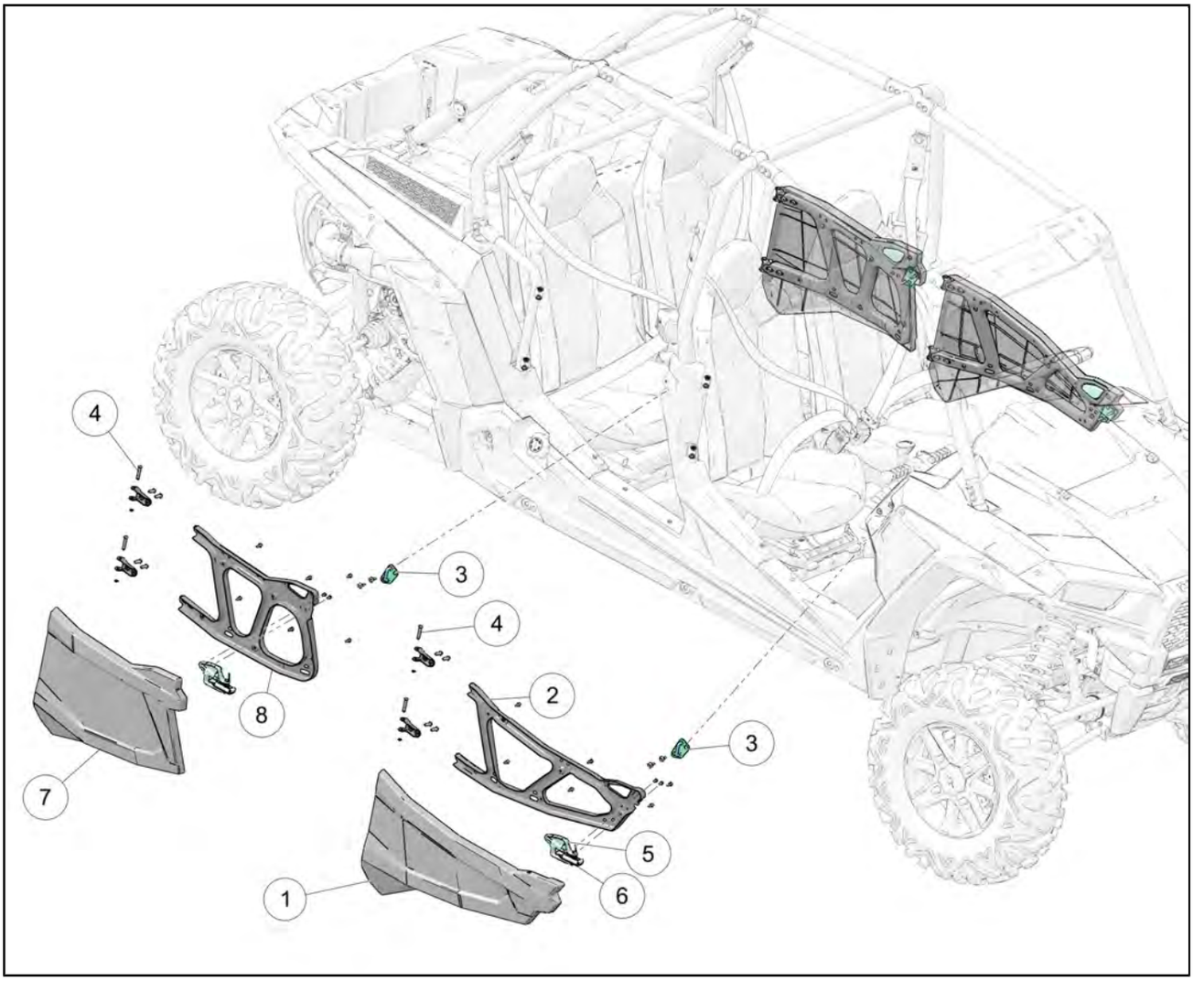
1. Install the ROPS mid-hoop to the frame with M10 x 1.5 x 65 screws and nuts ⑨. Torque to **17 ft-lb (23 Nm)**.
2. Install hip bolsters onto the main frame with M8 x 1.25 x 20 bolts ⑩. Torque bolts to **14 ft-lbs (19 N·m)**
3. Install ROPS rear hoop to frame with M10 x 1.25 x 55 bolts and nuts ⑧. Torque to **40 ft-lbs (54 N·m)**
4. Attach ROPS main to the mid ROPS hoop and front main frame with M10 x 1.5 x 45 screws ⑧. Torque to **40 ft-lbs (54 N·m)**.
5. Install rear ROPS to rear ROPS hoop and rear frame with M10 x 1.5 x 45 screws ⑧. Torque to **40 ft-lbs (54 N·m)**
6. Install ROPS brace to ROPS mid hoop and ROPS rear hoop with M10 x 1.5 x 45 screws ⑧. Torque to **40 ft-lbs (54 N·m)**
7. Install ROPS front to ROPS mains with M10 x 1.5 x 20 screws ⑧. Torque to **40 ft-lbs (54 N·m)**
8. Install visor panel on front ROPS with M10 x 1.25 x 20 bolts ⑪. Torque to **8 ft-lbs (11 N·m)**

DOORS XP



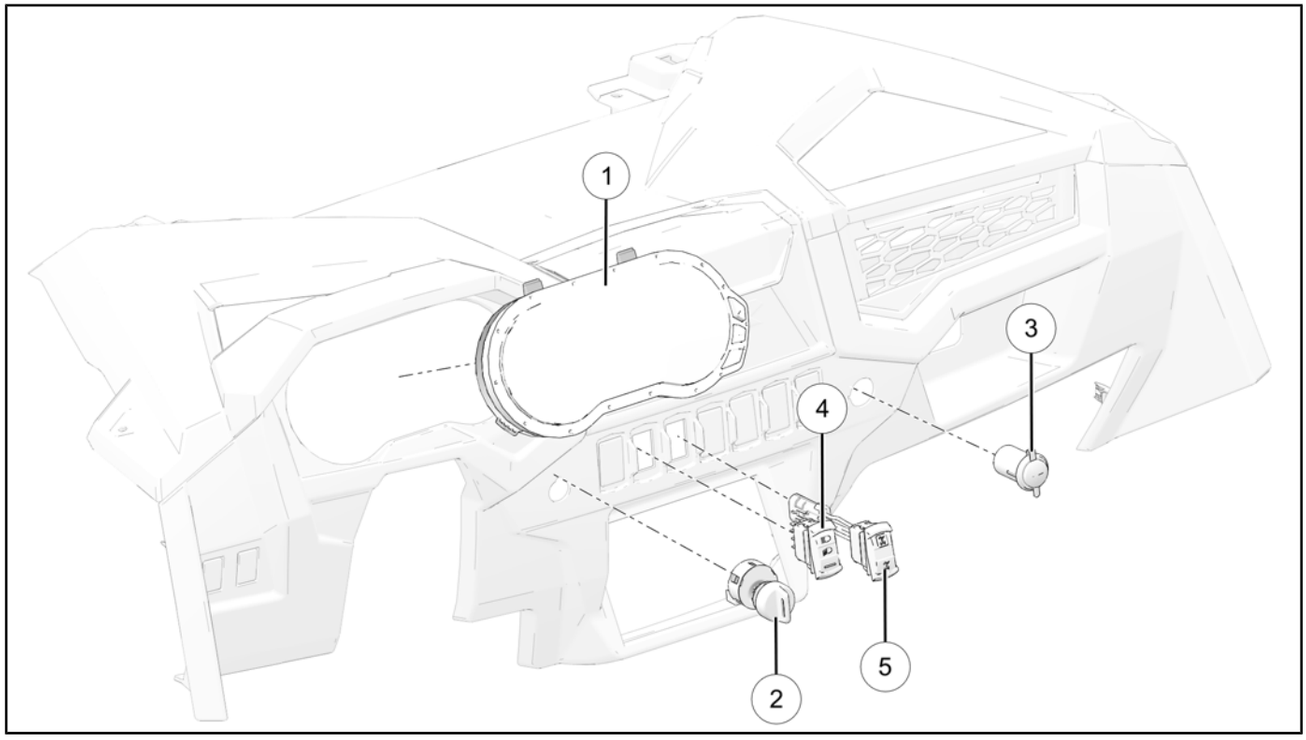
① Door Panel	⑥ Latch
② Door Frame	⑦ Hinge Screws **8 ft-lb (11 Nm)**
③ Latch Striker	⑧ Door Panel Screws **8 ft-lb (11 Nm)**
④ Hinge Pin	⑨ Door Latch Screws **8 ft-lb (11 Nm)**
⑤ Latch Release	⑩ Striker Screws **8 ft-lb (11 Nm)**

DOORS (XP4)



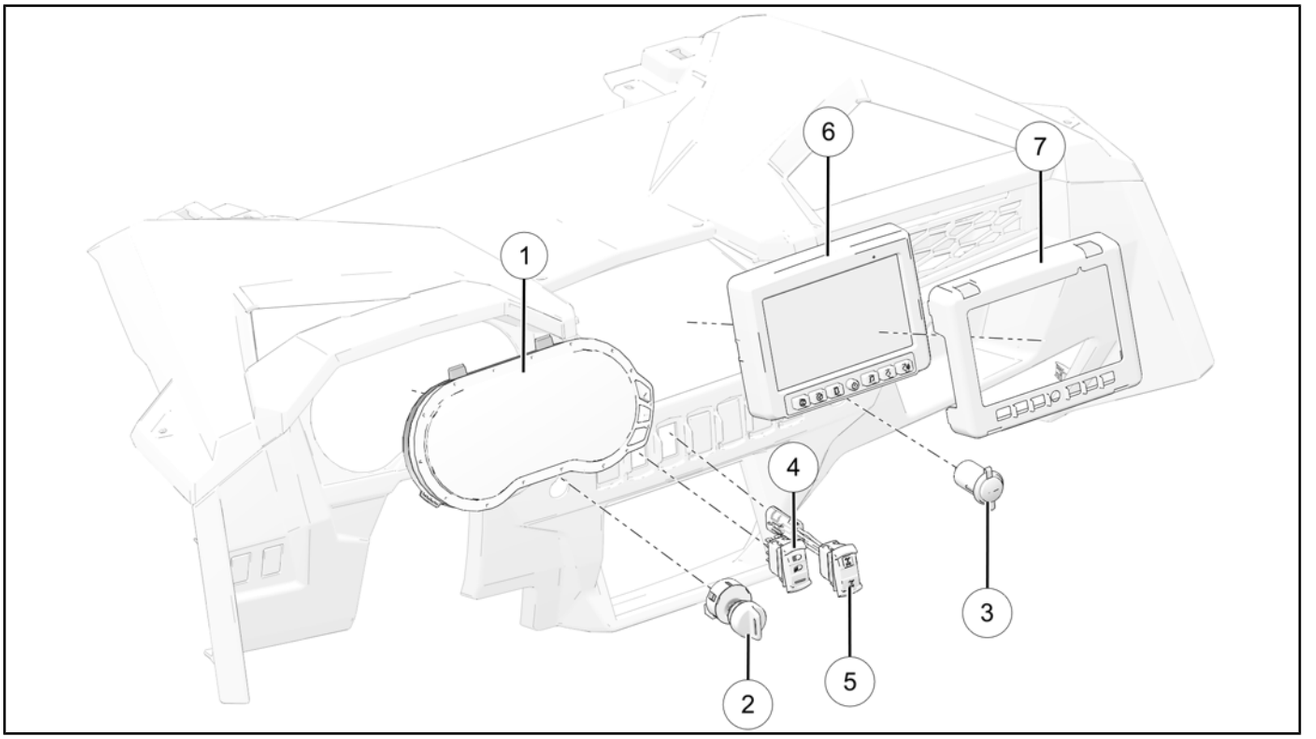
① Door Panel	⑤ Latch Release
② Door Frame	⑥ Latch
③ Latch Striker	⑦ Door panel (Rear)
④ Hinge Pin	⑧ Door Frame (Rear)

DASH INSTRUMENTS / CONTROLS



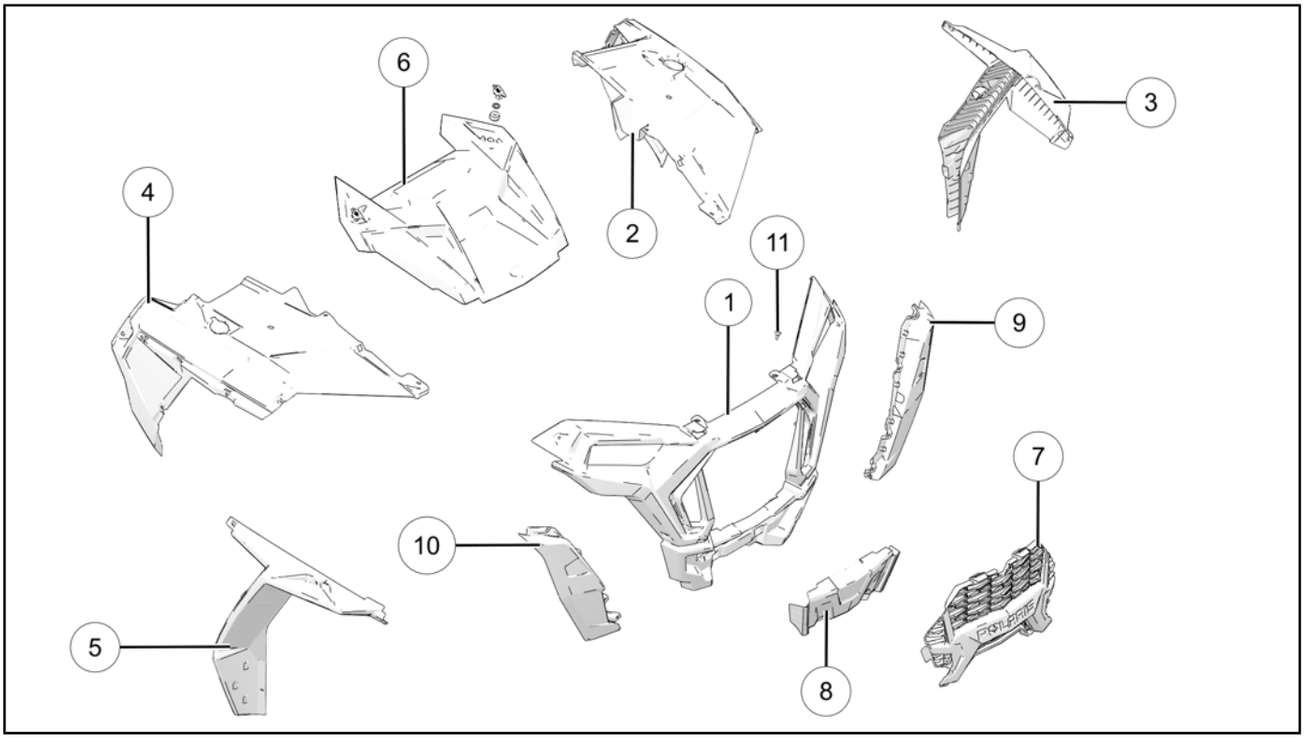
① C4 Instrument Cluster	④ Headlight Switch
② Key Switch	⑤ AWD Switch
③ 12V accessory Port	

DASH INSTRUMENTS / CONTROLS (RIDE COMMAND)



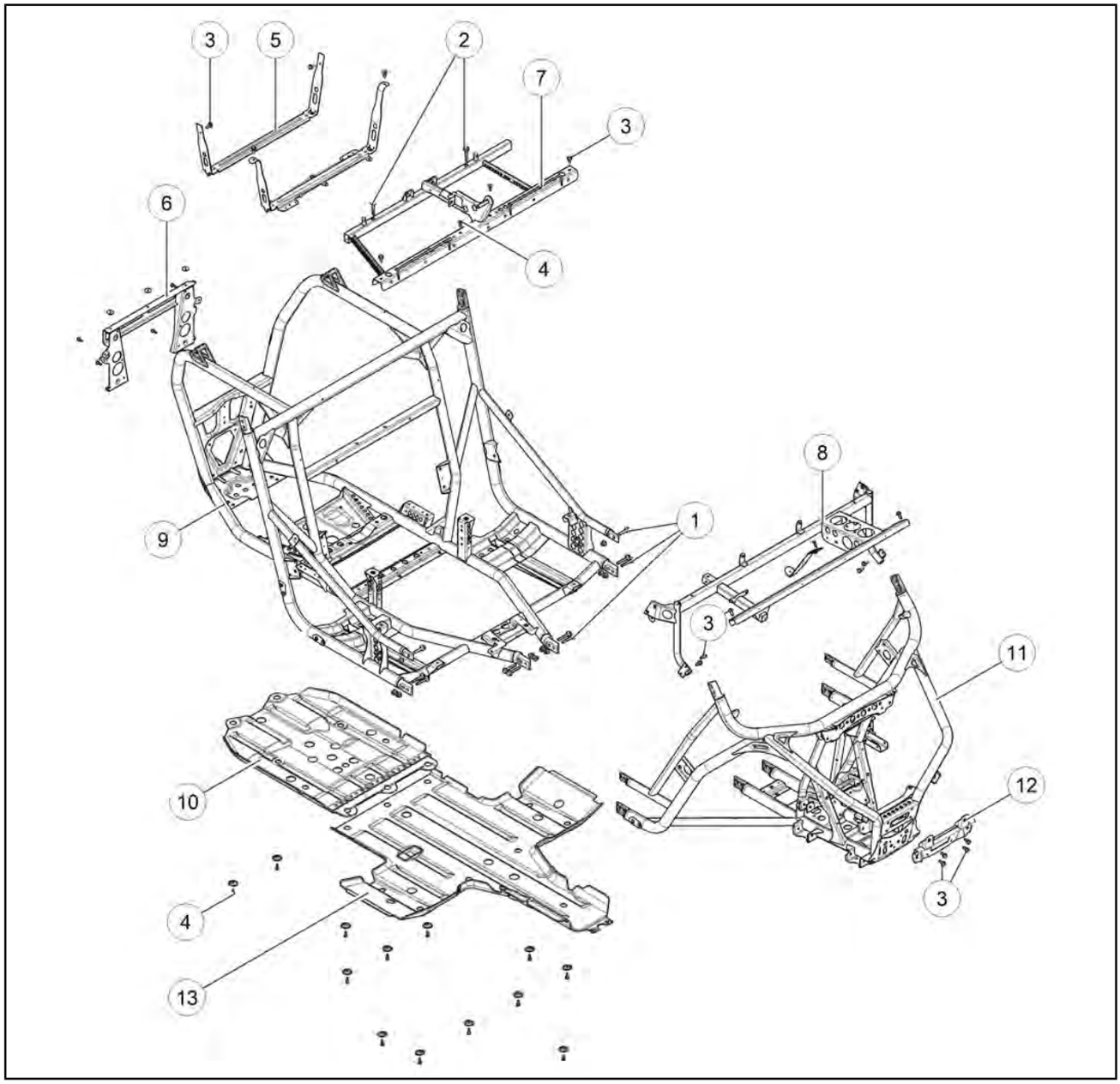
① C4 Instrument Cluster	⑤ AWD Switch
② Key Switch	⑥ Ride Command Display
③ 12V Accessory Port	⑦ Bezel
④ Headlight Switch	

HOOD / FRONT BODY WORK



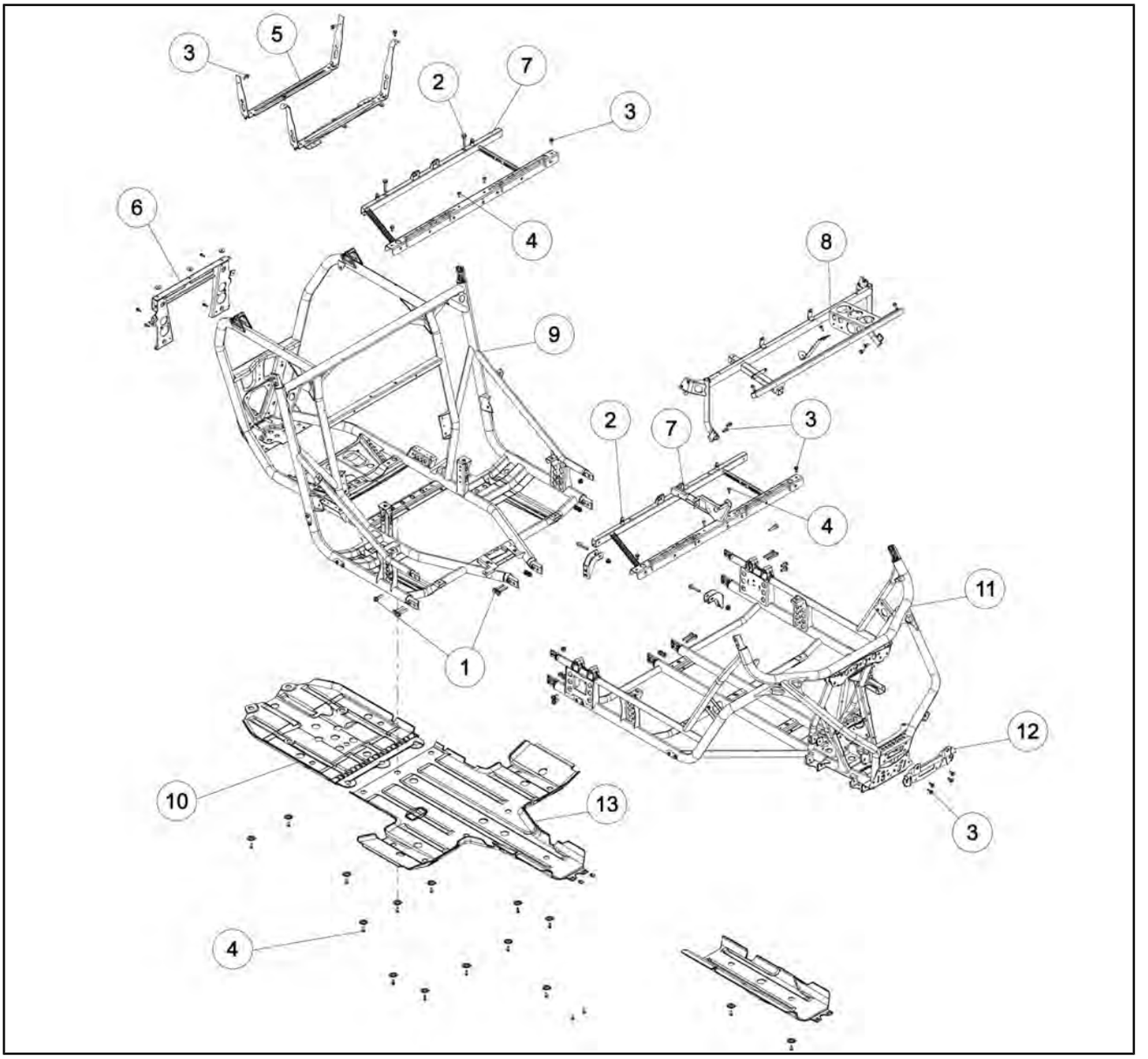
① Front Fascia	⑦ Grill
② Driver's Front Fender	⑧ Winch Cover
③ Driver's Front Fender Flair	⑨ Driver's Deflector Panel
④ Passenger Front Fender	⑩ Passenger Deflector Panel
⑤ Passenger Front Fender Flair	⑪ Front Fascia Fasteners **8 ft-lb (11 Nm)**
⑥ Hood	

CHASSIS / MAIN FRAME (XP)



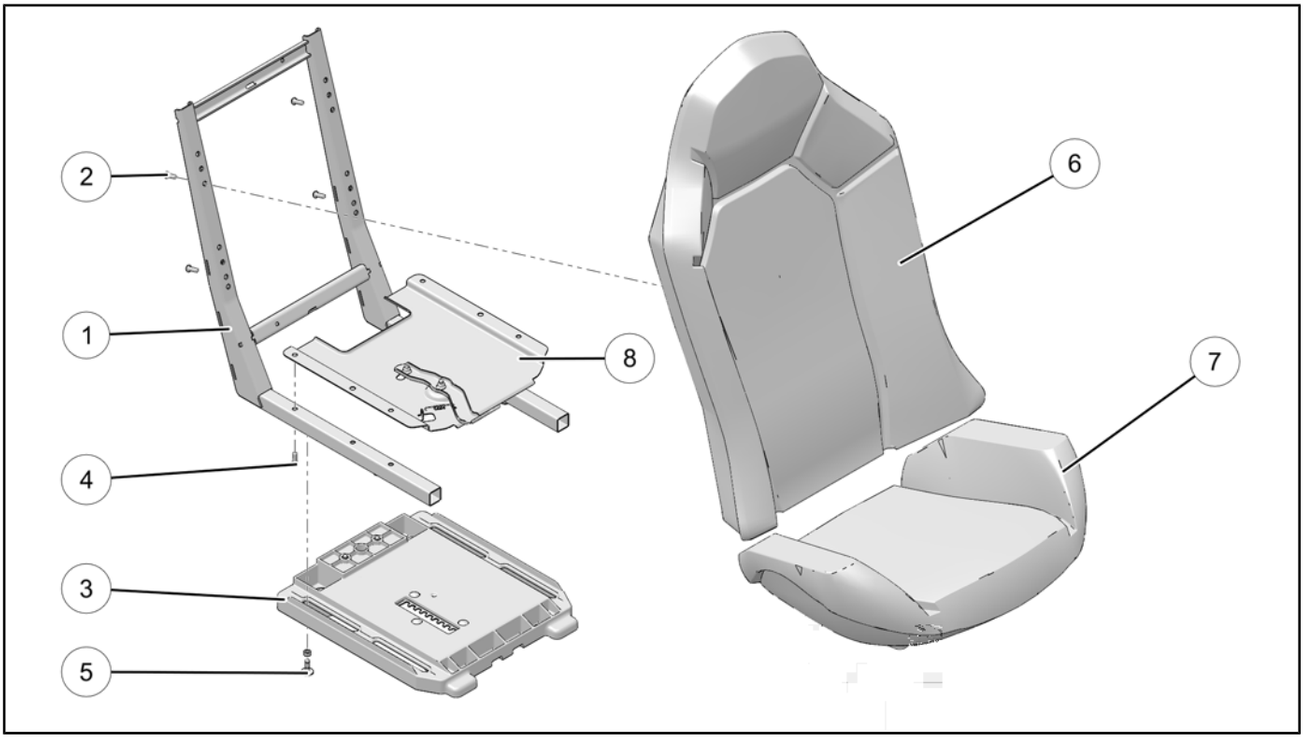
① Frame Fasteners **40 ft-lb (54 Nm)**	⑧ Dash Support
② Seat Frame Fasteners (rear) **30 ft-lb (41 Nm)**	⑨ Rear Frame
③ Fasteners **14 ft-lb (19 Nm)**	⑩ Rear Skid Pan
④ Fasteners **8 ft-lbs (11 Nm)**	⑪ Front Frame
⑤ Cargo Box Support	⑫ Bumper Bracket
⑥ Muffler Mount Bracket	⑬ Front Skid Pan
⑦ Seat Frame	

CHASSIS / MAIN FRAME (XP4)



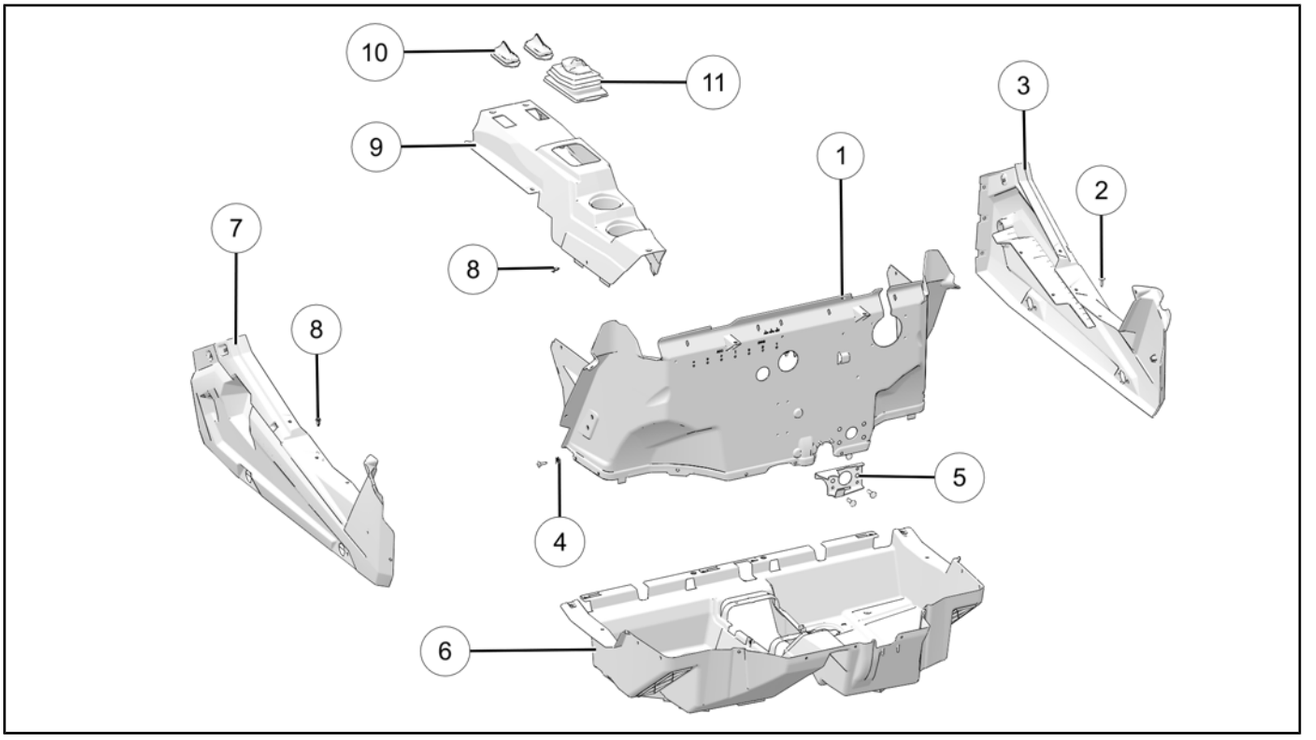
① Frame Fasteners **40 ft-lb (54 Nm)**	⑧ Dash Support
② Seat Frame Fasteners (rear) **30 ft-lb (41 Nm)**	⑨ Rear Frame
③ Fasteners **14 ft-lb (19 Nm)**	⑩ Rear Skid Pan
④ Fasteners **8 ft-lbs (11 Nm)**	⑪ Front Frame
⑤ Cargo Box Support	⑫ Bumper Bracket
⑥ Muffler Mount Bracket	⑬ Front Skid Pan
⑦ Seat Frame	

SEAT ASSEMBLY FRONT



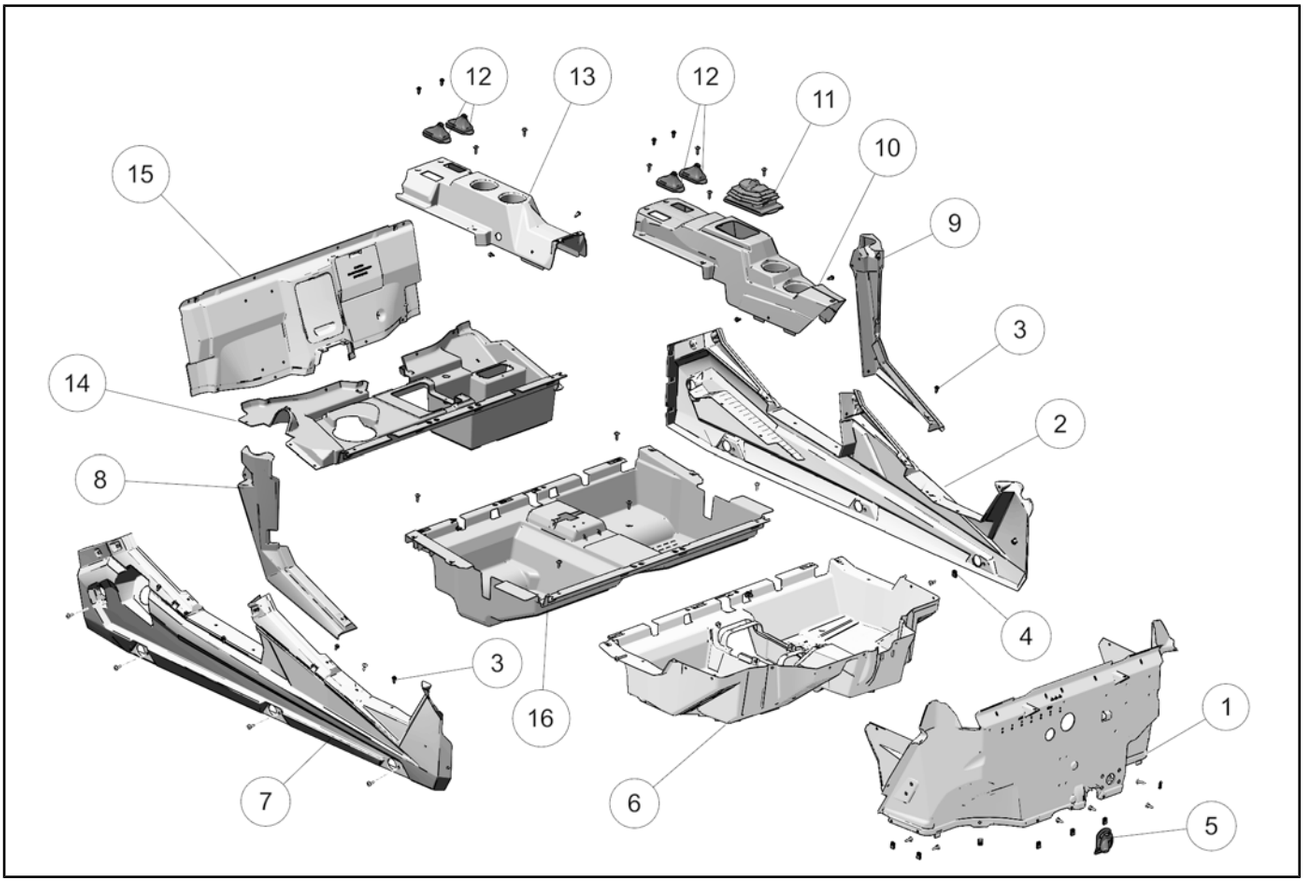
① Seat Frame	⑤ Seat Slider Screws **4 ft-lb (5 Nm)**
② Screw **4 ft-lb (5 Nm)**	⑥ Seat Back
③ Seat Base	⑦ Seat Base Pad
④ Seat Latch Lever	⑧ Seat Base Slider Assembly

FLOOR / ROCKER PANELS



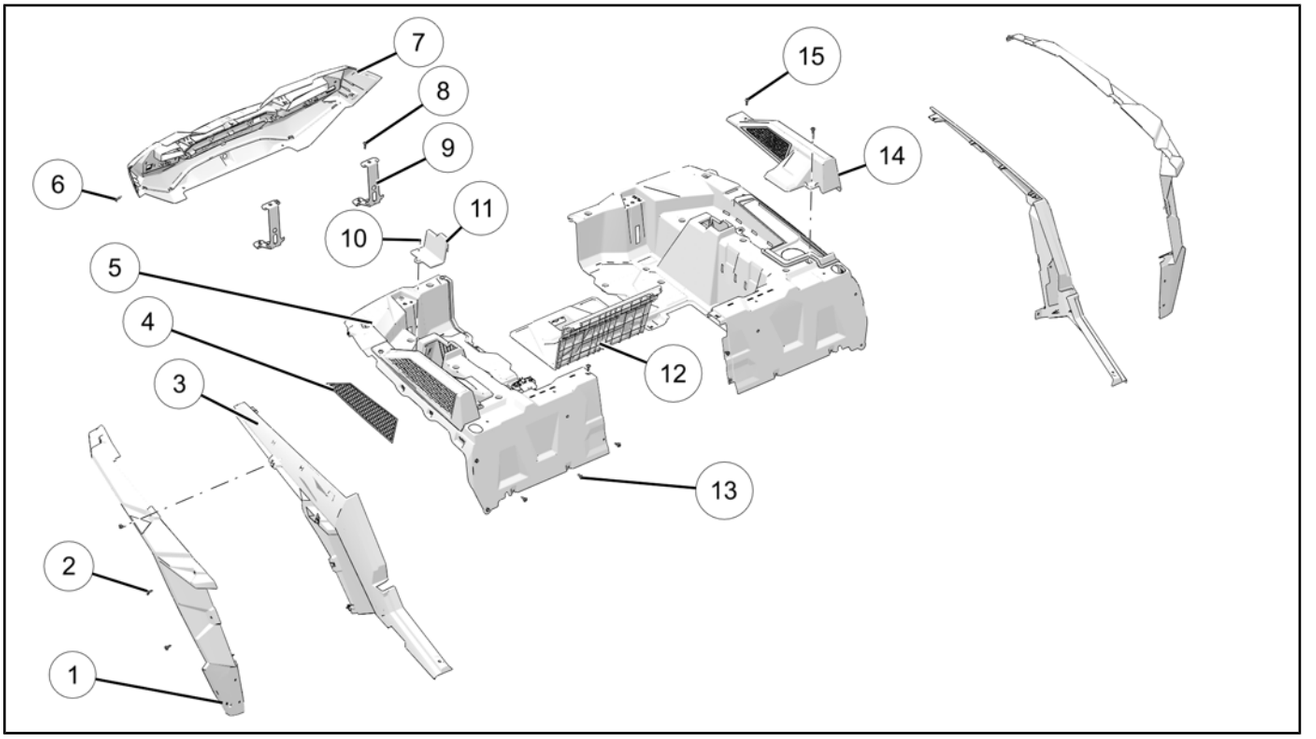
① Upper Floor	⑦ RH Rocker
② T40 Screws **8 ft-lb (11 Nm)**	⑧ Push Rivots
③ LH Rocker	⑨ Console Cover
④ U-Type Nuts	⑩ Seat Belt Boot
⑤ Master Cylinder Mounting Plate	⑪ Shifter Boot
⑥ Lower Floor	

FLOOR / ROCKER PANELS (XP4)



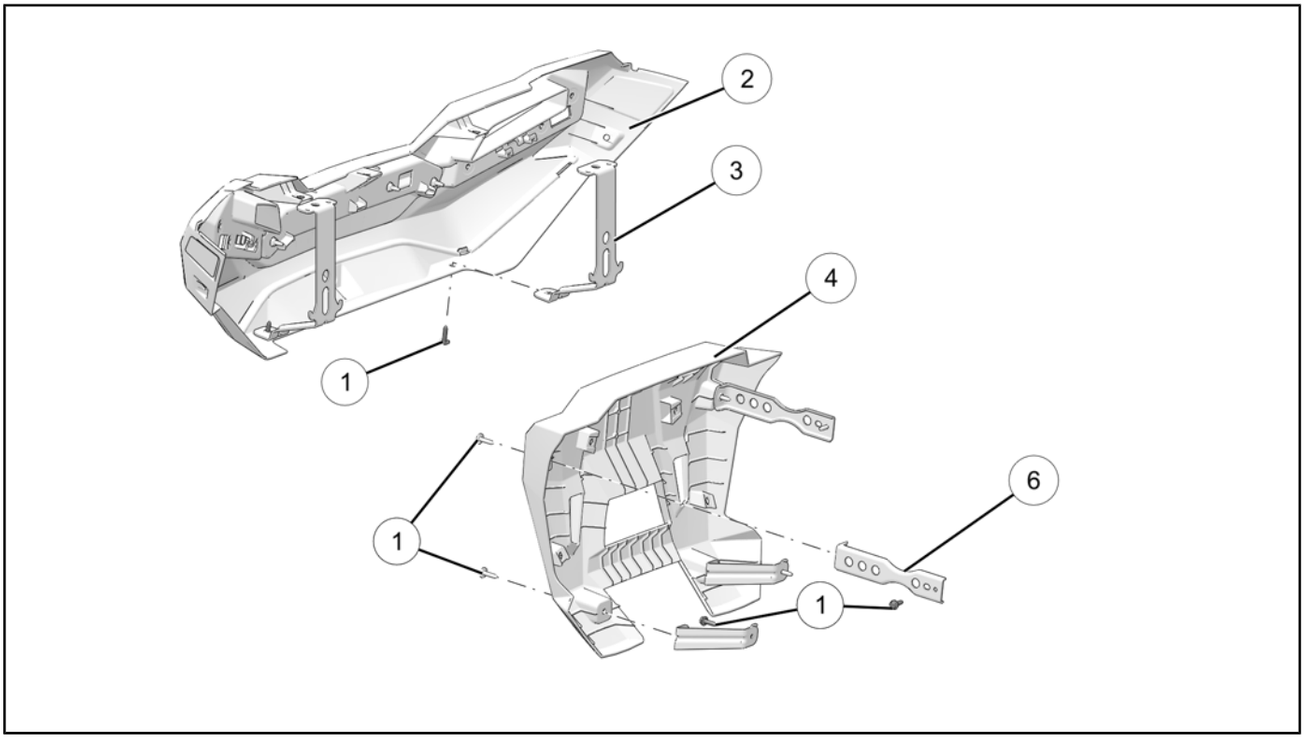
① Main Floor Upper	⑨ B-Pillar Cover LH
② Rocker LH	⑩ Console Front
③ Rivet	⑪ Shifter Boot
④ U-Type Nuts	⑫ Seat Belt Boot Front
⑤ Block Off Flap	⑬ Console Rear
⑥ Main Floor Lower	⑭ Lower Rear Close-off Panel
⑦ Rocker RH	⑮ Upper Rear Close-off Panel
⑧ B-Pillar Cover RH	⑯ Floor Rear

REAR CARGO BOX / FENDERS



① Rear Fender Flare (Right)	⑨ Rear Fascia Bracket Fastener **36 in-lbs (4 Nm)**
② Fender Flare Fastener **8 ft-lb (11 Nm)**	⑩ Shock Access Panel Fastener **36 in-lbs (4 Nm)**
③ Rear Fender (Right)	⑪ Shock Access Panel
④ Intake Pre-filter	⑫ Cargo Box Panel
⑤ Cargo Box Half (Right)	⑬ Cargo Box Fastener **36 in-lbs (4 Nm)**
⑥ Rear Fascia Fastener **36 in-lbs (4 Nm)**	⑭ Intake Cover
⑦ Rear Fascia	⑮ Intake Cover Fastener **36 in-lbs (4 Nm)**
⑧ Rear Fascia Bracket	

REAR BUMPER

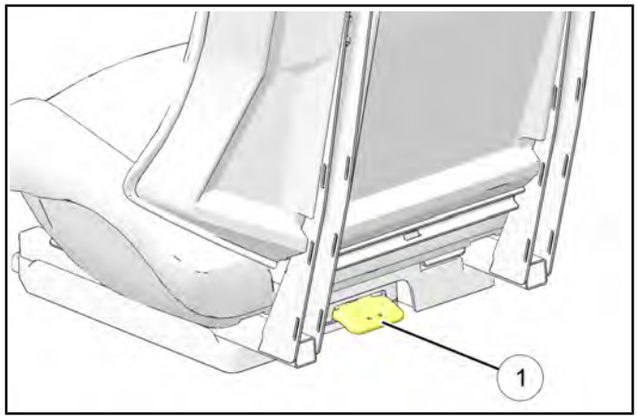


① Rear Fascia Fasteners **8 ft-lb (11 Nm)**	④ Exhaust Cover/Bumper
② Rear Fascia	⑤ Exhaust Cover Bracket (lower)
③ Fascia Support Brackets	⑥ Exhaust Cover Bracket (upper)

BODY COMPONENT REMOVAL

SEATS

1. To remove any of the seats, lift upward on the latch lever ① located behind the seat bottom.



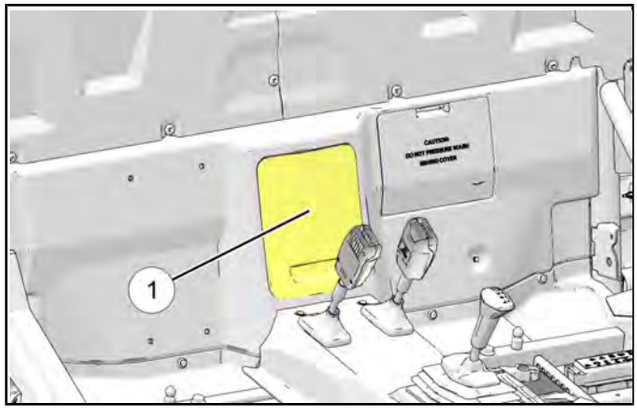
2. Lift upward and forward on the seat while lifting up on the latch lever and remove the seat from the vehicle.

ENGINE SERVICE PANEL

1. Remove the seats:

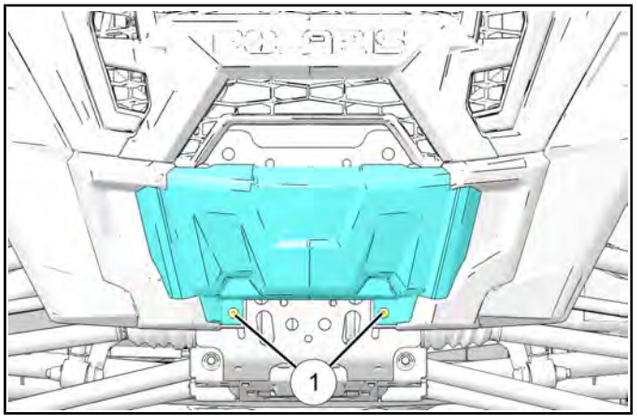
- Remove the driver and passenger seats

2. Lift the panel upward and towards the front of the vehicle to remove the panel ①.

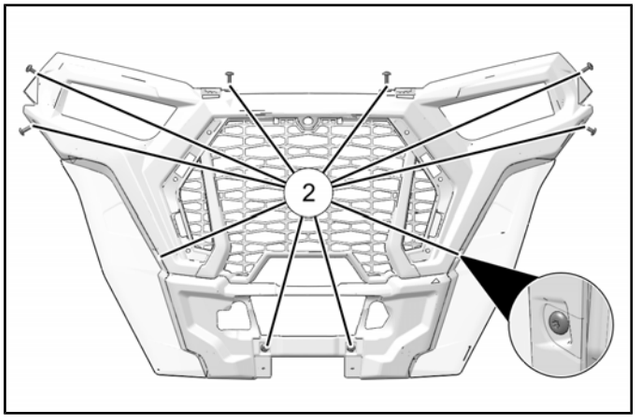


FRONT FASCIA

1. Remove hood panel by turning two 1/4 turn fasteners.
2. Unplug headlight and accent light connectors.
3. Remove winch cover by removing two T25 fasteners ①.



4. Remove front fascia by removing ten T40 fasteners ②.



5. Remove front fascia.
6. For installation, reverse steps and torque to specification.

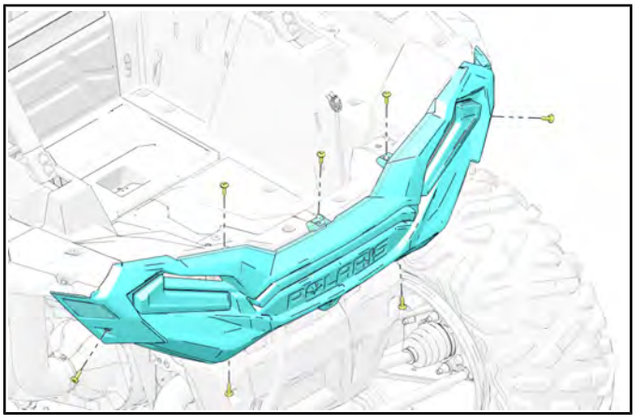
TORQUE
Front Fascia Fasteners: **8 ft-lb (11 Nm)**

TORQUE
Winch Cover Fasteners: **22 in-lb (3 Nm)**

11

REAR FASCIA

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 (four lower and three upper) T-40 Torx screws retaining rear bumper to the cargo box.



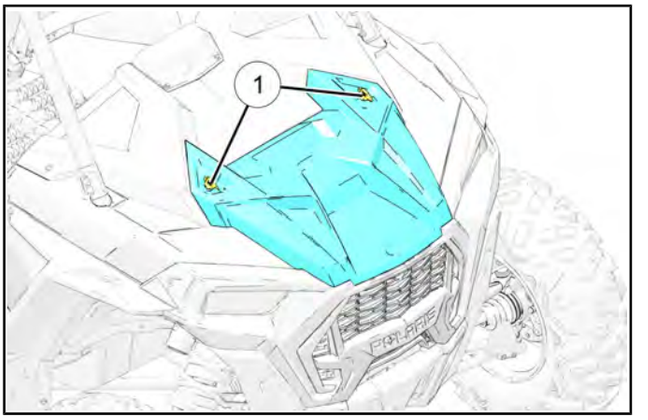
4. Remove rear bumper from vehicle.

HOOD AND FRONT BODY WORK

XREF

HOOD REMOVAL

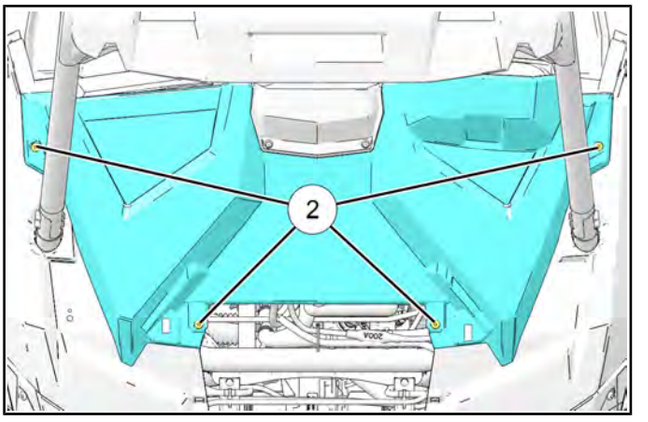
1. To remove the hood, turn both 1/4 turn latches ① to disengage the rear portion of the hood.



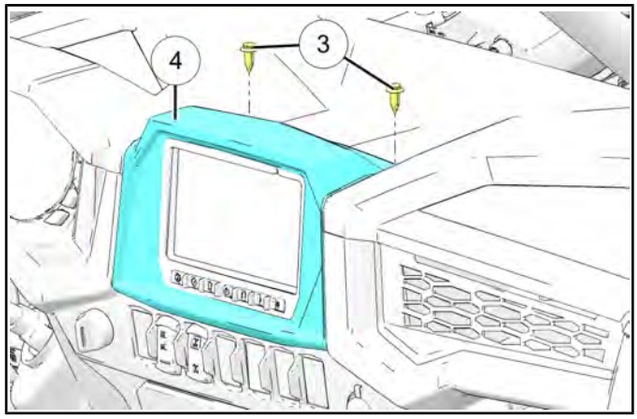
2. Lift rear of hood and slide forward to disengage the front tabs and remove the hood from the vehicle.

DASH REMOVAL

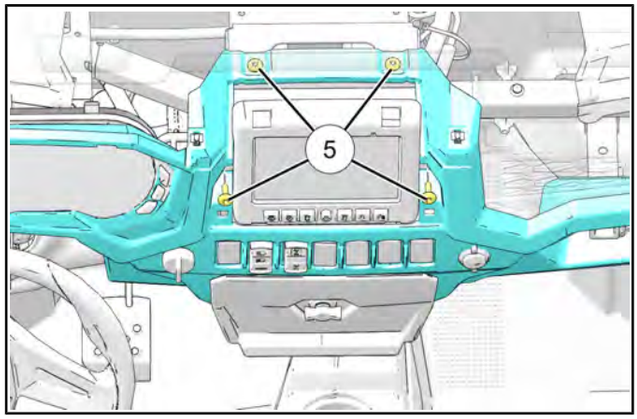
1. Remove hood as previously described.
2. Remove two T-40 Torx screws retaining Upper Dash cover between the front fenders ②.



3. Depending on vehicle model, remove two push pins ③ retaining display bezel ④, or storage bezel (Ride Command unit shown).

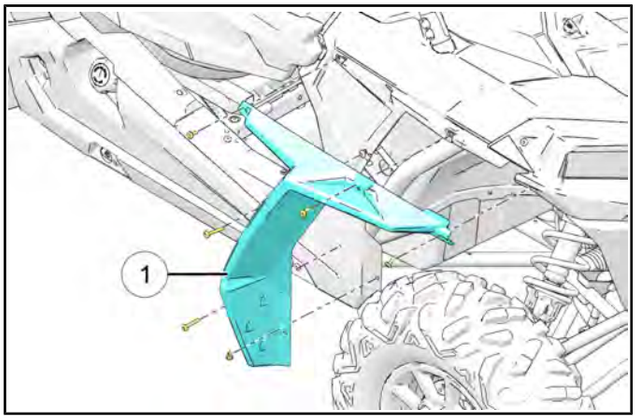


4. Disconnect instrument cluster, AWD switch, headlight switch, and ignition switch. Note their location and wire routing. Remove the upper dash.
5. Remove glove box and passenger grab handle.
6. Remove four lower dash fasteners ⑤ and remove lower dash by pulling rearward to disengage clips.



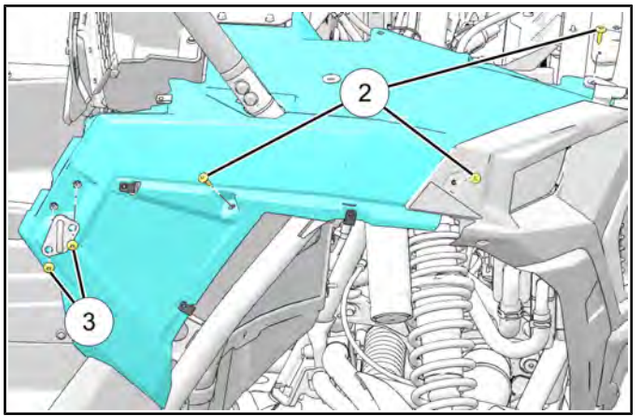
FRONT FENDER FLAIR REMOVAL

1. Remove five T-40 Torx screws and remove fender flairs ① from the dash assembly.

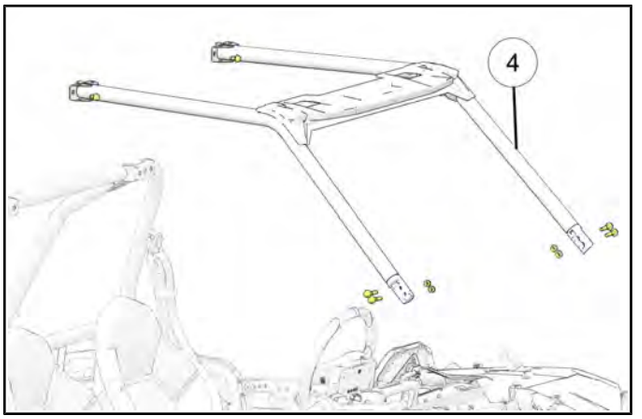


FRONT BODY REMOVAL

1. Remove the hood, upper dash, lower dash, and fender flairs.
2. Remove three fasteners ② retaining the fender.
3. Remove two fasteners ③ securing door striker to fender.



4. Remove front cab frame assembly ④. Refer to Cab Frame Assembly for installation and torque information.

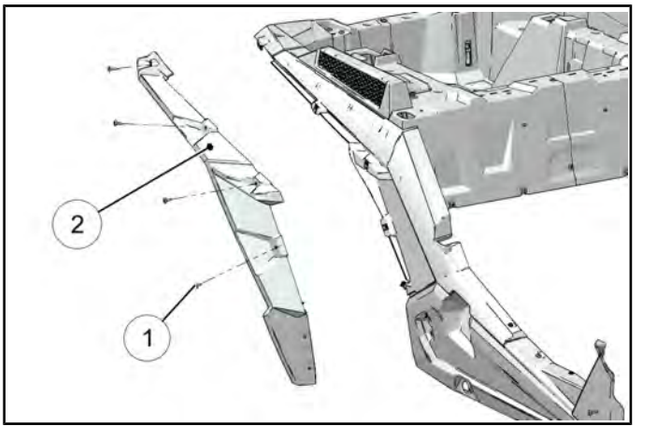


5. Remove Front Fender.

REAR FENDER / FENDER FLAIR REMOVAL

FENDER FLAIR REMOVAL

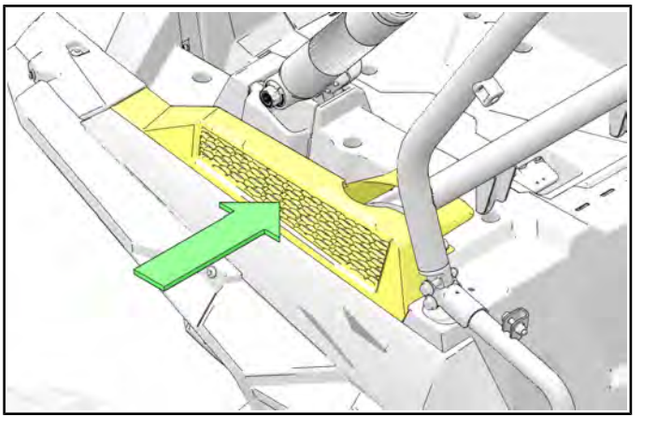
1. Remove the three Torx screws ①.



2. Remove the four plastic rivets on the lower side of the rear fender flare.
3. Remove the fender flare ② from the vehicle.

FENDER REMOVAL

1. Remove the PVT and/or Air Intake cover/pre-filter (engine air intake shown).



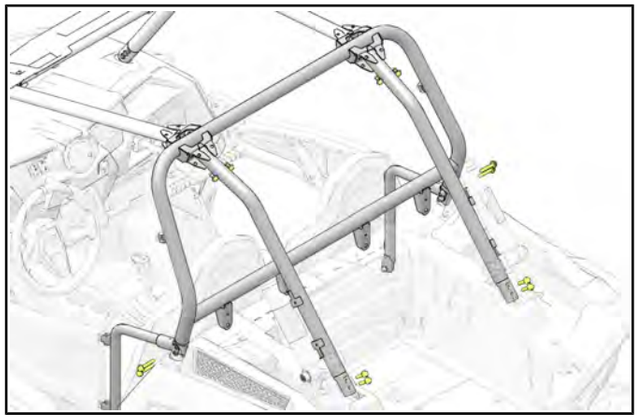
2. Remove the four plastic rivets (one of them hidden on the inside) retaining the rear fender.
3. Remove the one T-40 Torx screw on the top rear of the fender.
4. Remove the fender from the vehicle.

CARGO BOX ASSEMBLY REMOVAL

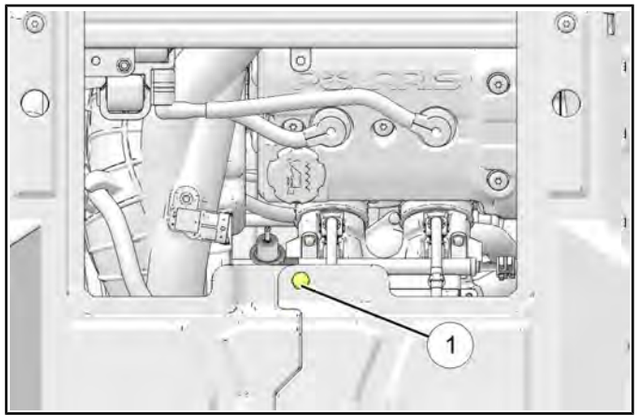
1. Remove both seats.
2. Remove the PVT pre-filter (driver side) and air intake pre-filter (passenger side) assembly.
3. Remove the T-25 Torx screw retaining each shock reservoir hose cover and remove the cover.
4. Loosen the shock reservoir clamps and maneuver the reservoir through the hole in the box.

NOTICE
Do NOT let the reservoir hang by the hose. Use a wire or string to restrain the reservoir.

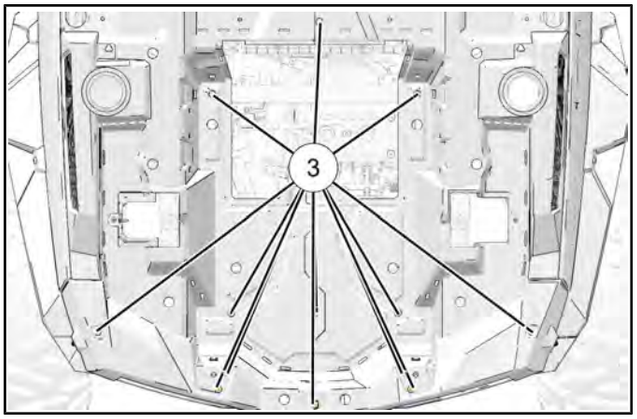
5. Remove the four bolts retaining each rear cab frame and remove it from the vehicle. Remove the bolts retaining the hip bolsters to the cab frame hoop.



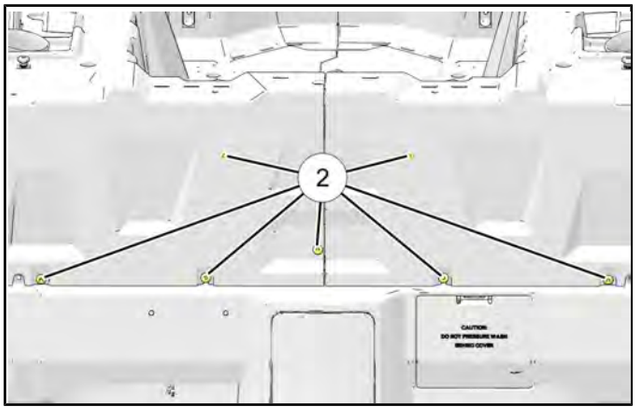
6. Remove the eight fasteners retaining the rear cab frame to the frame and to the front cab frame. Remove the rear cab frame from the vehicle.
7. Remove the engine access panel and the panel locking pin ①.



8. Remove the 15 Torx fasteners ③ and 2 plastic rivets in the bed of the cargo box.



9. Remove the seven T-40 Torx screws ② on the cab side of cargo box.



10. Remove the cargo box half from the vehicle.

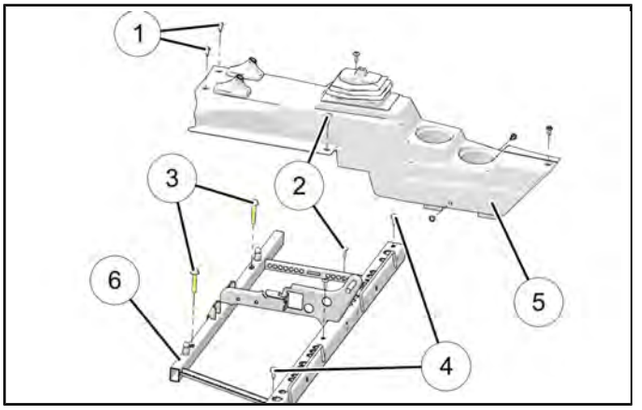
ROCKER PANELS, CONSOLE AND FLOOR XP

Rocker Panel Removal

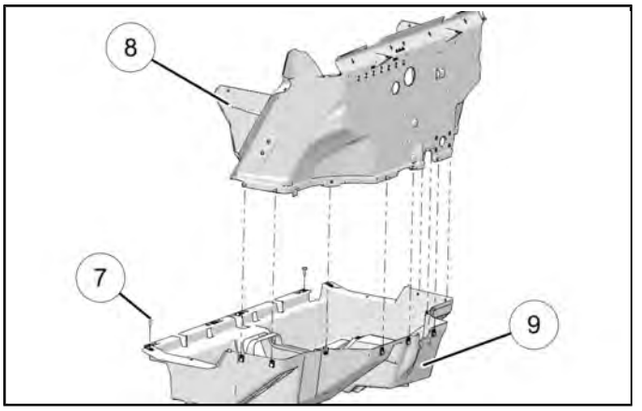
1. Remove the push rivets and Torx screws retaining the rocker panel and remove panel from the vehicle.

Console and Lower Floor Removal

2. Remove both seats and rocker panels (see Chapter 10 – Floor / Rocker Panels XP / High Lifter page).
3. Remove the T27 screws ① retaining the console ⑤ to the floor.
4. Remove shift handle knob and remove the console.



5. Remove the Torx screws retaining the upper floor ⑧ to the lower floor ⑨.

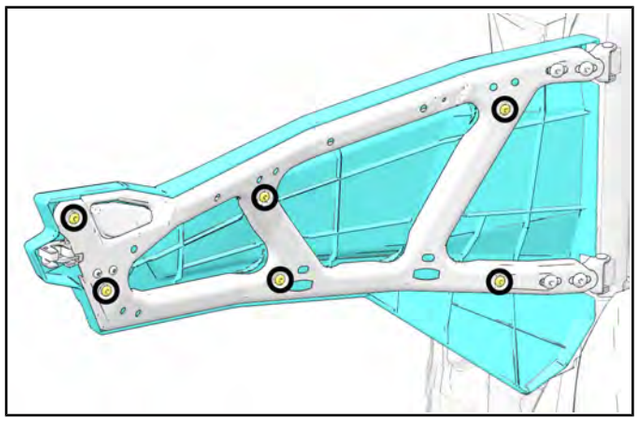


6. Remove the Torx screws ⑦ retaining the rear portion of the floor and remove the lower floor from the vehicle.

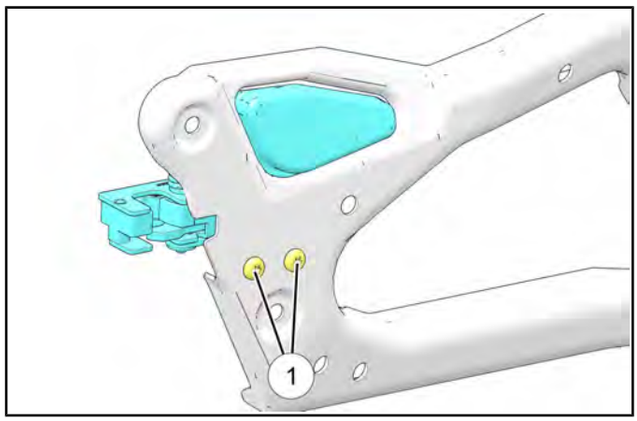
DOORS

DOOR PANEL / LATCH REPLACEMENT

1. Remove the T-25 fasteners retaining the door panel to the door frame. Remove the door panel.



2. Remove the two fasteners ① retaining the door latch to the door frame.



3. Install new latch onto the door frame. Torque mounting fasteners to specification.

TORQUE
Door Latch Fasteners: **8 ft-lb (11 Nm)**

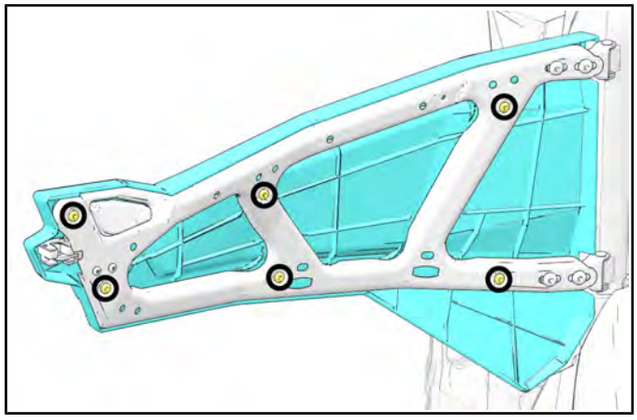
4. Install the door panel onto the door frame. Torque fasteners to specification.

TORQUE
Door Panel Fasteners: **22 in-lb (2 Nm)**

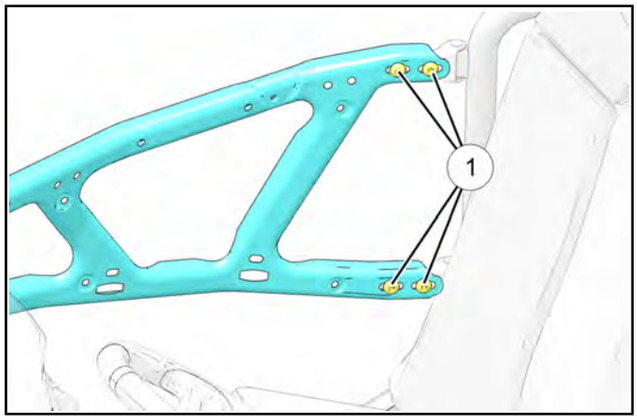
5. Adjust the door so it properly opens and latches. Refer to Door Adjustment page 11.25.

DOOR ADJUSTMENT

1. Remove the T-25 fasteners retaining the door panel to the door frame. Remove the door panel.

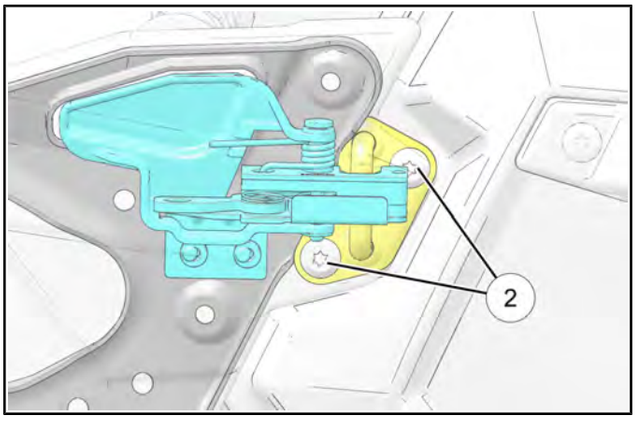


2. Close the door and keep it closed during entire adjustment for proper functional fit.
3. Loosen the M8 bolts ① holding the door assembly to the hinge brackets using a T-40 Torx driver.



11

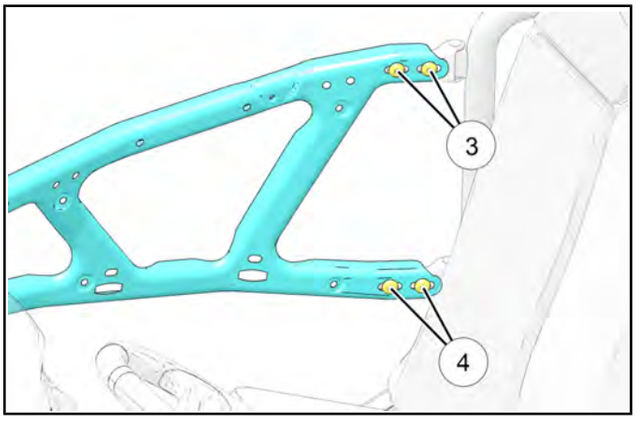
4. Adjust the door until the front latch is centered both vertically and horizontally in the striker bracket, as shown.



NOTICE
If it is difficult to center vertically and horizontally, loosen striker assembly fasteners ② for extra adjustment. Torque striker fasteners once aligned.

TORQUE
Striker Fasteners: **8 ft-lb (11 Nm)**

5. Holding the door in position, tighten the top hinge bracket M8 fasteners ③ and then bottom fasteners ④. Torque to specification.



TORQUE
Door Hinge Fasteners: **8 ft-lb (11 Nm)**

6. Install the door panel onto the door frame. Torque fasteners to specification.

TORQUE
Door Panel Fasteners: **22 in-lb (2 Nm)**

CHAPTER 12
ELECTRICAL

GENERAL INFORMATION

SPECIAL TOOLS

PART NUMBER	DESCRIPTION
2460761	Hall Effect Sensor Probe Harness
2870630	Timing Light
2871745	Static Timing Light Harness
PU-49466	Relay Bypass
PU-50296	Polaris MDX-610P Battery Tester
PU-50338	Battery Hydrometer
PV-43526	Connector Test Kit
PV-43568	Fluke™ 77 Digital Multimeter
-	Digital Wrench® (see Chapter 4 – DIGITAL WRENCH® OPERATION page)

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

UNDER-DASH COMPONENTS

The following switches and components can be accessed underneath the instrument / dash panel:

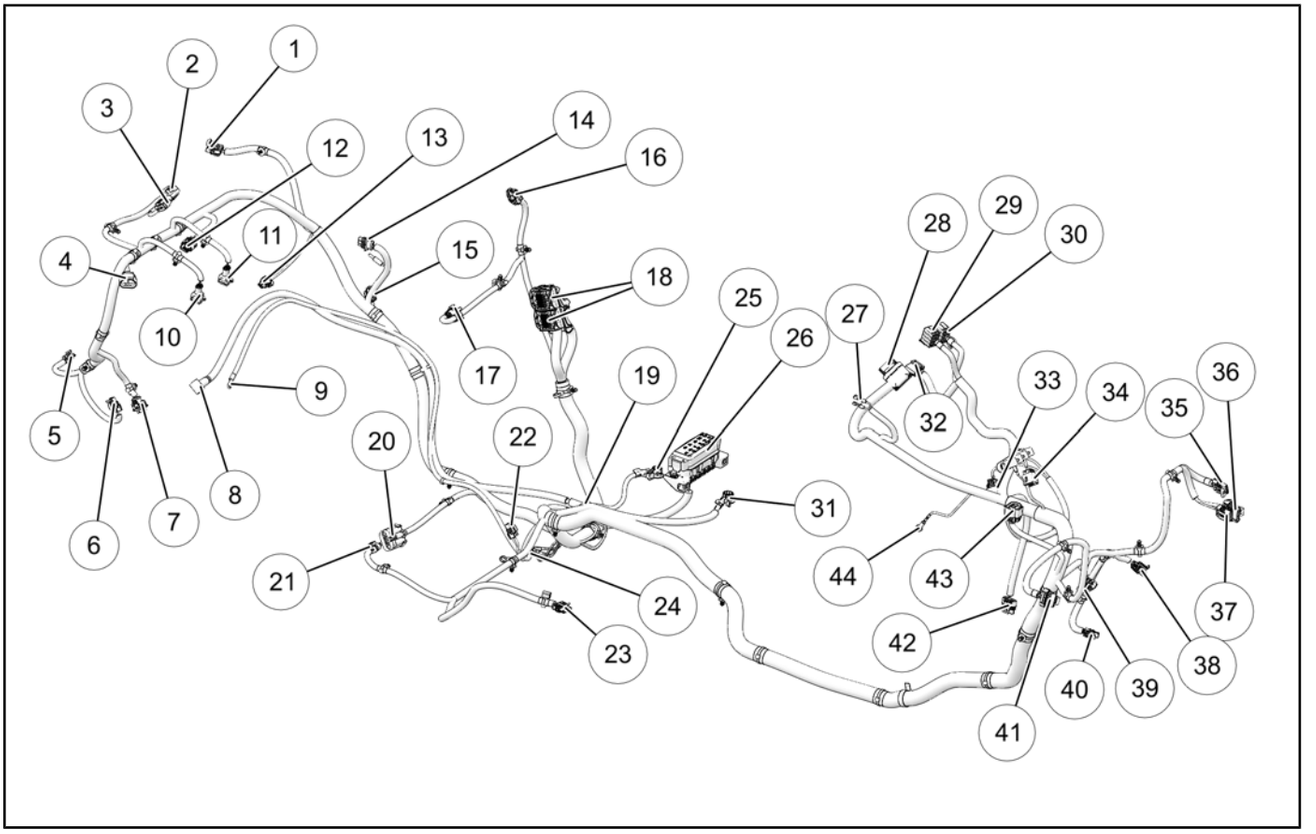
- Speedometer
- AWD Switch
- Headlamp Switch
- 12 Vdc Accessory Power Point
- Ignition Switch
- LED Ambiance Light

ELECTRICAL SERVICE NOTES

Keep the following notes in mind when diagnosing an electrical problem:

- All EFI component information and diagnostic testing procedures are located in the Fuel System chapter.
- Always refer to Digital Wrench when diagnosing and diagnostic trouble code.
- 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.
- Most electrical issues are related to damaged wiring. Fully test wiring before replacing any components.

ELECTRICAL COMPONENT LOCATIONS



① Taillight Harness	⑯ BAP Sensor	㉛ Battery (+)
② ETC Throttle Body	⑰ Waste Gate Control	㉜ Key Switch
③ Boost Pressure Sensor	⑱ ECU	㉝ EPS Power
④ Oxygen Sensor	⑲ Starter Solenoid	㉞ EPS Signal
⑤ Vehicle Speed Sensor	⑳ Stator	㉟ Left Headlight
⑥ Transmission Switch	㉑ Water Pump	㊱ Voltage Regulator
⑦ Crank Position Sensor	㉒ Seat Belt Switch	㊲ Voltage Regulator
⑧ Starter (+)	㉓ Fuel Pump / Sender	㊳ Fan
⑨ Engine Ground	㉔ Chassis Ground	㊴ AWD Coil
⑩ MAG Injector	㉕ Battery (-)	㊵ Brake Pressure Switch
⑪ PTO Injector	㉖ Fuse Box	㊶ Right Headlight
⑫ TMAP Sensor	㉗ 12V Receptacle	㊷ Pedal Position Sensor
⑬ Coolant Temp Sensor	㉘ Instrument Cluster	㊸ Diagnostic Plug
⑭ Ignition Coil	㉙ AWD Switch	㊹ LED Dash Light
⑮ Ignition Coil Ground	㉚	

ELECTRICAL DIAGNOSTICS

ELECTRICAL 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 low resistance value (under 10 Ohms), remember to subtract meter lead resistance from the reading. Connect 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.
- Voltage, amperage, and resistance values included in this manual are obtained with a Fluke™ 77 Digital Multimeter **(PV-43568)**. This meter is acceptable for use when diagnosing electrical problems. Readings obtained with other meters may differ.
- Pay attention to the prefix on the meter reading (K, M, etc.) and the position of the decimal point.
- For resistance readings, isolate component to be tested. Disconnect wire harness or power supply.

DIGITAL MULTI-METER (DMM) NOTES

Polaris advises to only use a high quality DMM that meets the same standards as the Fluke™ 77 (PV-43568) for electrical testing.

Unless you are very familiar with Ohm's Law, and have complete information about the circuit you are trying to diagnose, test lights are likely to provide results that would be misleading. This is especially true if any solid state component is involved, where you will almost certainly not have complete circuit information.

Polaris also specifically advises against the use of other circuit testing devices, including but not limited to:

- Short finders
- Simplified circuit testers
- Fuse piggy-back devices

Testers beside a DMM will only work in one scenario, and slight variables can provide you with misleading results. The testing practices described in this chapter are more certain and rely only on the DMM and your knowledge.

STATIC AND DYNAMIC TESTING

There are many methods for testing a DC circuit. These methods fall into one of two categories, either static or dynamic.

STATIC TESTING

The two most common forms of static testing are:

- Resistance testing (the Ohms setting on your DMM)
- Measuring voltage with the circuit open, such as when the harness connector is off a sensor you are testing. This is commonly referred to as measuring "Available Voltage".

These two tests will help you find the majority of electrical issues. If they do not, we must remember that static circuit testing does not take into account how current actually flows in that circuit. That is only accomplished with dynamic testing.

Before attempting dynamic testing (as it is intrusive on sealed connectors and damage could be done if not careful), verify the following:

- Static voltage testing advised for that circuit has been completed, and is in spec.
- All associated circuits have under 1 ohm of resistance from end to end. Testing Continuity / Resistance page 12.9
- All associated circuits have no shorts to ground. Testing For A Short To Ground page 12.9
- All associated circuits have no shorts to voltage. Testing For A Short To Voltage page 12.10

DYNAMIC TESTING

There are two types of dynamic testing we will advise to use when diagnosing electrical concerns:

- Current flow testing (Amperage) Testing Current Flow (Amperage) page 12.11. Measuring Amperage is not a common practice, as you will not typically have a spec to compare your reading to. Also, many components on this machine flow over 10 Amps, which will blow the majority of DMM fuses. The exception to this is a parasitic draw test refer to Current Draw - Key Off page 12.38.
- Measuring voltage drop. Performing this test correctly will give you understanding of how electrical pressure (voltage) varies in a circuit as current is flowing. Testing Voltage Drop page 12.12

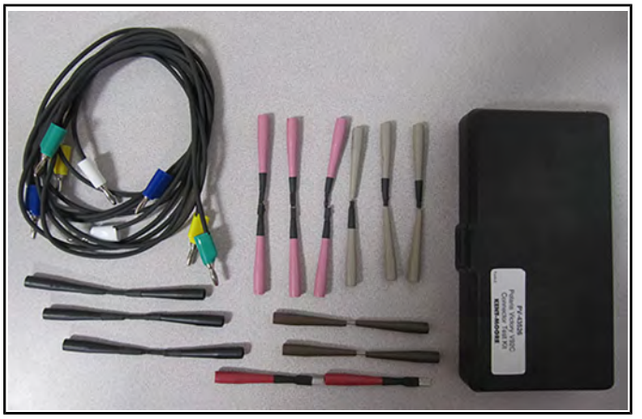
CONNECTOR PROBING GUIDELINES

FRONT PROBING

Front probing is accomplished by pulling the harness connector from the component, and then taking a measurement from the terminal face. This is the measurement taken in most situations.

The terminals in electrical connectors are small and fragile. Do not probe directly with your meter leads, as the meter leads are larger than almost all terminals. Probing with a meter lead will likely damage the terminal by spreading it beyond it's design limits, causing no tension. If there is no tension, you will have either no connection or a poor connection.

To avoid causing damage, use of the appropriate adapters is required. Most terminals used on Polaris machines can be tested using terminal test kit PV–43526. It includes male and female adapters that can be plugged into banana connectors to adapt to your meter.



PV–43526 adapters are also used as known good terminal drag testers. Insert the male tester terminal into the female connector on the harness. There should be a noticeable amount of force to install and remove the tester, and you should be able to tip the harness connector with the tester hanging from the connector, and not have the tester fall out.

If very little or no resistance is felt, or if the tester falls out when the connector is held upside down, this is an indication that the female connector in the harness has insufficient tension and will cause connection issues. You can either replace that harness, or service it by replacing the terminal or attempting to adjust/tighten the tang in the female terminal.

For a video demonstration, scan the QR code below, or right click it and select “open in new tab”.

BACK PROBING

Back probing is typically not advisable on sealed connectors, as it can easily cause damage to the wire, terminal, connector body, or body to wire seal.

NOTICE
There are commercially available back probe kits. Fine, narrow needles with no coating to block current flow also work well for back probing.

If back probing must be done to see voltage drop while current is flowing in the circuit (dynamic testing), ensure it is done only on connectors that are large enough to accommodate the probe. Ensure back probing is done gently and carefully. Ensure no damage has been done after probing.

For a video demonstration, scan the QR code below, or right click it and select “open in new tab”.

BREAK OUT

This is a method of front probing to achieve the goal of back probing, which is to measure the circuit while it is functioning.

You can use test probe kit PV–43526, test leads, and electrical tape to create a bridge with exposed testing areas to have everything exposed but still working.

CAUTION
Use electrical tape to cover the exposed conductive parts of the circuit, mainly the clamps of your test leads. If they contact each other, circuit or component damage could occur from a short.

TESTING CONTINUITY / RESISTANCE

Testing using the Ohmmeter function of your DMM is one of the first things you will do when troubleshooting an electrical issue. It is especially convenient when the wiring diagram provides a resistance spec for the component in the circuit you are diagnosing. It can quickly give you a good idea if you simply need to replace a part, or if there might be another circuit issue.

Using the following points in conjunction with your DMM owner's manual will ensure your resistance testing is always accurate:

- Only measure resistance on an isolated part of the circuit. This means if you are testing internal resistance of a component, it cannot be connected to the harness. If you are measuring a wire (typically from the ECU to a sensor) both the sensor and ECU would need to be unplugged. Most Ohmmeters provides a precise amount of current to determine resistance. Any other sources will make your reading inaccurate.
- Ensure you are making good contact by using the proper terminal adapters. Connector Probing Guidelines page 12.8
- If you are not using a self ranging meter, double check your range setting.
- If your continuity is under 1 ohm, leave the harness disconnected, and move on to testing for shorts to ground Testing For A Short To Ground page 12.9 and shorts to voltage Testing For A Short To Voltage page 12.10

For a video demonstration, scan the QR code below, or right click it and select "open in new tab".

TESTING FOR A SHORT TO GROUND

Shorts to ground happen when the current flowing in a given circuit bypasses the load. The current flowing from B+ finds an easier way to return to ground (B-), so much more of it can flow than the circuit is designed for. This causes the circuit's protection device (either a fuse or circuit breaker) to open, protecting the circuit from damage.

There are many possible causes of a short to ground, here are some:

- The harness rubbing against a component that is grounded, such as the frame, chassis component, or engine.
- A component's internal circuitry contacting it's case.
- Wire to wire chaffing causing contact with the conductor of a ground side circuit.
- Corrosion/moisture in a component providing a ground path.
- Moisture in a connector body providing a ground path.

NOTICE
This test is typically done right after checking continuity from sensor to ECU when diagnosing an EFI DTC. It can also be used to help diagnose concerns about blowing fuses. Ensure you are able to duplicate the concern before testing so that your results point you in the right direction.Testing for Intermittent Conditions page 12.10

TESTING PROCEDURE

1. Consult the wiring diagram. Determine which circuit you will be testing.
2. Ensure that any static voltage checks advised in relation to the DTC or concern you are diagnosing have been performed and are in spec.
3. Ensure you have checked continuity of the circuit. Testing Continuity / Resistance page 12.9
4. Ensure that neither end of the circuit is connected.
5. Set your DMM to Ohms.
6. Connect one meter lead securely to the battery negative post.
7. Connect the other lead to either end of the disconnected circuit. Ensure you are using the correct adapter.Connector Probing Guidelines page 12.8
8. If there is continuity, the harness is damaged and should be repaired or replaced.
9. If the DMM reads OL, there is no short to ground. Leave the harness disconnected on both sides, and proceed to check for a short to voltage. Testing For A Short To Voltage page 12.10

For a video demonstration, scan the QR code below, or right click it and select “open in new tab”.

TESTING FOR A SHORT TO VOLTAGE

There are three possible short to voltage causes:

1. Internal electronic component short.
2. Harness chaffing leading to contact of the circuit being diagnosed to one with B+ or a different reference voltage.
3. Moisture in a connector or component.

TESTING PROCEDURE

1. Consult the wiring diagram. Determine which circuit you will be testing.
2. Ensure that any static voltage checks advised in relation to the DTC or concern you are diagnosing have been performed and are in spec.
3. Ensure you have checked continuity of the circuit. Testing Continuity / Resistance page 12.9
4. Ensure you have checked for a short to ground. Testing For A Short To Ground page 12.9
5. Ensure that neither end of the circuit is connected.
6. Set your DMM to DC volts.
7. Connect one meter lead securely to the battery negative post.
8. Connect the other lead to either end of the disconnected circuit. Ensure you are using the correct adapter.Connector Probing Guidelines page 12.8
9. If there is voltage present, the harness is damaged and should be repaired or replaced. You may need to remove the protective tape and tubing to inspect.
10. If the DMM reads 0 volts, the concern may be in a component related to the circuit. If so, checking internal continuity of non-electronic components may reveal the concern, but diagnosis at this point may require using known good parts.

For a video demonstration, scan the QR code below, or right click it and select “open in new tab”.

TESTING FOR INTERMITTENT CONDITIONS

Intermittent conditions are very difficult to diagnose, as when you are testing the circuit, you may not have the circuit failing to indicate where the issue is. Intermittent electrical failures are almost always related to a poor connection that only goes open in specific situations, such as going over a certain kind of bump, at a certain temperature, or when the machine is torque loaded in one way.

Here is a list of possible failures that can be associated with an intermittent electrical failure:

- Loose female terminal in an electrical connector.

NOTICE

If the terminals in question are the correct size/series, always use PV–43526 to test the drag when inserting and removing the test terminal adapters. Compare the effort to the drag against the known good tester terminal for reference.

- Poor terminal to wire crimp.
- Terminal crimp that occurred at least partially on insulation instead of the conductor wire strands.
- Terminal fretting corrosion
- Contamination/moisture corrosion
- A full or partial break of the conductor wires in the insulation, with or without visible insulation damage.
- Improper routing, especially when it leads to chaffing or heat damage, especially near exhaust.

You may need to use different techniques to duplicate these concerns. These include but are not limited to:

- Moving the harness by wiggling it or flexing certain areas.
- Pulling at or near the suspected connector.
- Pushing in different directions to flex the connector body and try to isolate poor connections.
- Changing the temperature. This can be accomplished with either heat guns or cold air guns.

⚠ WARNING

Always exercise caution when using these tools, and use them for short periods of time when changing the temp of an area. Failure to do so can lead to Serious injury and/or damage to the machine.

TESTING CURRENT FLOW (AMPERAGE)

Performing a current flow test requires the meter leads be inserted into the correct cavities in the meter, and be placed in series in the circuit to be tested. Refer to your Digital Multi Meter's owner's manual for potential model specific instructions. Ensure you are using acceptable adapters to avoid damaging the connector terminals. Connector Probing Guidelines page 12.8

NOTICE

Amperage specs are generally not provided for circuits/components. Please only perform this test when advised in the manual.

CAUTION

Many circuits on this machine will exceed the 10 Amp fuse in most Digital Multi Meters in normal operation.

TESTING PARASITIC DRAW

Parasitic draw is when there is excessive current flow with the key off.

While the most common causes of draws are improperly installed accessories (tapping into un-switched B+ instead of switched) there can be electronic component failures that can cause this as well.

TESTING PROCEDURE

1. Remove the negative cable from the battery.
2. Connect a jumper from the negative battery cable terminal to the negative battery post.
3. Ensure your meter leads and selector dial are set to measure amperage.
4. Connect your red lead to the battery negative cable terminal.
5. Connect your black lead to the battery negative post.
6. Momentarily key the ignition switch on, then off.

CAUTION
Ensure all electrical components are switched off, or damage to your jumper and/or meter will occur.

NOTICE
Wait ten minutes with the key off for the ECU to power down to avoid a faulty readout while testing amperage draw.

7. Wait 10 minutes before checking the value. Vehicles will vary, but electronic components will take time to fully go to sleep after switched power is removed.
8. Maximum allowable is 10 milliamps. If your meter is ranged to the 10 Amp scale, this will appear as 0.010 Amps.
9. If over 10 milliamps, go to the fuse block and start systematically removing one fuse at a time until the value drops, indicating the circuit that requires attention.

TESTING VOLTAGE DROP

NOTICE
If you disconnect the connector at the load, and measure voltage with one lead on the power supply wire, and one to ground, you will be measuring available voltage. This is a static test and not dynamic voltage drop testing. Refer to Static and Dynamic Testing page 12.7.

The measurement of voltage is the **DIFFERENCE** in electrical pressure between the two points your DMM leads are touching.

Most circuits will have one load. The load is the component in the circuit that uses the current flow to do work, such as move a solenoid or light a bulb.

Voltage coming into the load should be near battery voltage with current flowing. There will be some loss from moving through electrical contacts in connectors and relays, but it will be minimal.

NOTICE
You will need to backprobe to perform this test. For information about doing this safely, refer to Connector Probing Guidelines page 12.8.

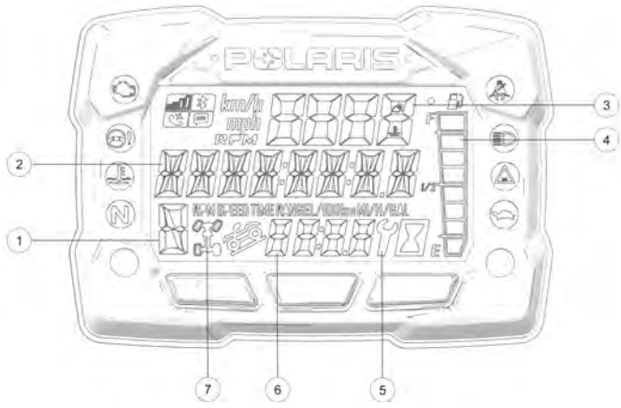
Voltage should be near fully depleted by the load. This means that when measuring on the ground side of the circuit, immediately after the load, back to battery negative, you should have near zero pressure difference (voltage).

If you do have a difference in pressure, this means there is something adding resistance to the circuit such as corrosion.

For a video demonstration, scan the QR code below, or right click it and select “open in new tab”.

INSTRUMENT CLUSTER

OVERVIEW



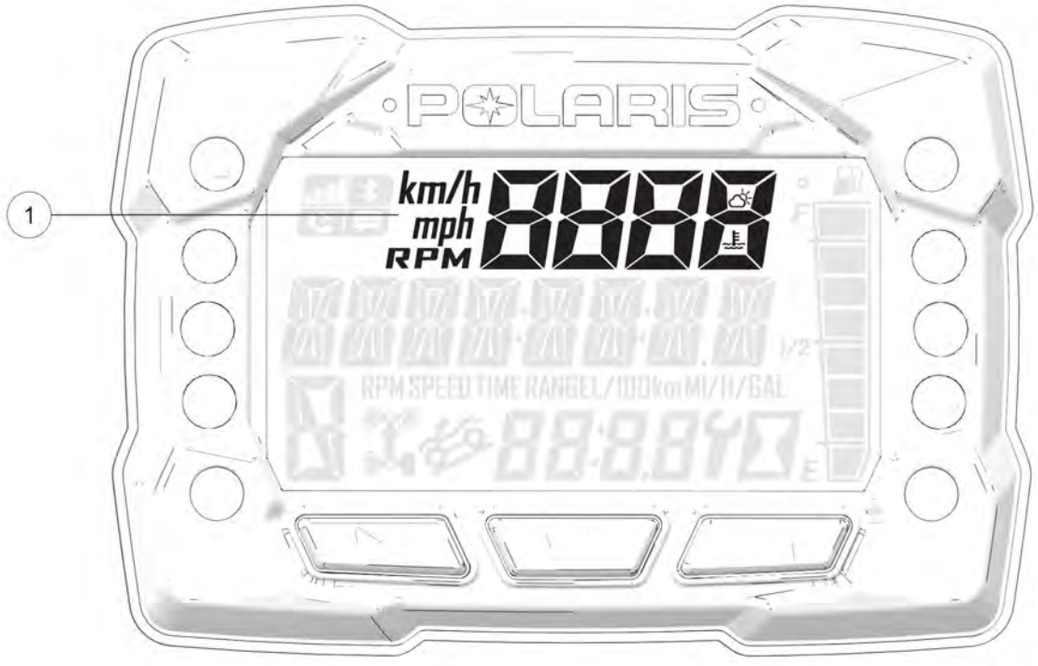
NOTICE
The use of a high pressure washer may damage the instrument cluster. Wash the vehicle by hand or with a garden hose using mild soap. Do not use alcohol to clean the instrument cluster. Do not allow insect sprays to contact the lens. Immediately clean off any gasoline that splashes on the instrument cluster.

① **Gear Indicator**	H = High Gear L = Low Gear N = Neutral R = Reverse Gear P = Park – = Gear Signal Error (or shifter between gears)
② **Display Area 2**	This area displays odometer, trip meter, trip meter 2, voltage, engine temperature, engine hour meter, programmable service hour interval, ground speed, or engine RPM.
③ **Display Area 1**	This area displays engine RPM, ground speed, or coolant temperature.
④ **Fuel Gauge**	The segments of the fuel gauge show the level of fuel in the fuel tank. When the last segment clears, a low fuel warning is activated. All segments including the fuel icon will flash. Refuel immediately.
⑤ **Service Indicator**	A flashing wrench symbol alerts the operator that the preset service interval has been reached. Your POLARIS dealer can provide scheduled maintenance. See Service Hours page 12.26 for more information.
⑥ **Clock**	The clock displays time in a 12-hour or 24-hour format.
⑦ **AWD Indicator**	Segments of the indicator illuminate based on drive mode engaged.

INDICATOR LAMPS

① Check Engine		This indicator appears if an EFI-related fault occurs. Do not operate the vehicle if this warning appears. Serious engine damage could result. Your authorized POLARIS dealer can assist.
② EPS Warning (if equipped)		This indicator illuminates when a fault has occurred in the EPS system. Your authorized POLARIS dealer can assist. EPS operation is possible with key on/engine off for up to 5 minutes.
③ Engine Hot		This lamp illuminates to indicate an overheated engine. If the indicator flashes, a severe overheating condition exists.
④ Neutral		This lamp illuminates when the transmission is in neutral and the ignition key is in the ON position.
⑤ Helmet/Seat Belt		This lamp flashes for several seconds when the key is turned to the ON position. The lamp is a reminder to wear helmet and seat belt before operating.
⑥ High Beam		This lamp illuminates when the headlamp switch is set to high beam.
⑦ Chassis Fault		If applicable.
⑧ Performance Limited		If applicable.

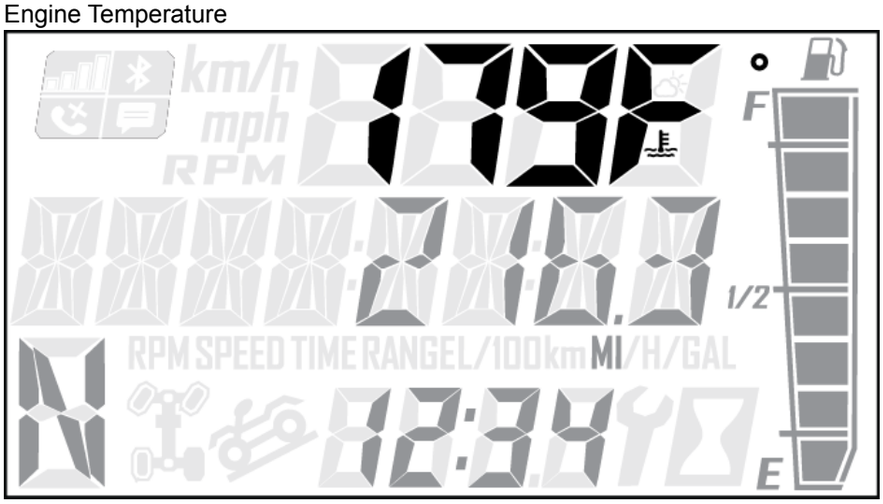
DISPLAY AREA 1



Pressing the MODE button will change the information displayed in Area 1 ①.

Speed

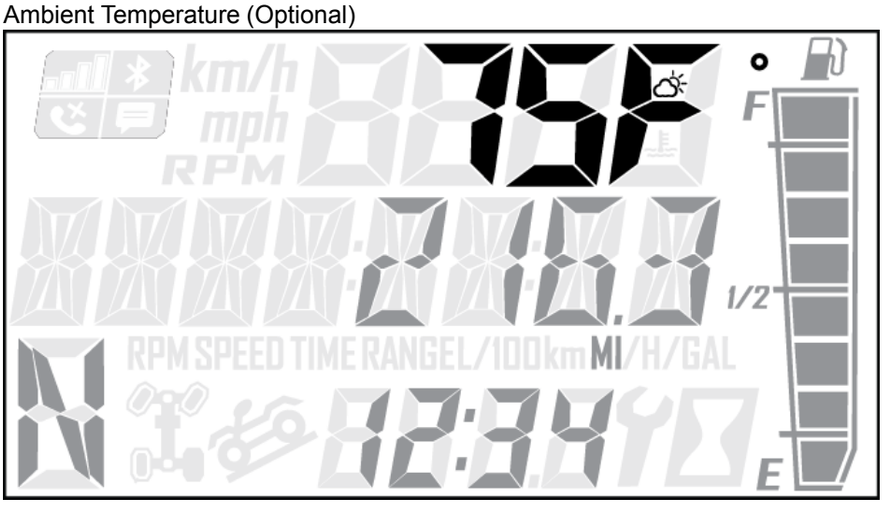
Engine Temperature



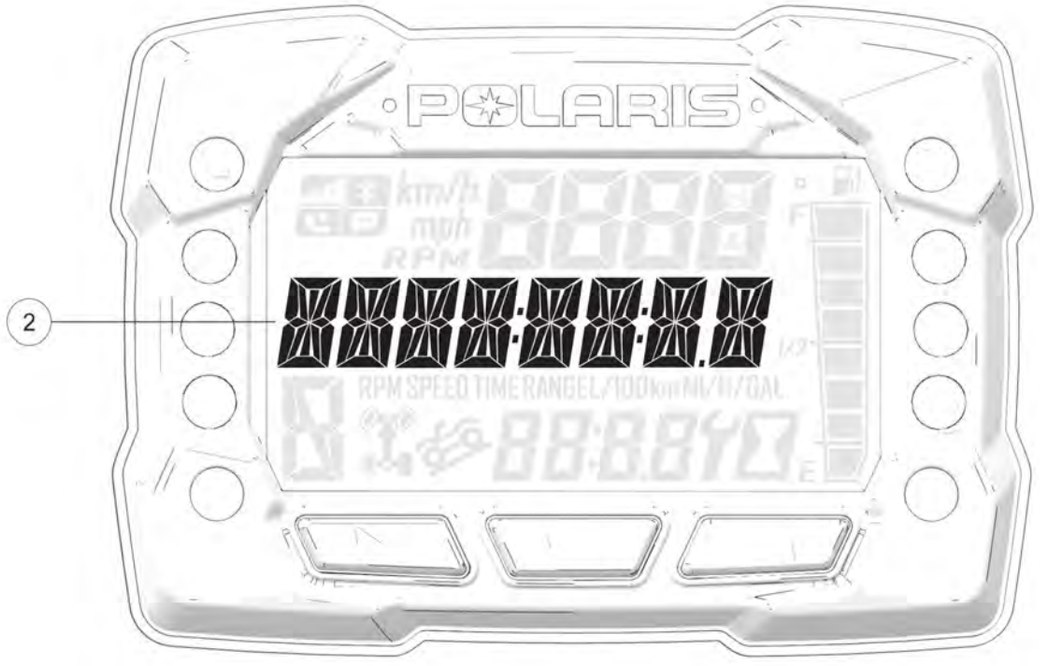
12

RPM

Ambient Temperature (Optional)

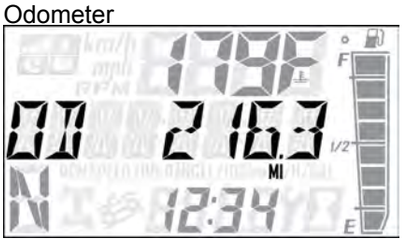


DISPLAY AREA 2

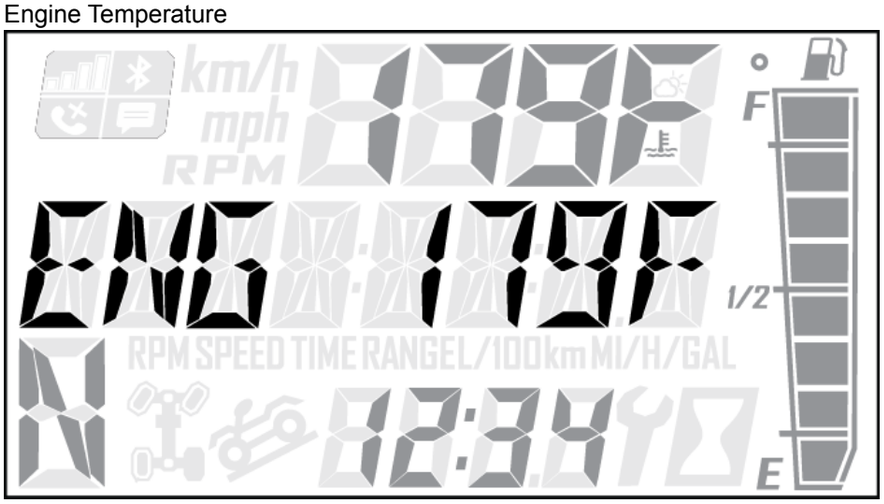


Toggle the Up/Down buttons to change the information displayed in Area 2 ②.

Odometer



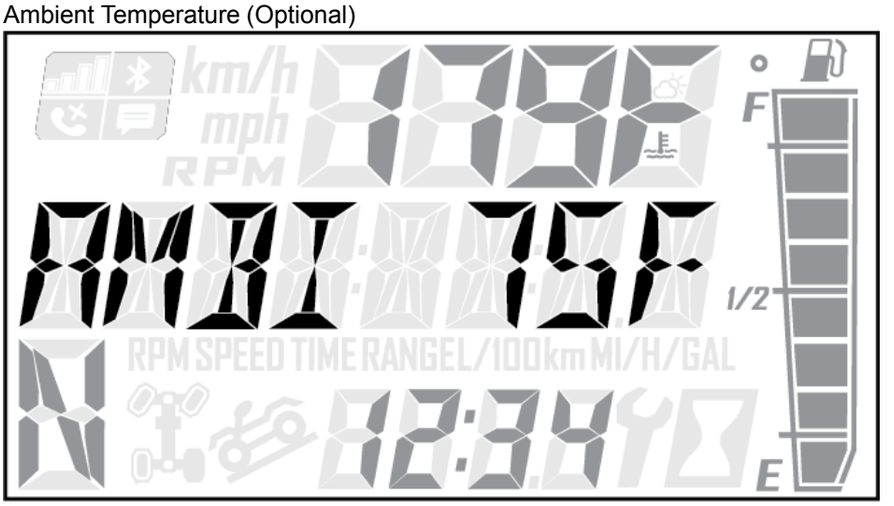
Engine Temperature



12

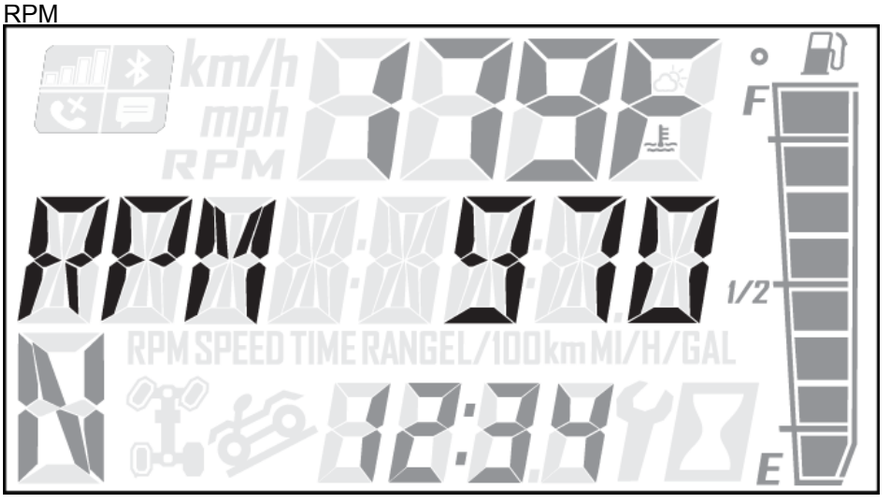
Trip 1

Ambient Temperature (Optional)

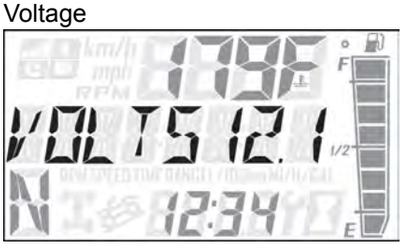


Trip 2

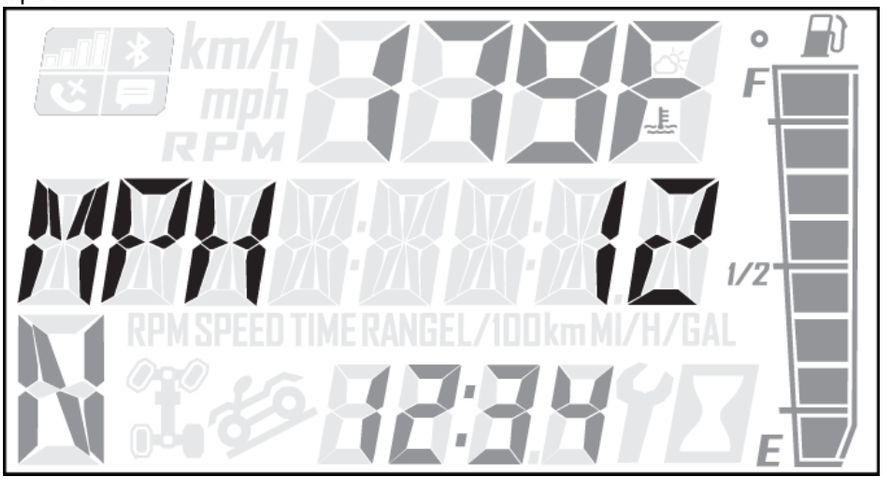
RPM



Voltage

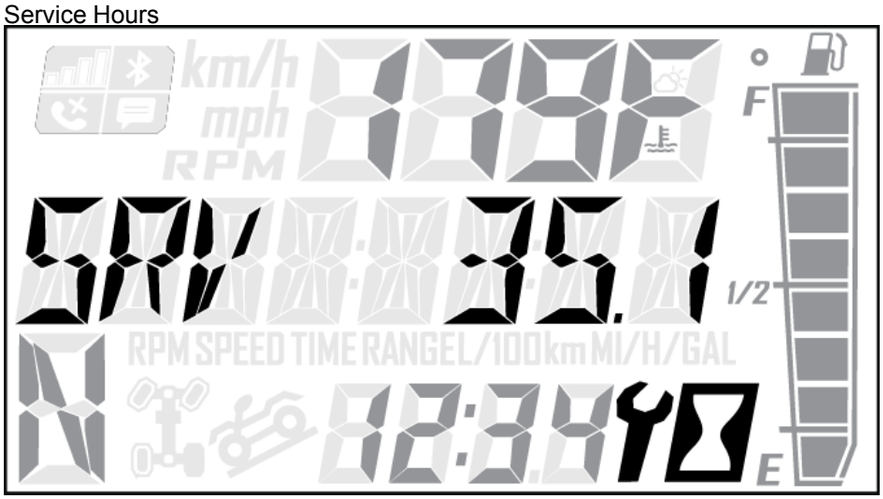


Speed



Engine Hours

Service Hours

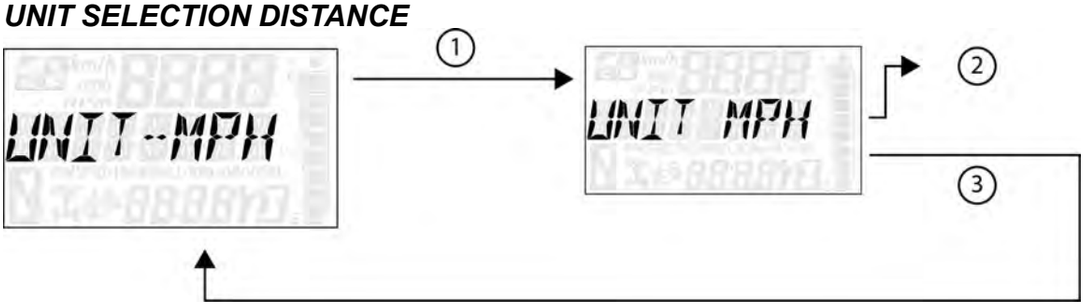


OPTIONS MENU

Press and hold the MODE button to enter the Options Menu.

OPTIONS MENU	NOTES
Diagnostic Codes	Only displays if fault codes are present or stored
Units - Distance	Select MPH or KPH
Units - Temp	Select between °F and °C
Clock	Select between 12H or 24H, and set time
Backlight Color	Select between Blue or Red
Backlight Level	Set backlight brightness level
Service Hours	View/Set Service hours
Exit Menu	Exit

UNIT SELECTION DISTANCE



1. Press and hold the MODE button to enter the Options Menu.

NOTICE
“OPTIONS” will display on the screen for 3 seconds before showing first menu item.

2. Select “Units-Distance” from the Options Menu by pressing the MODE button.

   Reference the image shown above:

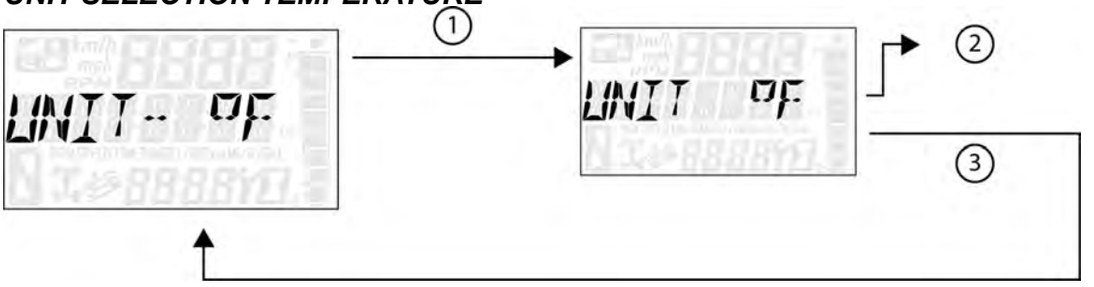
   ① Press the MODE button.

   ② Toggle the Up/Down Buttons to change the units (MPH or KPH)

   ③ With the correct unit displayed, Press the mode button which will set the unit and return to the Options Menu.

3. To exit the Options Menu the user can select Exit Menu function from Options Menu, can hold Mode Button and exit out of Options Menu, or not press any button for 10 seconds, which will exit out of the Options Menu.

UNIT SELECTION TEMPERATURE



1. Press and hold the MODE button to enter the Options Menu.

NOTICE
“OPTIONS” will display on the screen for 3 seconds before showing first menu item.

2. Select “Units - Temp” from the Options Menu by pressing the MODE button.

   Reference the image shown above:

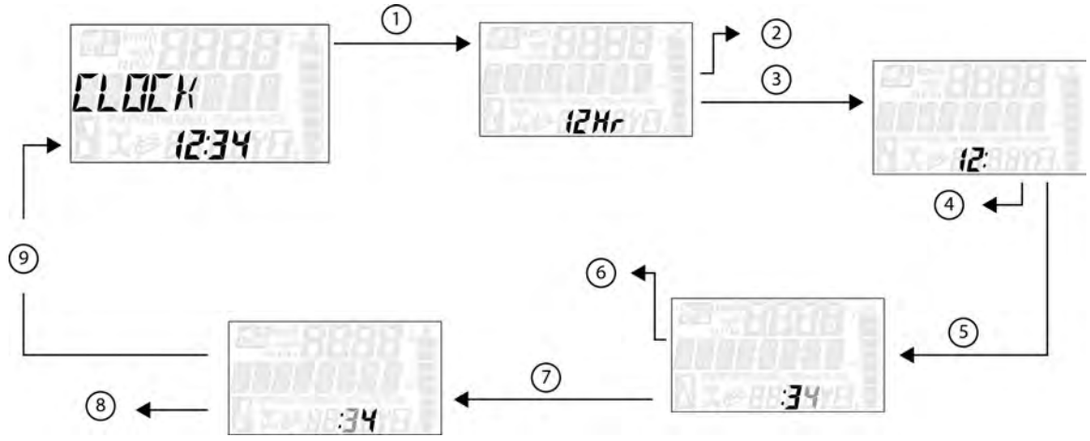
   ① Press the MODE button.

   ② Toggle the Up/Down Buttons to change the units (°F or °C)

   ③ With the correct unit displayed, Press the mode button which will set the unit and return to the Options Menu.

3. To exit the Options Menu the user can select Exit Menu function from Options Menu, can hold Mode Button and exit out of Options Menu, or not press any button for 10 seconds, which will exit out of the Options Menu.

CLOCK



1. Press and hold the MODE button to enter the Options Menu.

NOTICE
"OPTIONS" will display on the screen for 3 seconds before showing first menu item.

2. Select "Clock" from the Options Menu by pressing the MODE button.

   Reference the image shown above:

   ① Press the MODE button.

   ② Toggle the Up/Down Buttons to change the units (12H or 24H)

   ③ With the correct unit displayed, Press the mode button which will set the unit.

   ④ Toggle the Up/Down Buttons to change the units (Cycles Hours)

   ⑤ With the correct unit displayed, Press the mode button which will set the unit.

   ⑥ Toggle the Up/Down Buttons to change the units (Cycles 10s of Minutes)

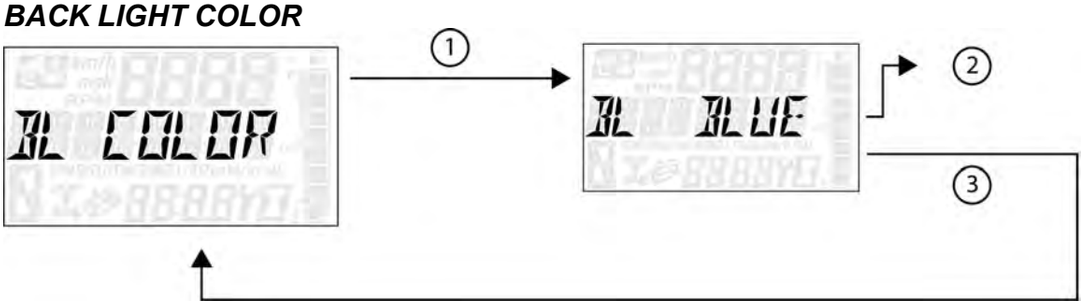
   ⑦ With the correct unit displayed, Press the mode button which will set the unit.

   ⑧ Toggle the Up/Down Buttons to change the units (Cycles 1s of Minutes)

   ⑨ With the correct unit displayed, Press the mode button which will set the unit and return to the Options Menu.

3. To exit the Options Menu the user can select Exit Menu function from Options Menu, can hold Mode Button and exit out of Options Menu, or not press any button for 10 seconds, which will exit out of the Options Menu.

BACK LIGHT COLOR



1. Press and hold the MODE button to enter the Options Menu.

NOTICE
“OPTIONS” will display on the screen for 3 seconds before showing first menu item.

2. Select “Backlight Color” from the Options Menu by pressing the MODE button.

   Reference the image shown above:

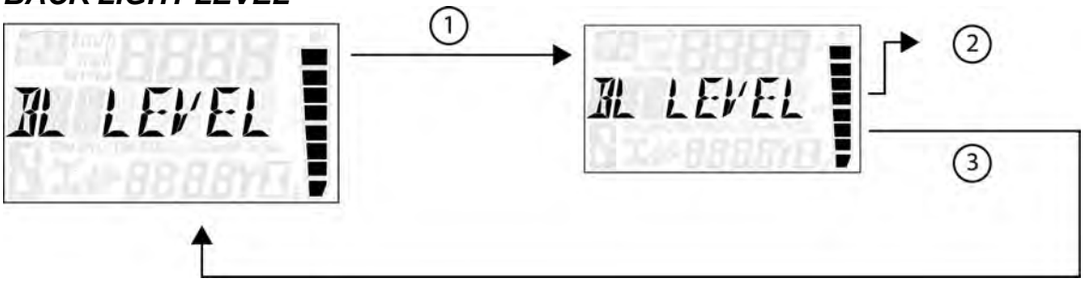
   ① Press the MODE button.

   ② Toggle the Up/Down Buttons to change the units (Blue or Red)

   ③ With the correct unit displayed, Press the mode button which will set the unit and return to the Options Menu.

3. To exit the Options Menu the user can select Exit Menu function from Options Menu, can hold Mode Button and exit out of Options Menu, or not press any button for 10 seconds, which will exit out of the Options Menu.

BACK LIGHT LEVEL



1. Press and hold the MODE button to enter the Options Menu.

NOTICE
“OPTIONS” will display on the screen for 3 seconds before showing first menu item.

2. Select “Backlight Level” from the Options Menu by pressing the MODE button.

   Reference the image shown above:

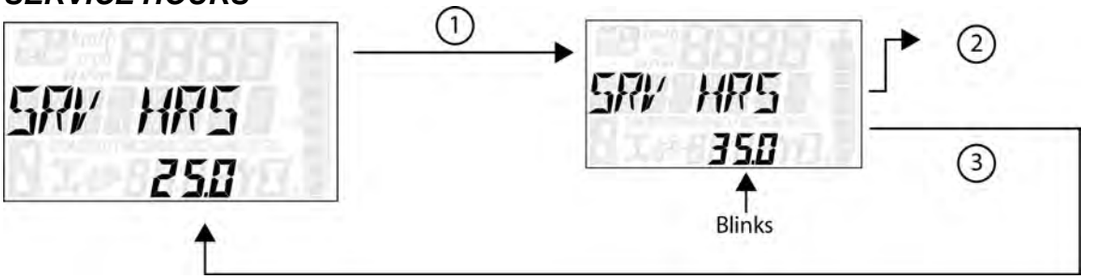
   ① Press the MODE button.

   ② Toggle the Up/Down Buttons to change the units (Increase or Decrease Level)

   ③ With the correct unit displayed, Press the mode button which will set the unit and return to the Options Menu.

3. To exit the Options Menu the user can select Exit Menu function from Options Menu, can hold Mode Button and exit out of Options Menu, or not press any button for 10 seconds, which will exit out of the Options Menu.

SERVICE HOURS



1. Press and hold the MODE button to enter the Options Menu.

NOTICE
“OPTIONS” will display on the screen for 3 seconds before showing first menu item.

2. Select “Service Hours” from the Options Menu by pressing the MODE button.

   Reference the image shown above:

   ① Press the MODE button.

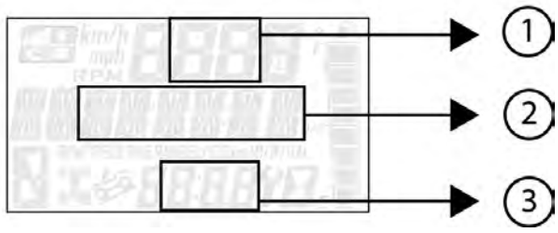
   ② Toggle the Up/Down Buttons to change the units (0, 5, 10 - 95, 100)

   ③ With the correct unit displayed, press the MODE button, which will set the unit and return you to the Options Menu.

NOTICE
To reset service hours after they have counted down to "0.0", reselect the existing setpoint or select a new service hour value.

3. To exit the Options Menu the user can select Exit Menu function from Options Menu, can hold Mode Button and exit out of Options Menu, or not press any button for 10 seconds, which will exit out of the Options Menu.

DIAGNOSTIC CODE



NOTICE
Diagnostic Code Screen will show available MIL that has come on during that ignition cycle.

1. Press and hold the MODE button to enter the Options Menu.

NOTICE
“OPTIONS” will display on the screen for 3 seconds before showing first menu item.

2. Select “Diagnostic Codes” from the Options Menu by pressing the MODE button.

   Toggle the Up/Down Buttons to cycle through Code(s).

NOTICE
This option will only be available if a fault code was set or is active during the current ignition key 'on' cycle. Turning off the ignition will clear any save fault codes from the gauge.

   Reference the image shown above:

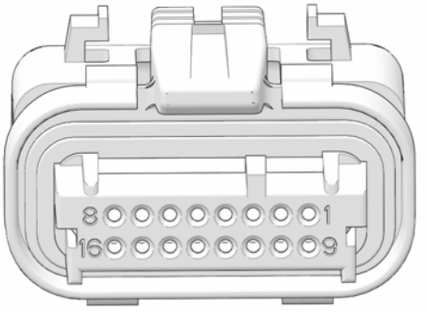
   ① Area A will Display FMI (XX)

   ② Area B will Display SPN (XXXXXX)

   ③ Clock Area will Display Count (XXX)

3. To exit the Options Menu the user can select Exit Menu function from Options Menu, can hold Mode Button and exit out of Options Menu, or not press any button for 10 seconds, which will exit out of the Options Menu.

INSTRUMENT CLUSTER PINOUTS



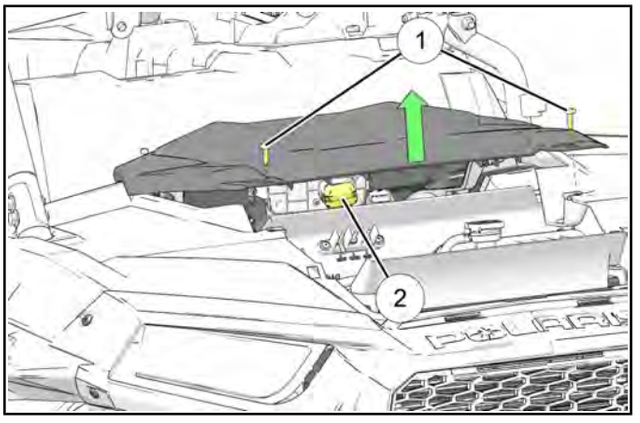
FUNCTION	PIN
CAN High	1
CAN Low	2
Constant Power (Vdc)	3
Switched Power (Vdc)	4
Ground	5
Fuel Level Sensor	11

INSTRUMENT CLUSTER REMOVAL

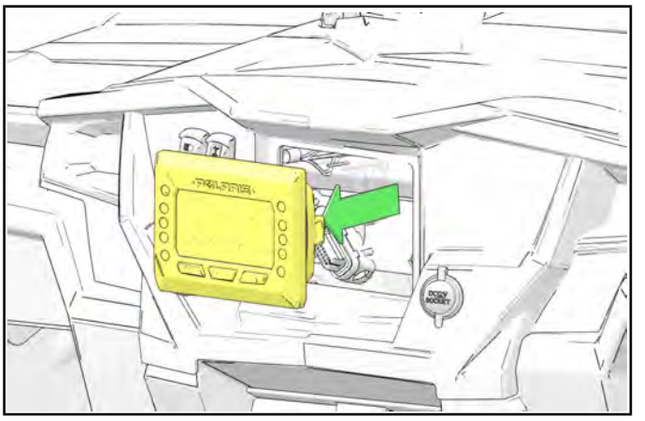
NOTICE

Do not allow alcohol or petroleum products to come in contact with the instrument cluster lens.

1. Remove the hood.
2. Remove the two T-40 Torx screws ① retaining the front part of the upper hood panel. Carefully lift the panel to access the instrument cluster wiring.



3. Disconnect the wire harness connector ② from the back side of the instrument cluster.
4. Push the instrument cluster out from the back side of the dash while securely holding the dash and rubber mount.



NOTICE

Do not remove the rubber mount from the dash panel. Only remove the rubber mount if necessary. The bezel is a snap-on assembly and is a serviceable part.

INSTRUMENT CLUSTER INSTALLATION

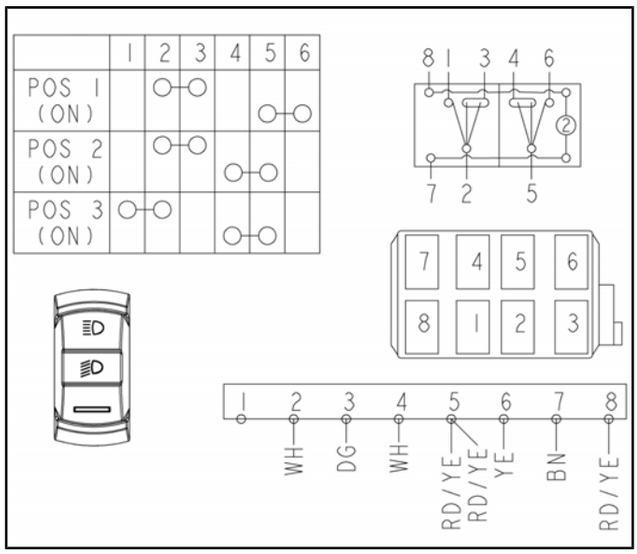
1. Spray a soap and water mixture onto the outer surface area of the instrument cluster. This will help the instrument cluster slide into the rubber mount more easily.
2. Be sure the rubber mount inside the dash is fully installed and that the indexing key on the rubber mount is lined up with the keyway in the dash.
3. Hold the dash securely and insert the instrument cluster into the dash. Apply pressure on the bezel while pressing down on the instrument cluster.
4. Reconnect the wiring harness to the instrument cluster.

SWITCHES / CONTROLS

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; 7 and 8.
- Move the switch to LOW. There should be continuity between switch pins 2 and 3; 4 and 5; 7 and 8..
- Move the switch to OFF. There should be continuity between switch pins 1 and 2; 4 and 5; 7 and 8.

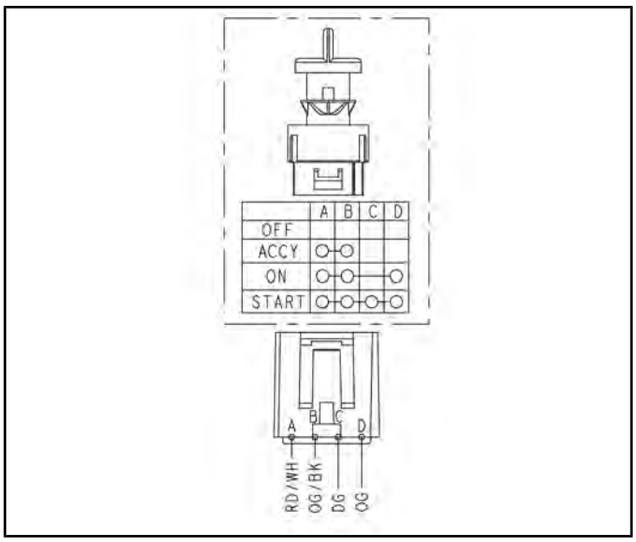


NOTICE
Pins 7 and 8 provide power and ground to light the switch lamp.

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 4 sets of outputs (OFF / ACCY / ON / START). If any of the tests fail, replace ignition switch assembly.

- In the OFF position, there should be no continuity between any of the pins.
- Turn the key to ACCY position. There should be contunity between switch pins A and B.
- Turn the key to ON position. There should be continuity between switch pins A, B and D.
- Turn the key to START position. There should be continuity between all the pins on the switch.

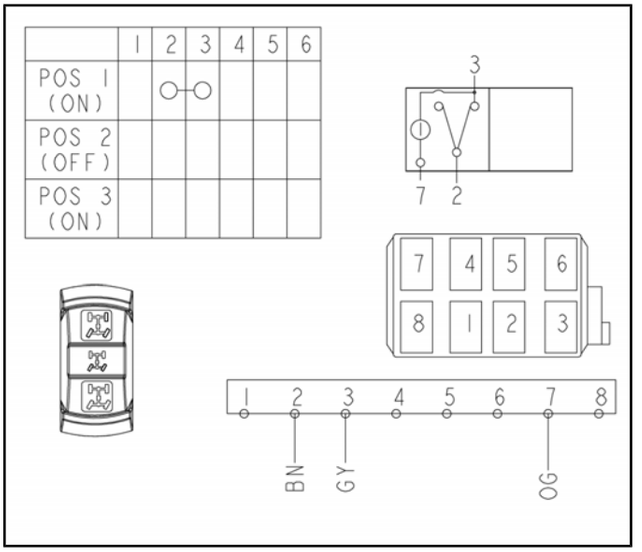


AWD / 2WD SWITCH (NO TURF MODE)

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 as well as 3 and 7.
- Move the switch to 2WD (NONE / OFF). There should ONLY be continuity between pins 3 and 7.



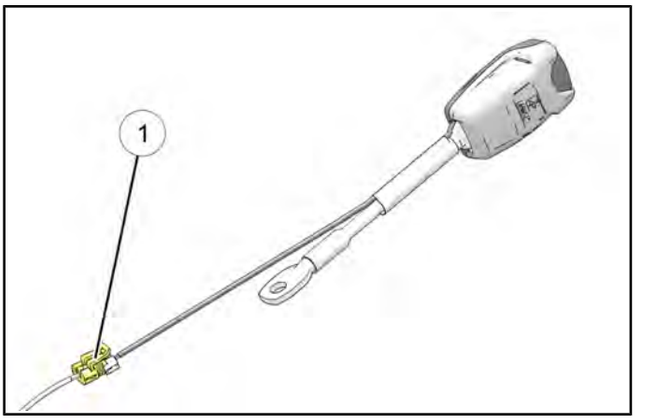
SEAT BELT SWITCH

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:

1. Disconnect the harness ① running to the seat belt.

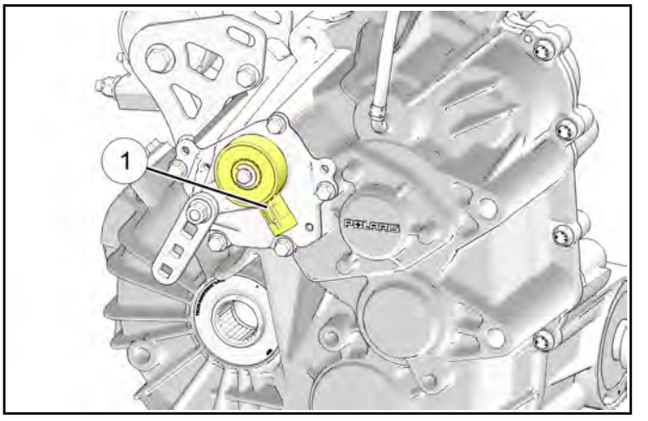


2. Using a multi-meter, measure between both pins on switch.

	SEAT BELT DISENGAGED	SEAT BELT ENGAGED
Between both pins on switch	∞ (OL)	< 1 Ω

TRANSMISSION / GEAR POSITION SWITCH

The transmission (gear position) switch ① is located on the RH side of the transmission and can be accessed through the rear RH wheel well area.



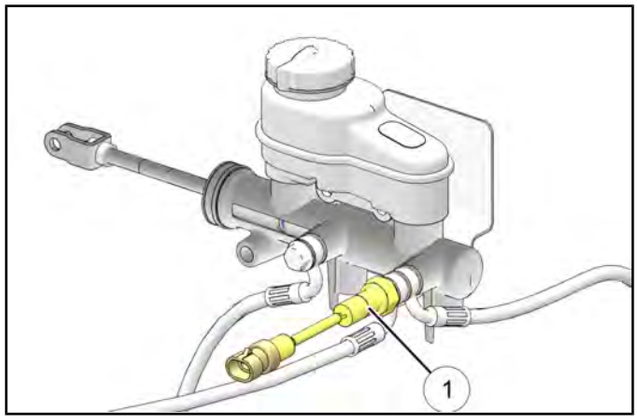
TESTING

1. Disconnect the transmission switch harness by lifting the connector lock and pulling on the connector. Do not pull on the wiring.
2. 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	620 Ω
LOW	300 Ω
NEU	160 Ω
REV	75 Ω
PARK	24 Ω

BRAKE PRESSURE SWITCH

The brake pressure switch ① is located on the rear brake line outlet on the master cylinder.



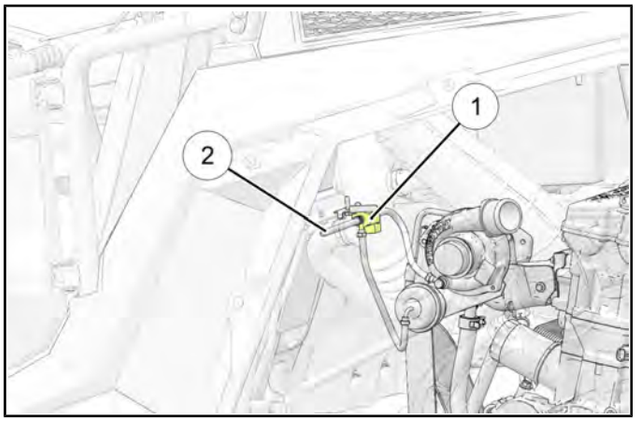
TORQUE
Brake Pressure Switch: **15 ft-lbs (20 Nm)**

NOTICE
Always replace brake system seals if fastener is loosened or removed.

1. Disconnect the wire harness from the brake switch.
2. Connect an ohmmeter across switch contacts. Reading should be infinite (OL).
3. Apply foot brake and check for continuity between switch contacts. If there is no continuity or greater than 0.5 Ω resistance when the brake is applied with slight pressure, first clean the switch contacts and re-test. Replace switch if necessary.

BOOST CONTROL SOLENOID / VALVE

The boost control valve ① allows the ECU to control the amount of boost pressure within the induction system. Boost control is accomplished by pulsing the valve at different frequencies (pulse width modulate) depending on the amount of boost pressure within the induction system. If the ECU determines that the targeted boost pressure has been obtained, the ECU will trigger the pulse valve so that a certain level of compressor pressure is routed to the wastegate actuator. Doing so activates the wastegate so that a proportion of exhaust gas bypasses the turbine. The boost control valve vents to atmosphere when building boost. If the vent hose ② to atmosphere is plugged, an underboost code will set.

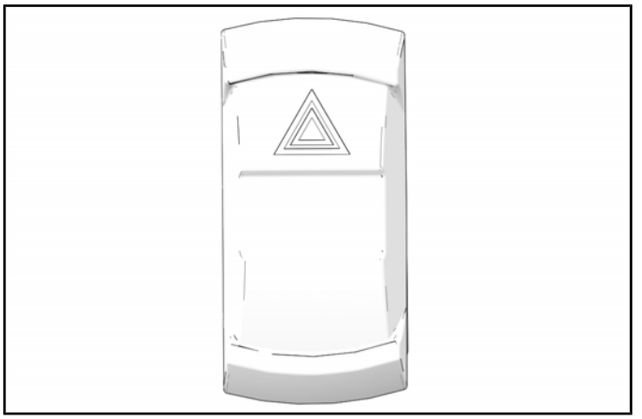


If a trouble code is being set for the boost control valve and the vent hose is not plugged, the valve can be statically tested with a multimeter. Disconnect the harness to the valve and ohm the two pins on the valve.

Boost Control Valve: **22–24 Ω**

More information relating to the turbocharger system and components may be found in the Engine and Fuel System chapters.

HAZARD SWITCH (INT'L / TRACTOR)

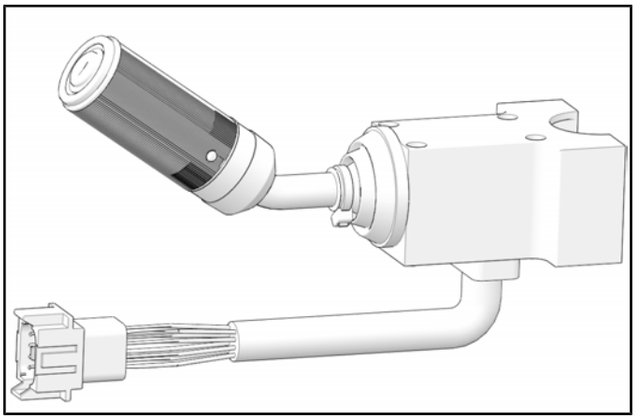


Testing

1. Disconnect the harness from the hazard switch.
2. Test outputs in both the ON and OFF positions. If any of the tests fail, replace the switch.

- Move switch to ON. There should be continuity between switch pins 2 and 3.
- Move the switch to OFF. There should be no continuity between any switch pins.

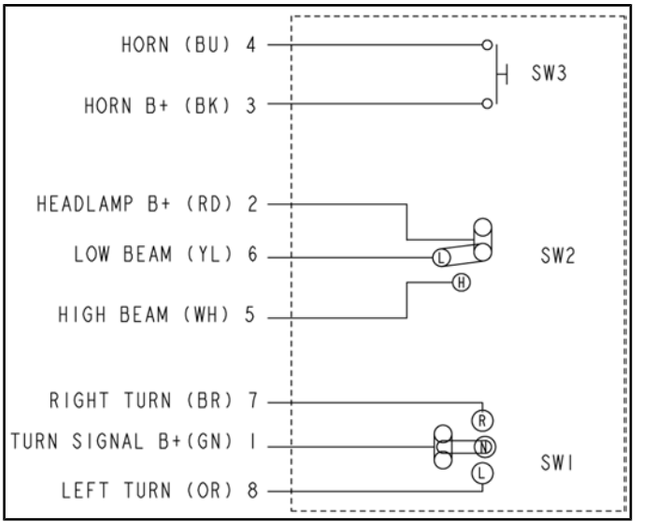
TURN/LIGHTS/HORN SWITCH (INT'L/ TRACTOR)



Testing

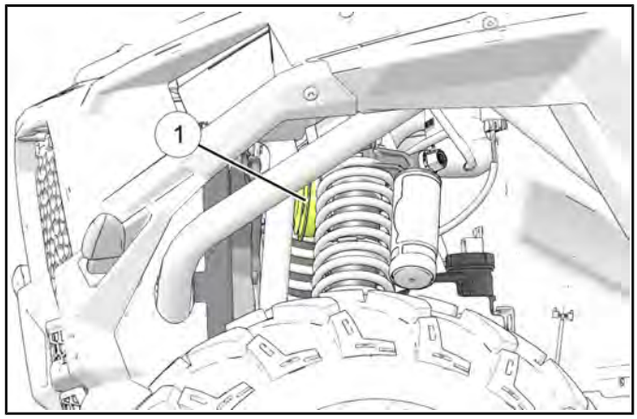
1. Disconnect the Turn/Lights/Horn switch by depressing the connector locks and pulling on the connector. Do NOT pull on the wiring.
2. Test between the sets of outputs. If any of the tests fail, replace the switch assembly.

- Turn on the High Beam. There should be continuity between switch pins 2 and 5.
- Turn on the Low Beam. There should be continuity between switch pins 2 and 6.
- Turn on the Left Turn Signal. There should be continuity between switch pins 1 and 8.
- Turn on the Right Turn Signal. There should be continuity between switch pins 1 and 7.
- Depress the Horn. There should be continuity between switch pins 3 and 4.



HORN

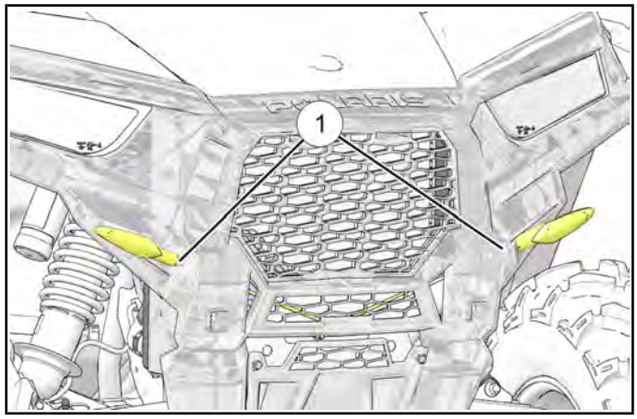
The horn ① is located in the front of the unit behind the radiator, accessible through the front left side of the vehicle.



TURN LIGHTS

Front

The front turn lights are retained to the front bumper by a single faster ①, accessible through the front grill.

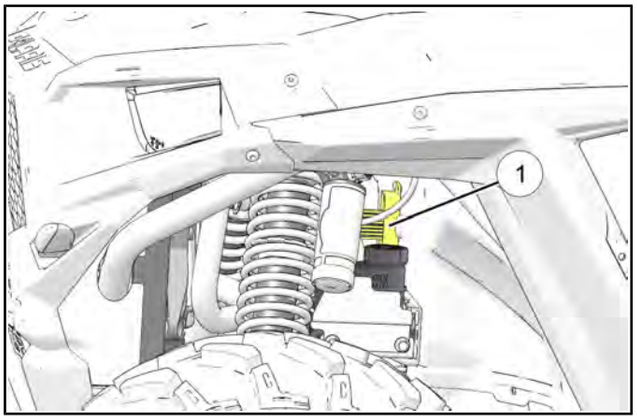


Rear

The rear turn lights are integrated into the rear taillight. If the taillights are functioning properly but there is no blinker, check the wiring connections and the flasher module.

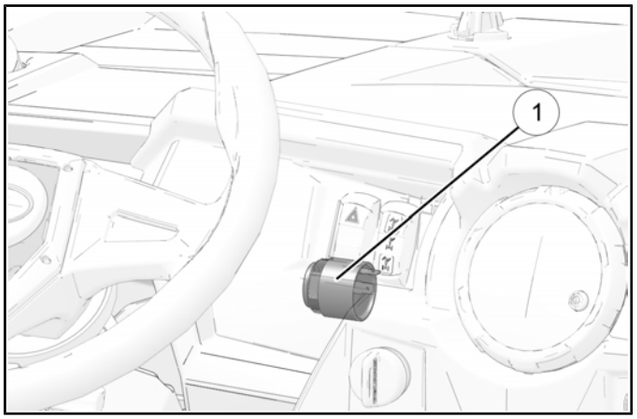
FLASHER MODULE (INT'L/TRACTOR)

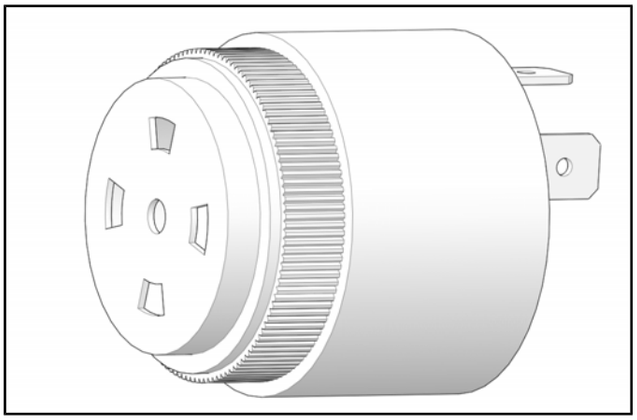
The flasher module ① is located on the front floor assembly near the master cylinder. The module and fasteners are accessible through the front left side of the vehicle.



BRAKE ALARM (INT'L/TRACTOR)

The brake alarm ① is located near the steering column behind the upper dash panel. The brake alarm will sound if the vehicle's parking brake is applied and the throttle is pushed in a forward or reverse gear.





PARKING BRAKE SWITCH (INT'L/ TRACTOR)

The parking brake switch is located within the parking brake lever. Remove the rubber boot covering the parking brake lever to locate the internally mounted switch.

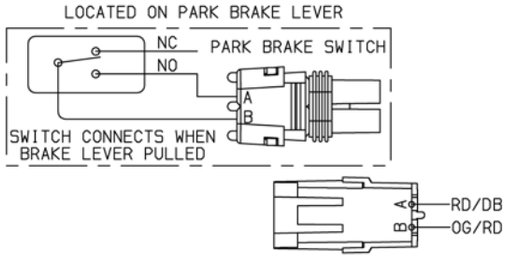
The switch remains in the "open" position when the park brake lever is not applied.

When the parking brake lever is applied, the switch makes contact and sends voltage to the ECU to illuminate "BRAKE" in the instrument cluster rider information display area (see "Park Brake Indicator").

NOTICE
If the parking brake is applied the ECU will rev limit the engine at 1500 RPM until the parking brake is released. This feature has been added to prevent drive-away with the parking brake applied.

Testing The Parking Brake Switch

1. Disconnect the harness connector at the parking brake switch (Orange/Red and Red/Blue wires).
2. Place the ohmmeter leads onto the switch terminals. The reading should be infinite (OL).



CAVITY	CAVITY	LEVER POSITION	CONTINUITY
A	B	BRAKE SET	YES
A	B	BRAKE RELEASED	NO

3. Apply the parking brake. Continuity should now exist between the switch terminals. If no continuity exists when the parking brake is applied, try to clean the switch terminals and re-test. Replace switch if necessary.

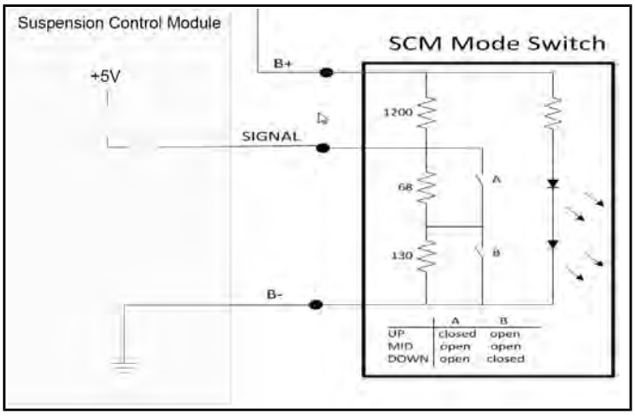
Park Brake Indicator

This warning is used to notify the operator that the park brake lever is engaged.

When the parking 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.

SUSPENSION MODE SWITCH (DYNAMIX MODELS)

For more information on the Dynamix suspension system, refer to the Steering / Suspension chapter - Dynamix Overview page 9.54



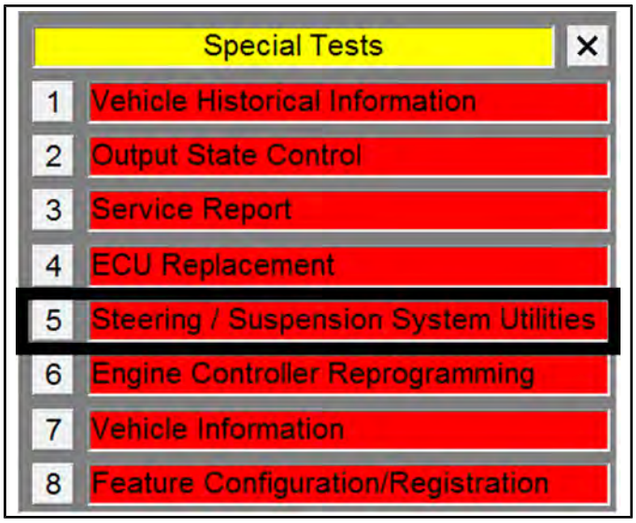
SWITCH POSITION	CONTACT A	CONTACT B	PINS 1 TO 7
Comfort	Closed	Open	1270 Ω
Sport	Open	Open	1400 Ω
Firm	Open	Closed	1330 Ω

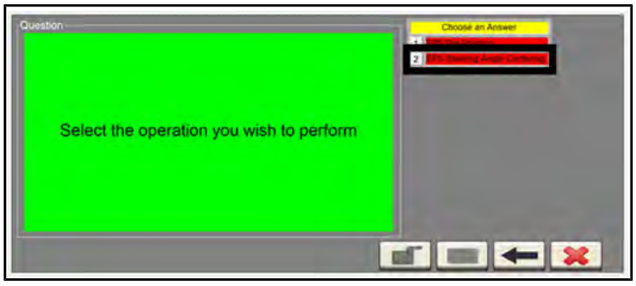
STEERING ANGLE SENSOR CENTERING (DYNAMIX)

The steering angle sensor centering procedure should be performed ANY TIME one of the following situations occurs:

- EPS has been removed, disconnected, or replaced
- EPS codes SPN 1807 FMI 13 or 31 is present
- Steering System or Front Suspension has been serviced (such as toe alignment)
- New steering components have been installed
- SCM is indicating an alignment code **SPN 516122 FMI 15 or 17** or **SPN 524114 FMI 2**

1. Connect to Digital Wrench.
2. Perform EPS Steering Angle Centering procedure, found in Steering / Suspension System Utilities on the Special Tests menu in Digital Wrench.





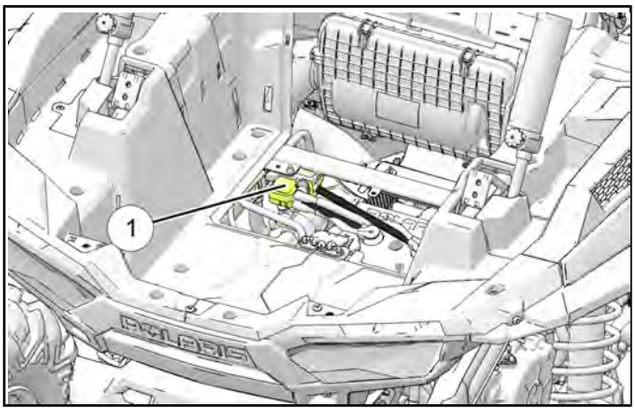
3. Drive vehicle straight at 10 mph (16 km/h) for at least 10 seconds.
4. Come to a complete stop without turning the steering wheel. Turn key off.
5. Turn key to ON position.
6. Cycle key off and back on.

7. If any codes are set after performing the EPS Absolute Position Sensor Calibration procedure, repeat steps 2-6
8. If no EPS or SCM DTCs are present, drive straight and verify that the reported steering angle from the EPS is centered (+/– 5°).
9. If the steering is properly centered, perform SCM Steering Angle Adaptation Value Reset procedure, found in Steering / Suspension System Utilities on the Special Tests menu in Digital Wrench.

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

NOTICE
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).

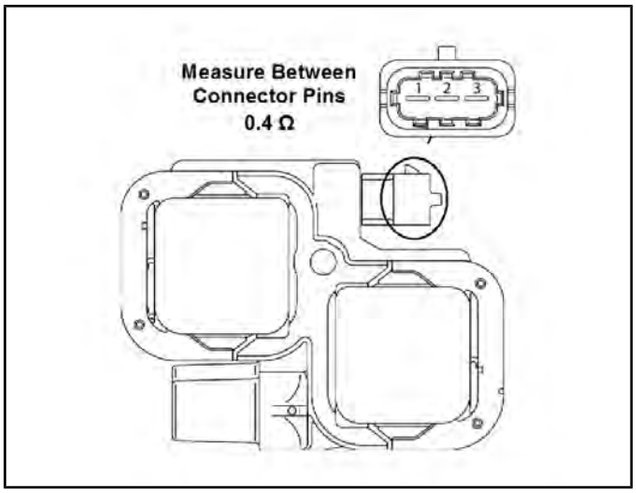
TORQUE
Ignition Coil Mounting Bolt: **8 ft-lb (11 Nm)**

IGNITION COIL TESTS

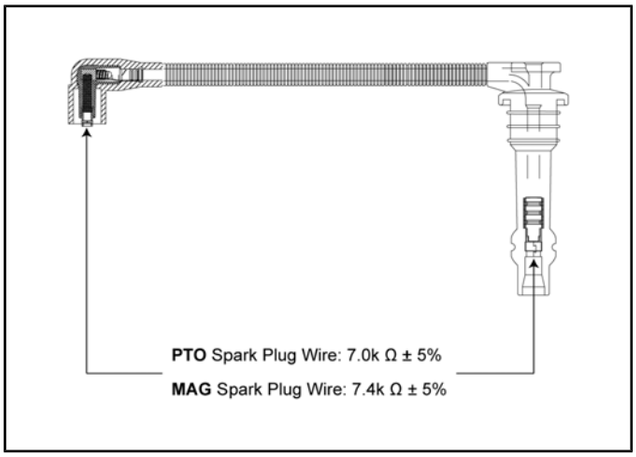
The ignition coil can be tested by using an ohm meter. Use the following illustration and specification table to test the ignition coil resistance.

TEST	PIN CONNECTION	Ω
Primary	Between 1 & 2 Between 2 & 3	0.4 Ω
Secondary (PTO)	Between High Tension Lead Caps	7.0 k Ω ± 5%
Secondary (MAG)	Between High Tension Lead Caps	7.4 k Ω ± 5%

Primary Test



Secondary Test



12

CHARGING SYSTEM

CURRENT DRAW - KEY OFF

Parasitic draw is when there is excessive current flow with the key off.

While the most common causes of draws are improperly installed accessories (tapping into un-switched B+ instead of switched) there can be electronic component failures that can cause this as well.

CAUTION

Do not connect or disconnect the battery cable, or ammeter with the engine running. Damage will occur to electrical components.

CAUTION

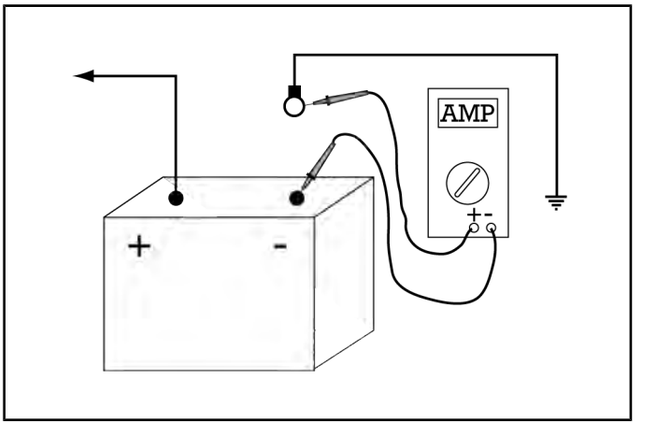
Charging system damage will occur if incompatible components are installed. Always reference Polaris Electric Parts Catalog for proper part numbers.

NOTICE

Wait ten minutes with the key off for the ECU to power down. This will avoid a faulty readout while testing amperage draw.

TESTING PROCEDURE

1. Remove the negative cable from the battery.
2. Connect a jumper from the negative battery cable terminal to the negative battery post.
3. Ensure your meter leads and selector dial are set to measure amperage.
4. Connect your red lead to the battery negative cable terminal.



5. Connect your black lead to the battery negative post.
6. Momentarily key the ignition switch on, then off.

CAUTION

Ensure all electrical components are switched off, or damage to your jumper and/or meter will occur.

7. Wait 10 minutes before checking the value. Vehicles will vary, but electronic components will take time to fully go to sleep after switched power is removed.
8. Maximum allowable is 10 milliamps. If your meter is ranged to the 10 Amp scale, this will appear as 0.010 Amps.

Current Draw - Key Off:
Maximum of .01 DCA (10 mA)

9. If over 10 milliamps, go to the fuse block and start systematically removing one fuse at a time until the value drops, indicating the circuit that requires attention.

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.

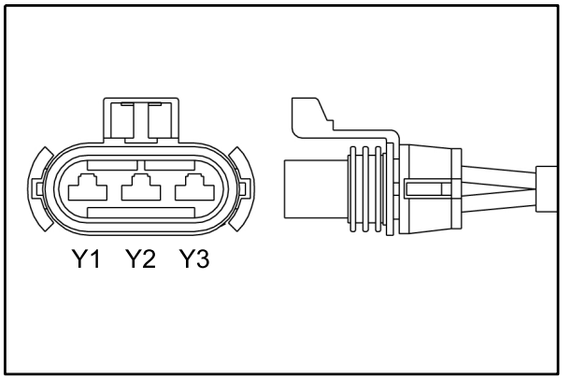
⚠ WARNING

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.

STATOR TESTING

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

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:

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

NOTICE

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

Measure the resistance value of each of the stator legs to ground: Y1 to Ground, Y2 to Ground, Y3 to Ground. Each test should measure:

TEST	CONNECT METER LEADS TO:	OHMS READING
Battery Charge Coil	Y1, Y2, or Y3 to Ground	Open Line (Infinity)

NOTICE

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

1. Set the selector dial to measure AC Voltage.
2. Start the engine and let it idle.
3. 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).

4. Refer to the following table for **approximate** AC Voltage readings according to RPM. Test each leg at the specified RPM in the table.

NOTICE
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	24 VAC ± 25%
3000	50 VAC ± 25%
5000	82 VAC ± 25%

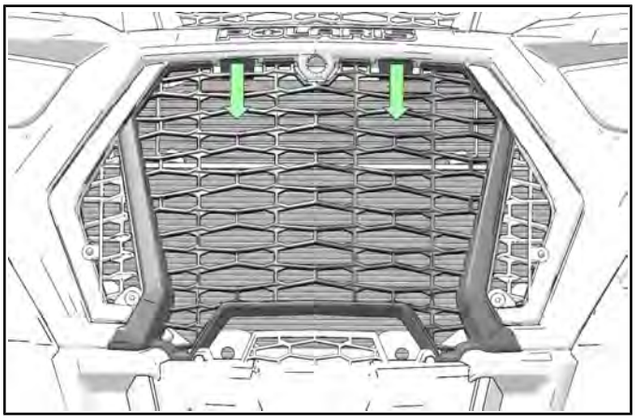
VOLTAGE REGULATOR (NON-DYNAMIX)

The regulator / rectifier is located between the front fascia and the radiator.

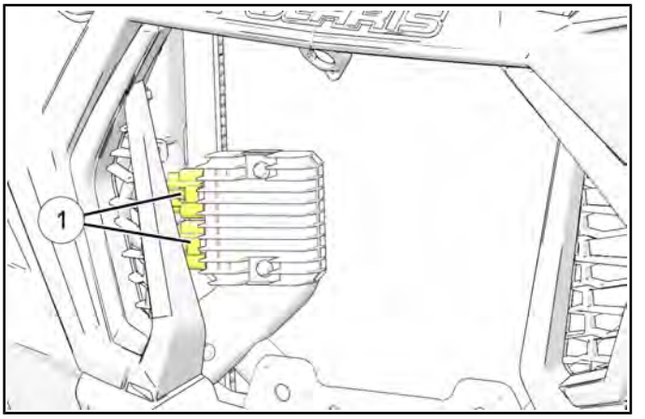
NOTICE
If the regulator / rectifier case temperature exceeds 230° F or 110° C, the unit will turn itself off to cool down. The unit will turn on again after it has cooled down to at least 212° F or 100° C. If it turns off, verify the cooling fins are clean, free from mud/debris and that adequate airflow is present.

REGULATOR REPLACEMENT

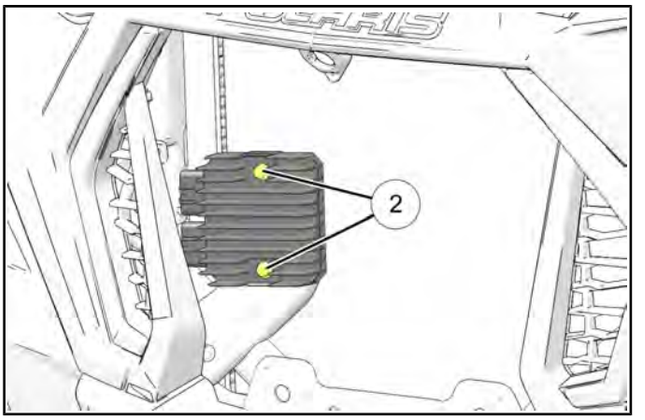
1. Disconnect the negative battery terminal.
2. Push the locking tabs down on the front fascia grill and remove the grill.



3. Disconnect both regulator connectors ①.



4. Remove the two regulator mounting fasteners ② and remove the regulator through the grill opening.



5. Install regulator onto the mounting plate. Torque mounting fasteners to specification.

TORQUE
Regulator Mounting Fasteners: **5 ft-lb (7 Nm)**

6. Connect the regulator harness connectors. The connectors are keyed so each connector will only fit on one of the regulator connectors.
7. Install the grill. Ensure the bottom tabs and clips are locked into the front fascia.
8. Install the battery negative terminal. Torque fastener to specification.

TORQUE
Battery Terminal Fastener: **60 in-lbs (7 Nm)**

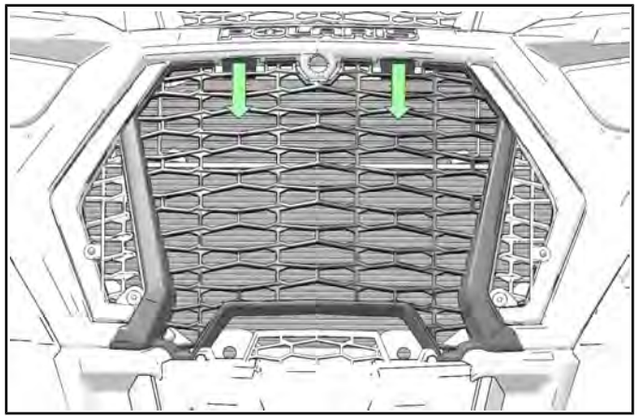
VOLTAGE REGULATOR (DYNAMIX)

The dual regulator / rectifier assemblies are located behind the front fascia grill in front of the radiator.

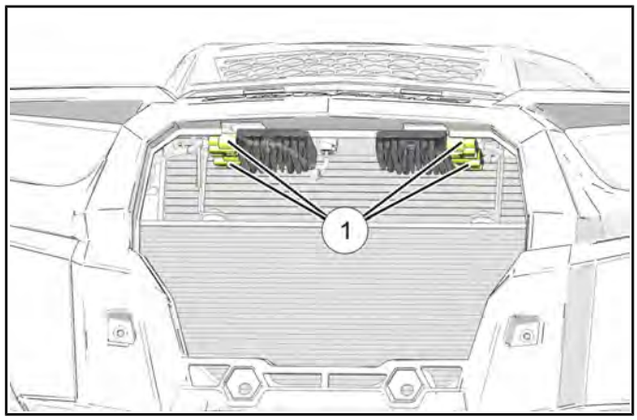
If the regulator / rectifier case temperature exceeds 230° F or 110° C, the unit will turn itself off to cool down. The unit will turn on again after it has cooled down to at least 212° F or 100° C. If it turns off, verify the cooling fins are clean, free from debris and that adequate airflow is present.

REGULATOR REPLACEMENT

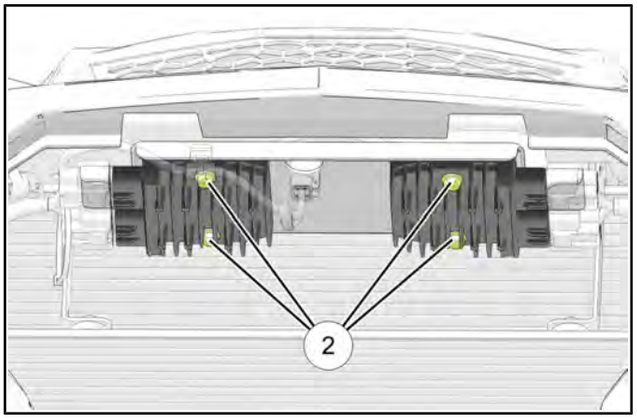
1. Remove the seat and disconnect the negative battery terminal.
2. Remove the front fascia grill cover by pulling down on the two tabs to release it.



3. Disconnect the two wiring harnesses ① going to the regulator(s) being removed.



4. Remove the two fasteners ② retaining the regulator (s) to the mounting bracket.



5. Install new regulator(s) on the bracket. Torque fasteners to specification.

TORQUE
Regulator Fasteners: **8 ft-lb (11 Nm)**

6. Connect the two regulator harnesses on each regulator.
7. Install the front fascia grill.
8. Connect the battery negative cable. Torque fastener to specification.

NOTICE
Battery Terminal Fastener: **60 in-lbs (7 Nm)**

9. Install the seat.

BATTERY

BATTERY SPECIFICATIONS

Type	Polaris / Johnson Controls 575 Sealed - Maintenance Free
Voltage	12 Vdc
Nominal Capacity @ 10 HR Rate	30 AH
CCA	575
Nominal Open Circuit Voltage	12.8 Vdc or more.
Recommended Charging Rate	1.8A @ 5-10 HR or 6.0A @ 1 HR

NOTICE

Never attempt to open the battery. If the seal is broken, the battery will be ruined and will fail within a few weeks.

GENERAL BATTERY INFORMATION

⚠ 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 acid! Serious burns can result from contact with the 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 a 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 closed space. Always shield eyes when working near batteries.

Keep out of reach of children.

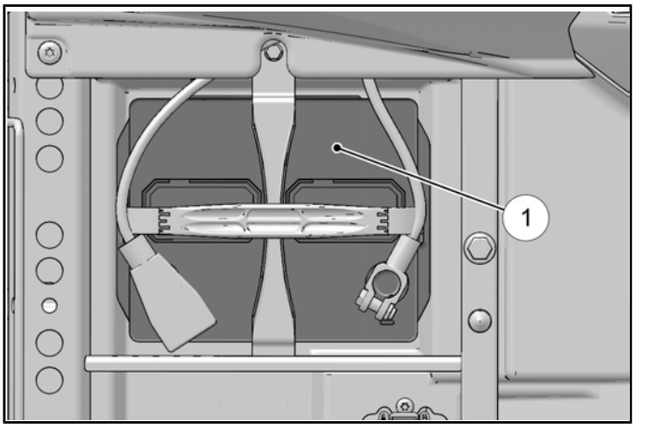
1. Check battery voltage with a volt/ohm meter. A fully charged battery should be 12.8 V or higher.
2. If the voltage is below 12.6 V, the battery will need to be recharged (see Chapter 11 – Charging Procedure page 12.44).

To service a Maintenance Free battery:

3. Remove battery from the vehicle (see Battery Removal page 12.42).
4. Test battery with a voltage meter or load tester to determine battery condition. This will determine the length of time required to charge the battery to full capacity. Refer to OCV table (see OCV - Open Circuit Voltage Test page 12.44).
5. Charge the battery as recommended (see – Charging Procedure page 12.44).

BATTERY REMOVAL

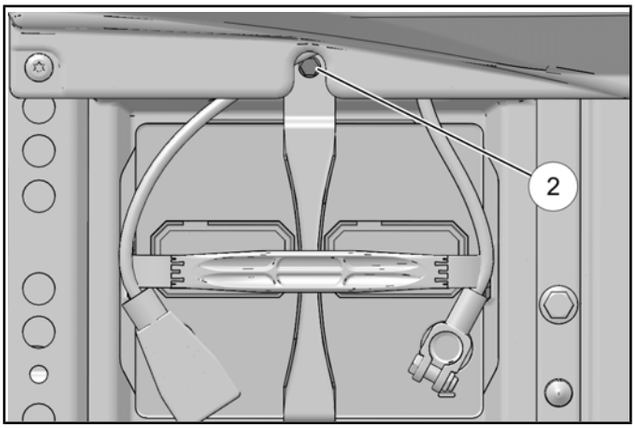
1. Remove the driver's seat to access the battery ①.



2. Disconnect the black (negative) battery cable(s).
3. Disconnect the red (positive) battery cable(s).

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.

4. Remove the battery hold-down bracket ②.

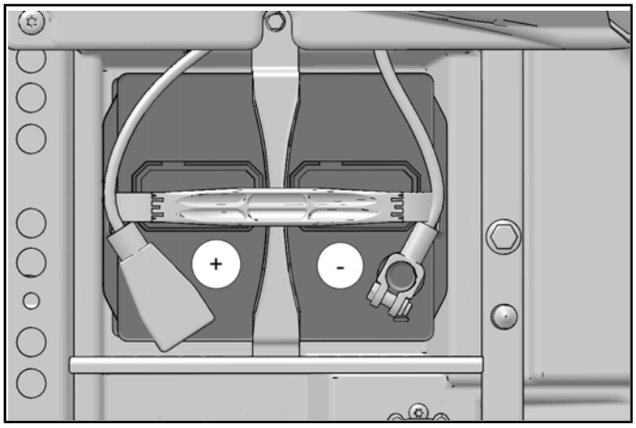


5. Lift the battery out of the vehicle.

BATTERY INSTALLATION

CAUTION
Using a new battery that has not been fully charged can damage the battery, result in a shorter life and hinder vehicle performance.

1. Ensure the battery is fully charged.
2. Place the battery in the battery holder and secure with hold-down strap.
3. Coat the terminals with dielectric grease or petroleum jelly.
4. Connect and tighten the red (positive) cable(s) first.
5. Connect and tighten the black (negative) cable (s) last. Torque terminal fasteners to specification.



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

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

BATTERY OFF SEASON STORAGE

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

NOTICE
Battery charge can be maintained by using a Polaris battery tender or by charging once a month to make up for self-discharge. Battery tenders can be left connected to automatically charge the battery if voltage drops below a pre-determined level.

BATTERY TESTING

Whenever a service complaint is related to either the starting or charging systems, the battery should be checked first.

The following are two tests which can easily be made on a sealed Maintenance Free battery to determine its condition: OCV Test and a Load Test.

OCV - OPEN CIRCUIT VOLTAGE TEST

Battery voltage should be checked with a digital multitester. Readings of 12.6 volts or less require further battery testing and charging. See the following chart and “Load Test”.

NOTICE
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.

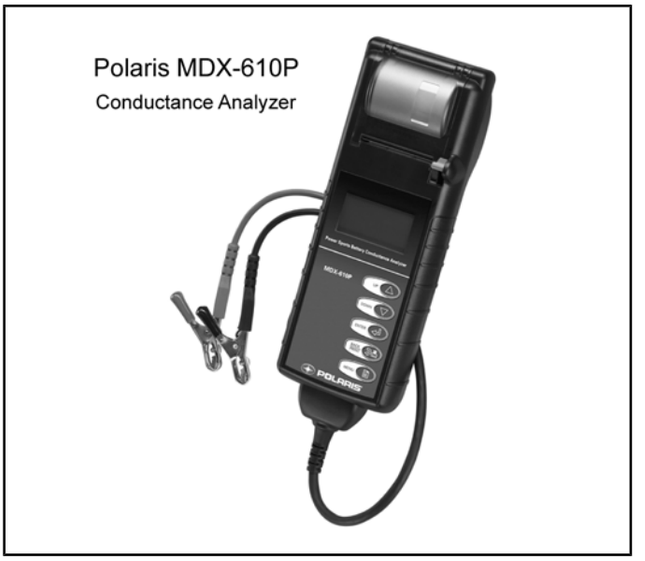
A battery may indicate a full charge condition in the OCV test, but still may not have the storage capacity necessary to properly function in the electrical system. For this reason, a battery capacity or load test should be conducted whenever poor battery performance is encountered.

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
PU-50296

CHARGING PROCEDURE

If battery voltage is 12.6 Vdc or less, 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.

NOTICE
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	CHARG-E 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

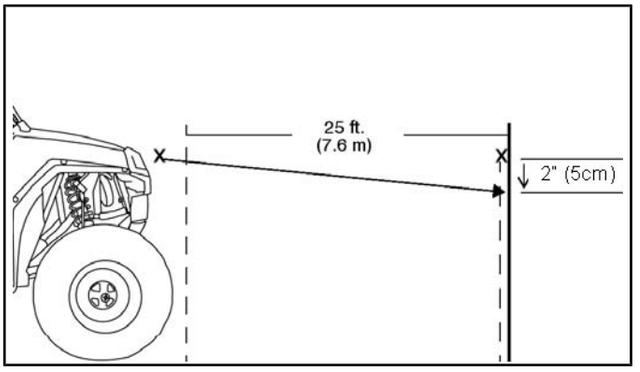
NOTICE
Follow the charger instructions supplied by the manufacture regarding the order or connections, switch positions and when to connect the charger to an outlet.

LIGHTING SYSTEM

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.

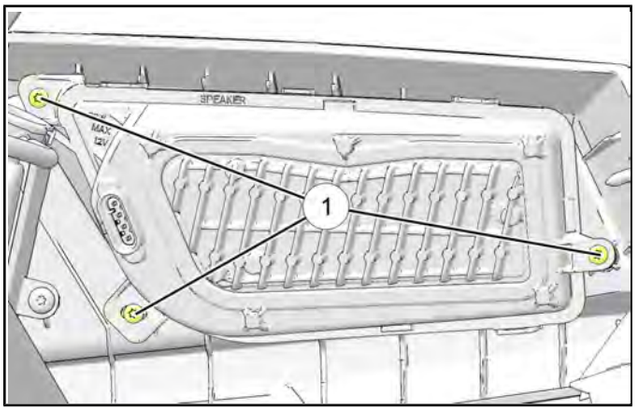


2. Measure the distance from the floor to the center of the headlight and make a mark on the wall at the same height.
3. With the machine in Park, start the engine and turn the headlight switch to the LOW position.
4. The most intense part of the LOW beam headlight beam should be aimed 2 in. (5 cm) below the mark placed on the wall in Step 2.

NOTICE

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.



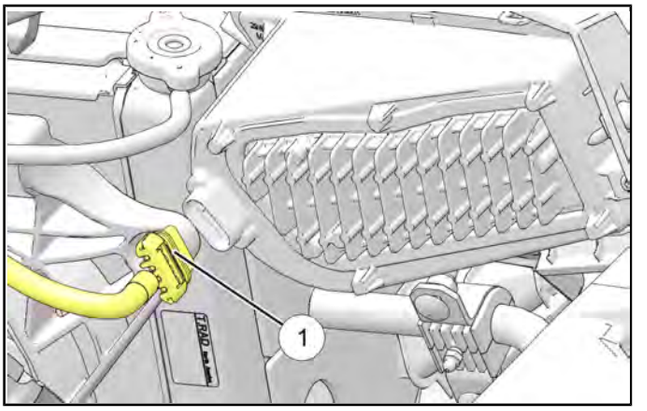
6. Adjust the beam to desired position. Repeat the procedure to adjust the other headlight.

⚠ WARNING

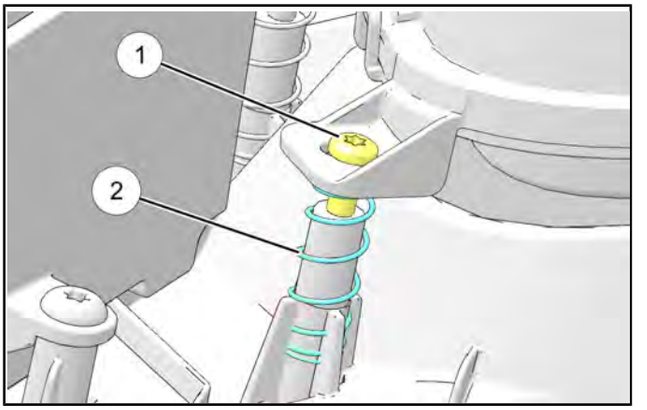
Due to the nature of light utility vehicles and where they are operated, headlight lenses become dirty. Frequent washing is necessary to maintain lighting quality. Riding with poor lighting can result in severe injury or death.

HEADLAMP REPLACEMENT

1. Disconnect wire harness from headlamp assembly ①. Be sure to pull on the connector, not on the wiring.



2. Remove the three T-25 headlamp mounting screws ② and three adjustment preload springs ③.



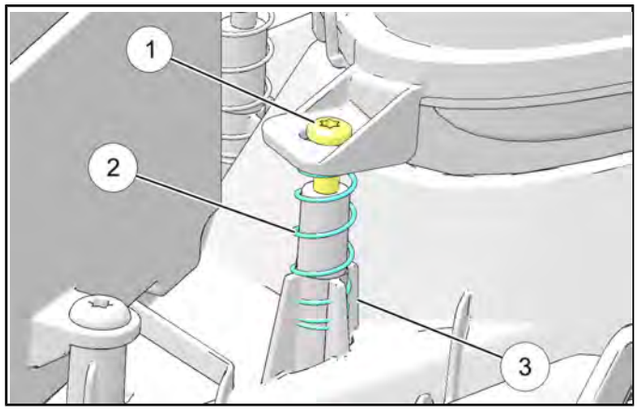
NOTICE

The front bumper can be removed and placed face down on a suitable workbench to ease headlamp replacement (see Chapter 10 – Front Bumper XP page).

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.

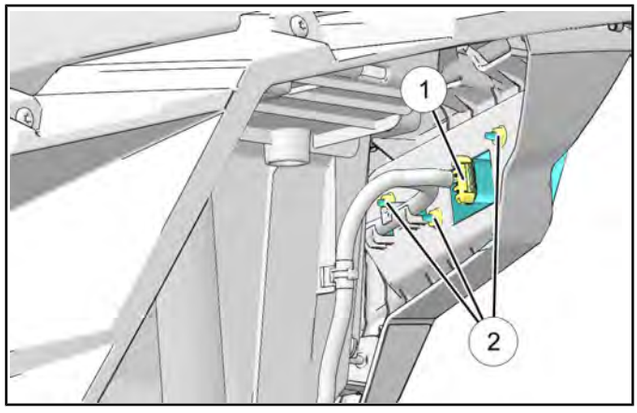


4. Fully tighten all three headlamp screws until the headlamp assembly is fully seated. Back headlamp mounting screws off 1/8” to 1/4” (2-3 turns).
5. Install the front bumper as shown in Chapter 5 if previously removed.
6. Connect headlamp electrical connector to the headlamp assembly.
7. Perform the “Headlight Adjustment” procedure as shown in this chapter.

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 LIGHT

The LED light will remain ON for approximately 30 seconds after key has been switched to the OFF position.

COOLING SYSTEM

COOLING FAN DESCRIPTION AND OPERATION

The RZR Turbo fan is controlled by the ECU and a solid state driver in the fan motor assembly.

Power is supplied through a 30 amp fuse to terminal 1 of the fan connector.

The ground path for the motor assembly is provided through terminal 2 of the fan assembly connector.

Terminal 4 of the fan assembly connector runs back to 141, or terminal 41 of ECU connector 1. This provides a pulse-width modulated ground path that acts as the control signal for the controller in the fan assembly. This controls fan speed. The longer the ground path through the ECU is left on, the faster the fan motor will spin.

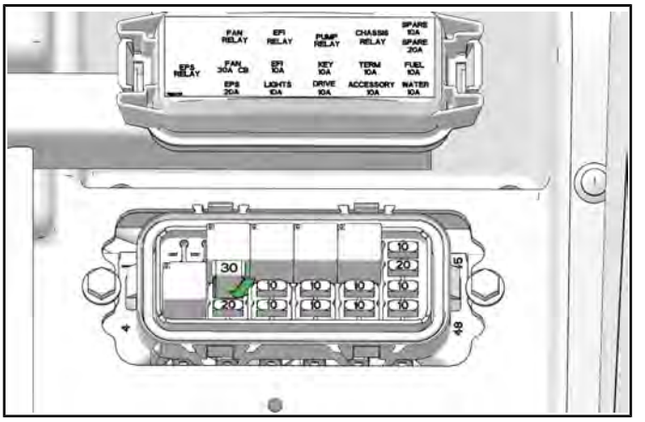
COOLING FAN TESTING

The cooling fan circuit can be tested for proper function by using Digital Wrench – Output State Control. From this menu, you can turn the cooling fan off and on. If the cooling fan does not come on when requested:

1. Disconnect the harness going to the fan and check for power and ground on the main harness side using a multimeter.

NOTICE
When performing this test, Fan Control must be set to ON or no voltage will be seen.

2. If power is present, reconnect the fan harness and remove the fuse box cover. Cycle the Fan control ON using Digital Wrench and check voltage on both sides of the fan circuit breaker.



- If voltage is being lost, jump power directly to the fan and use an inductive amp clamp around the fan power wire.
- Normal running amperage for the fan is 15–20 amps but will be momentarily higher when the fan first kicks on.

3. If no power is present, isolate it to a power or ground issue.

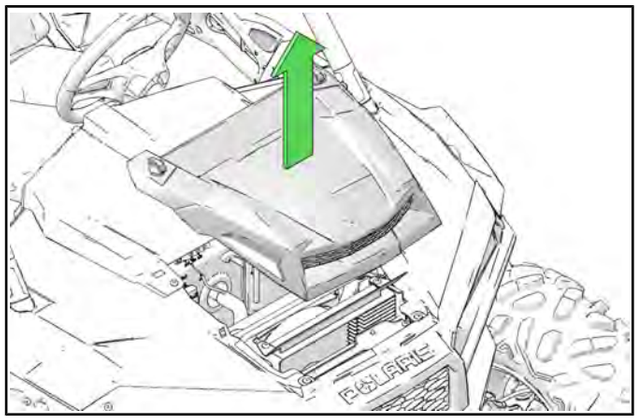
- Ground wire back to battery negative should have less than 1 Ω.
- Power side should show battery voltage. If battery voltage is not seen, check voltage at the fan circuit breaker.

FAN CONTROL CIRCUIT BYPASS TEST

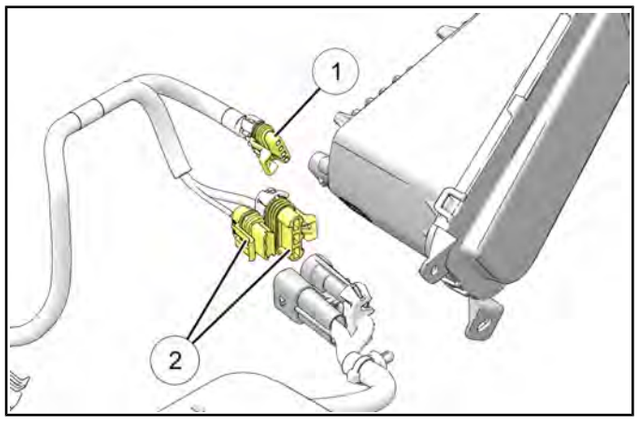
1. Disconnect harness from coolant temperature sensor on the engine cylinder head (see Engine Coolant Temperature Sensor (ECT) Overview outlined in this chapter).
2. With the transmission in Park, start the engine. After a few seconds, the fan should start running and the “Check Engine” indicator should display on the instrument cluster. This indicates all other components are working properly.
3. If the fan does not run or runs slowly, check the fan motor wiring, ground, motor condition, circuit breaker and mechanical relay for proper operation. Repair or replace as necessary. If the fan runs with the sensor harness disconnected, but will not turn on when the engine is hot, check the coolant temperature sensor and connector terminals.

COOLING FAN REPLACEMENT

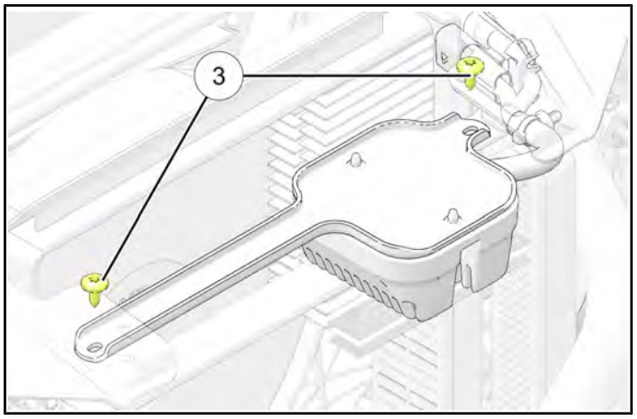
1. Remove the hood panel.



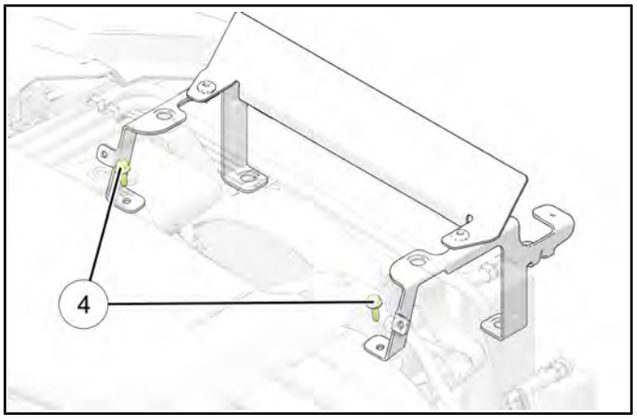
2. Disconnect the front headlight harnesses ① on both sides and the two voltage regulator harness connections ②.



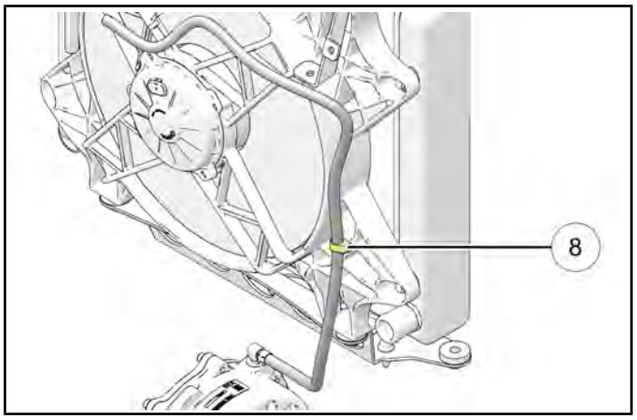
3. Remove the zip ties on both sides retaining the headlight harnesses.
4. Remove the two fasteners ③ retaining the voltage regulator bracket and remove the bracket.



5. Remove the two fasteners ④ retaining the upper radiator bracket.

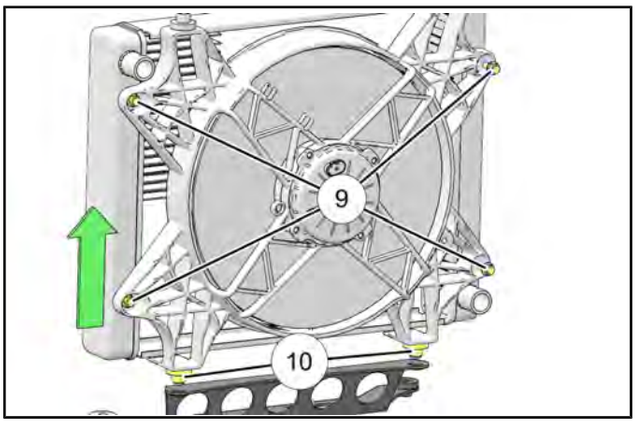


6. Disconnect the fan harness.
7. Disconnect the front gearcase breather hose ⑧ from the fan shroud.



12

8. Remove the four fasteners ⑨ retaining the fan to the radiator. Lift the radiator up slightly to allow the fan shroud to be removed from the lower bracket and the bottom of the radiator. Remove the fan assembly out the top of the vehicle.



9. Install the new fan into the chassis.

NOTICE
The radiator should rest of the lower fan shroud mount points and the lower mount grommets should be secure in the lower bracket.

10. Connect the front gearcase breather hose to the fan shroud.
11. Connect the fan harness.
12. Install the two fasteners retaining the upper radiator bracket. Torque fasteners to specification.

TORQUE
Radiator Bracket Fasteners: **8 ft-lb (11 Nm)**

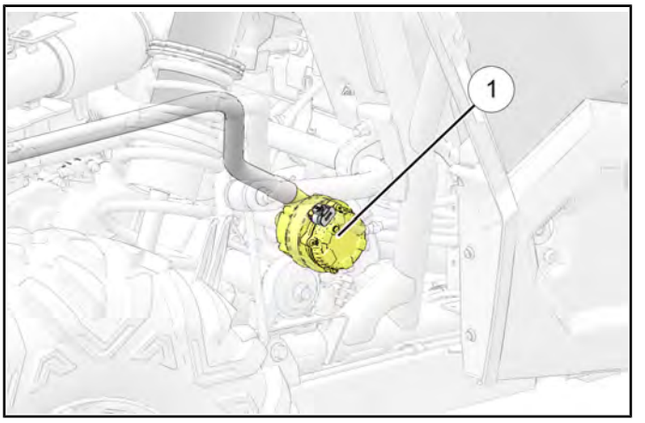
13. Install the two fasteners retaining the voltage regulator bracket to the chassis. Torque fasteners to specification.

TORQUE
Voltage Regulator Bracket Fasteners: **8 ft-lb (11 Nm)**

14. Install zip ties on both sides retaining the headlight harnesses.
15. Connect the front headlight harnesses on both sides and connect the two voltage regulator harness connections.
16. Install the hood panel.

ELECTRIC COOLANT PUMP

An electric coolant pump ①, located in front of the engine on the passenger side of the vehicle, help circulate coolant through the charge air cooler system. The pump runs off the Fuel Pump relay, through the 10A WATER fuse,and will only run for the first few seconds when the key is turned on and runs constantly when the engine is running.



The electric coolant pump can also be used to assist in bleeding the charge air cooler system.

BLEEDING

1. Use a relay jumper to bypass the Fuel Pump relay.

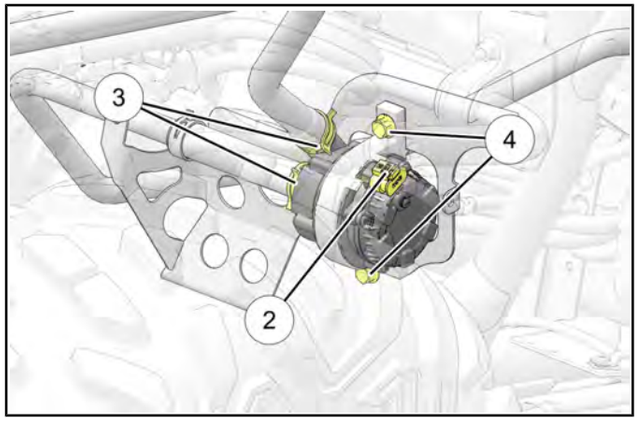
Relay Bypass Jumper: **PU-49466**

2. When the key is turned on, the coolant pump will continuously cycle even when the engine is not running.
3. When the system is bled properly, remove the jumper and reinstall the Fuel Pump relay.

REPLACEMENT

1. Place a drain pan underneath the coolant pump.

2. Disconnect the electrical harness ② going to the pump.



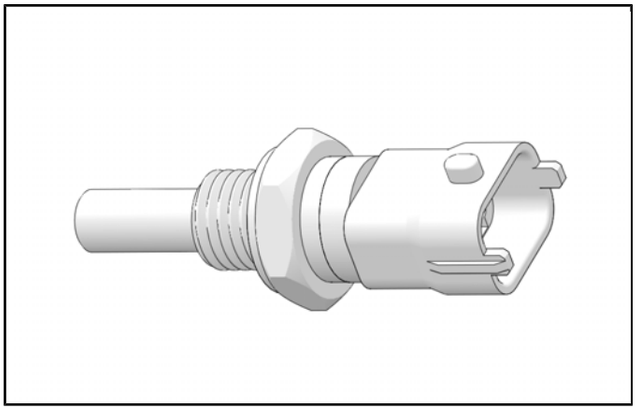
3. Remove the spring clamps ③ on the coolant hoses and remove the hoses from the pump.
4. Remove the two mounting bracket fasteners ④ and remove the pump from the vehicle.
5. Install new pump and reverse the procedure. Torque mounting fasteners to specification.

TORQUE
Electric Coolant Pump Fasteners: **8 ft-lb (11 Nm)**

6. Refer to the Bleeding procedure above to purge air out of the charge air cooling system.

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.



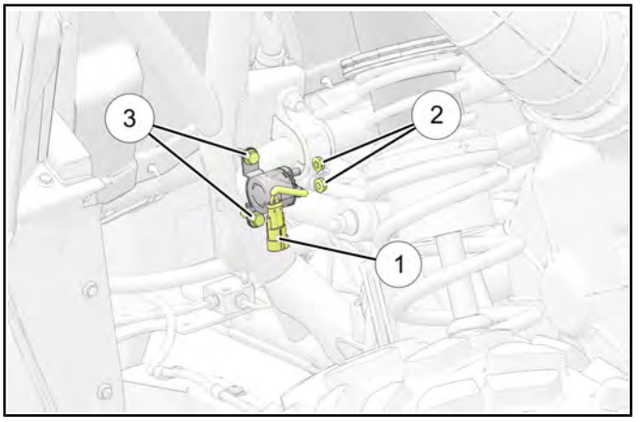
Polaris dealers can test the sensor by using Digital Wrench® Diagnostic Software (dealer only).

TEMPERATURE °F (°C)	RESISTANCE
68 °F (20 °C)	2.5 k Ω ± 6%
86 °F (30 °C)	1.7 k Ω ± 6%
104 °F (40 °C)	1.2 k Ω ± 6%
122 °F (50 °C)	834 Ω ± 6%
140 °F (60 °C)	596 Ω ± 6%
158 °F (70 °C)	435 Ω ± 6%
176 °F (80 °C)	323 Ω ± 6%
194 °F (90 °C)	243 Ω ± 6%
212 °F (100 °C)	186 Ω ± 6%

STARTING SYSTEM

STARTER SOLENOID REPLACEMENT

1. Disconnect the harness ① to the solenoid.



2. Remove the fasteners ② retaining the cables to the solenoid posts.
3. Remove the starter solenoid mounting fasteners③.
4. Remove the solenoid.
5. Install new solenoid and mounting fasteners. Torque mounting fasteners to specification.

TORQUE
Starter Solenoid Mounting Fasteners: **8 ft-lb (11 Nm)**

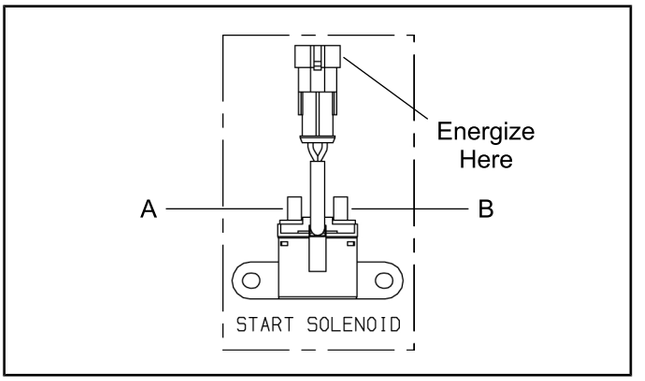
6. Install the cables on the solenoid posts. Torque nuts to specification.

TORQUE
Solenoid Cable Nuts: **35 in-lb (4 Nm)**

7. Connect the harness to the 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 Ω 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.

ELECTRONIC POWER STEERING (EPS)

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.

NOTICE
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 30A 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®.

NOTICE
DO NOT SPLICE OR CUT INTO THE CAN CIRCUITS.

⚠ WARNING
Electronic Power Steering (EPS) units are not interchangeable between ATV and *RANGER* product lines.

NOTICE
See Steering System Assembly page in the Steering / Suspension chapter for power steering unit removal and installation procedures.

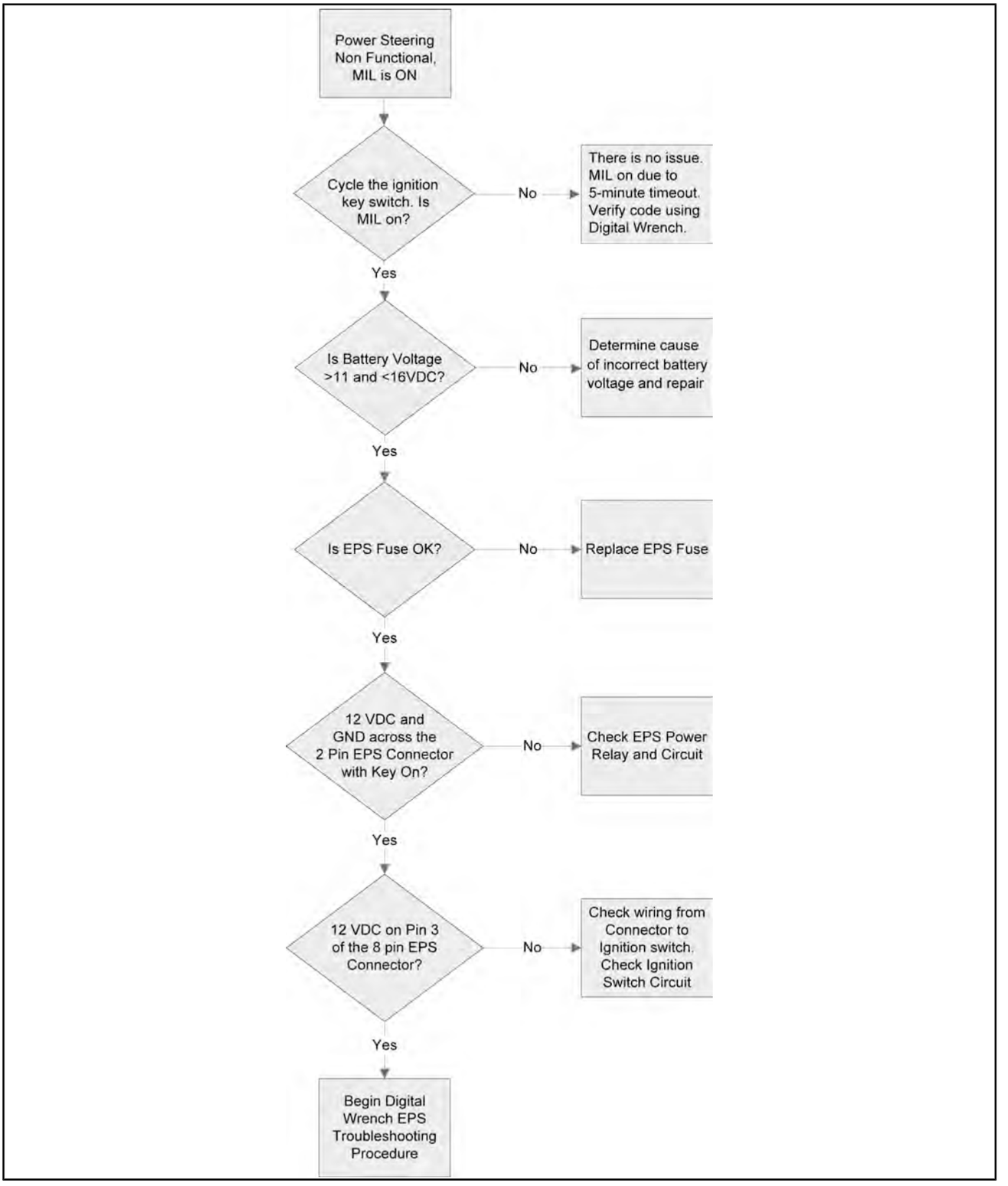
WIRE COLOR	FUNCTION
ORANGE (2-Pin)	Main Power (30A Protected)
BROWN (2-Pin)	Ground
ORANGE (8-Pin)	Key-On Battery Voltage
YELLOW (8-Pin)	CAN High Signal
GREEN (8-Pin)	CAN Low Signal

PROPER EPS SYSTEM DIAGNOSING

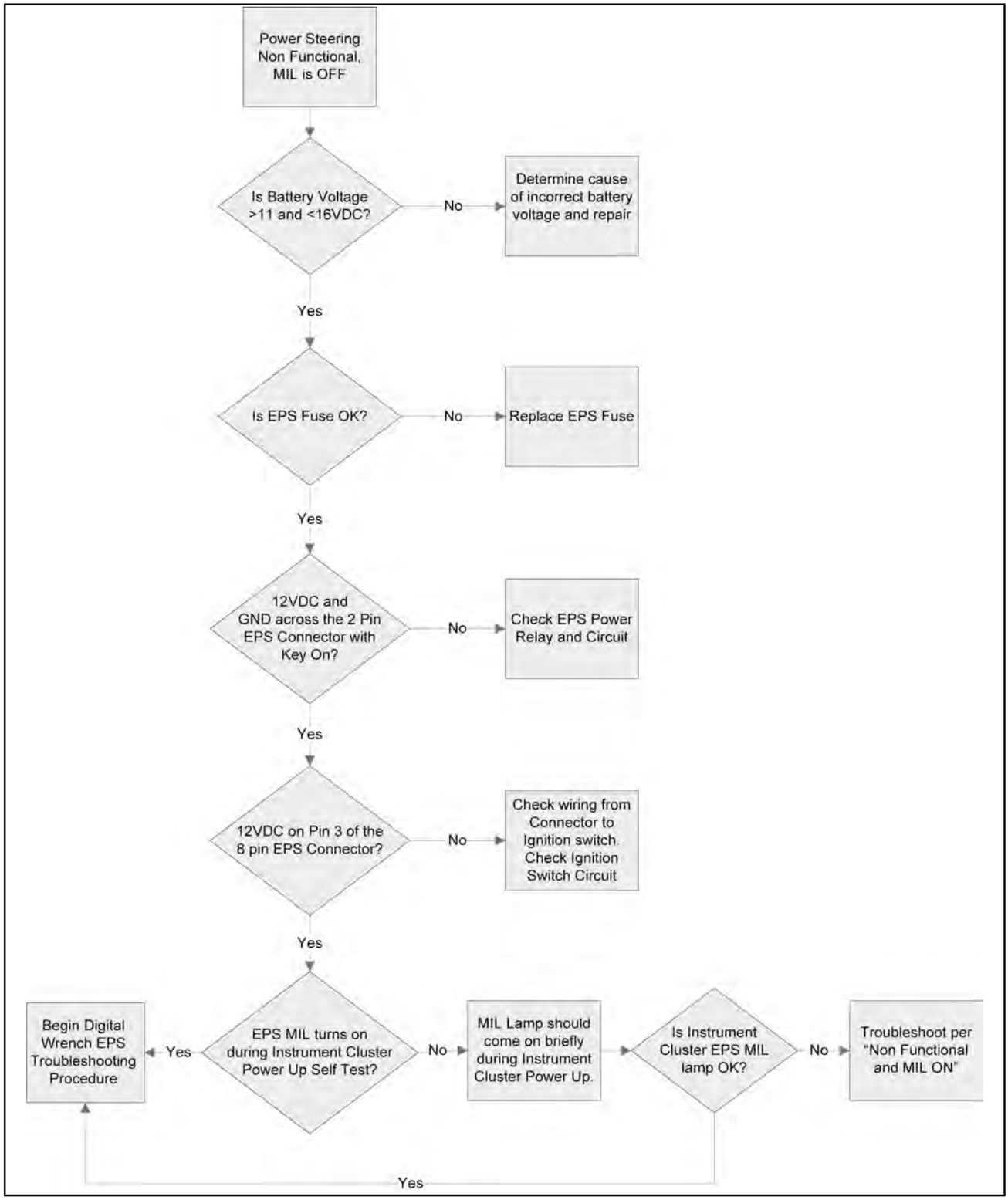
READ BEFORE YOU REPLACE THE EPS UNIT!

NOTICE
Verify the EPS unit has the latest software version and calibration loaded before replacing the EPS unit. If not, update to the latest version for each and follow the guided diagnostic procedure(s) available in Digital Wrench®.

EPS TROUBLESHOOTING (POWER STEERING NON-FUNCTIONAL WITH MIL ON)



EPS TROUBLESHOOTING (POWER STEERING NON-FUNCTIONAL WITH MIL OFF)



EPS TROUBLESHOOTING (USING DIGITAL WRENCH®)

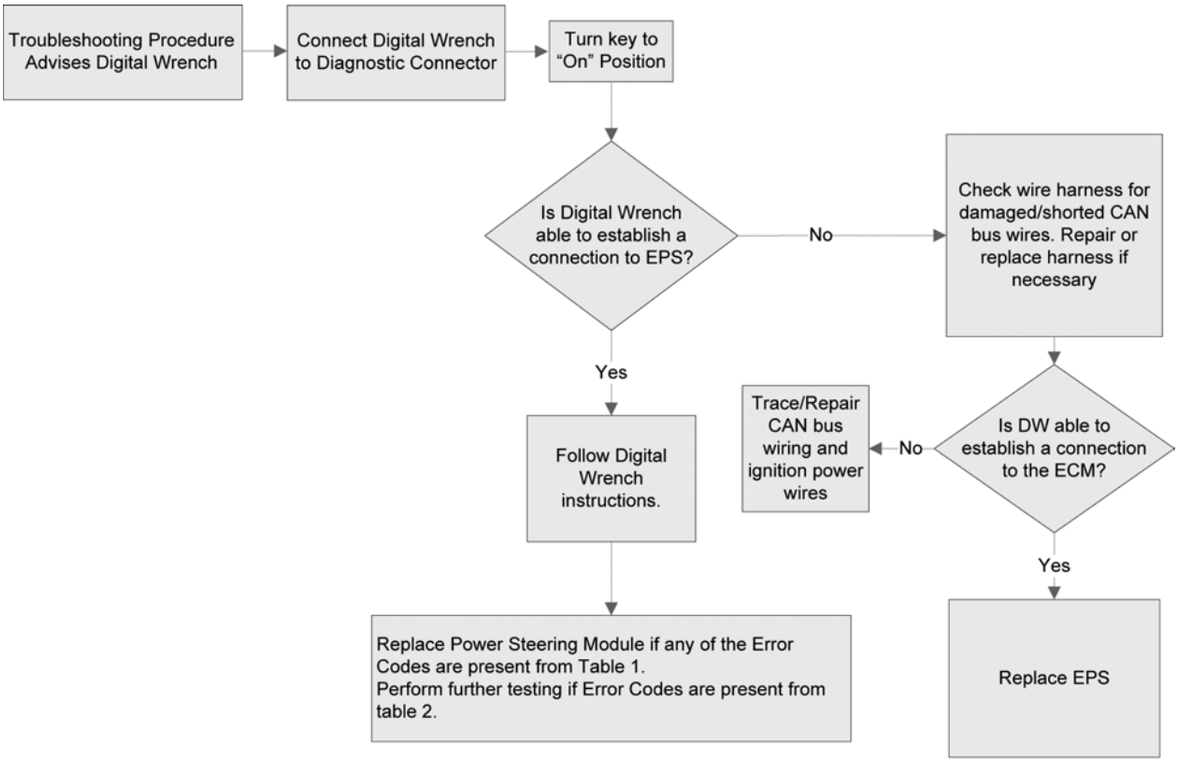


Table 1: Error Codes requiring Power Steering Replacement

1. Position Encoder Error
2. EPS Software Error
3. Steering Torque Sensor Full Failure
4. Steering Excessive Current Error*
5. Steering Over Current Shutdown*
6. Phase Sensing Over Current
7. Phase Sensing Excessive Current
8. Torque Sensor Range
9. Rotor Encoder Communication
10. Rotor Encoder Variance
11. SEPIC Voltage Low/High
12. EEPROM Failure

Table 2: Error Codes Requiring Additional Troubleshooting

1. EPS Inverter Temperature- check for mud/debris on EPS
2. Battery Voltage Over / Under- check bike's charging system and battery.
3. Calibration Error – Relfash EPS Unit

EPS Inverter Temperature Test:

1. Verify that Power Steering module heat sink surface (top surface) is clean and free of mud and dirt. Make a note of how much debris was on heat sink before cleaning. Record all power steering error codes and then clear all error codes. EPS inverter temperature can be monitored through Digital Wrench.
2. Allow vehicle to set and cool for at least 2 hours.
3. Drive vehicle for 30 minutes of left and right turning and then Connect Digital wrench and read Power Steering Error Codes. If Inverter Temperature Error Code is present, replace Power Steering Module. If error is not present, Module is OK. EPS inverter temperature can be checked using Digital wrench

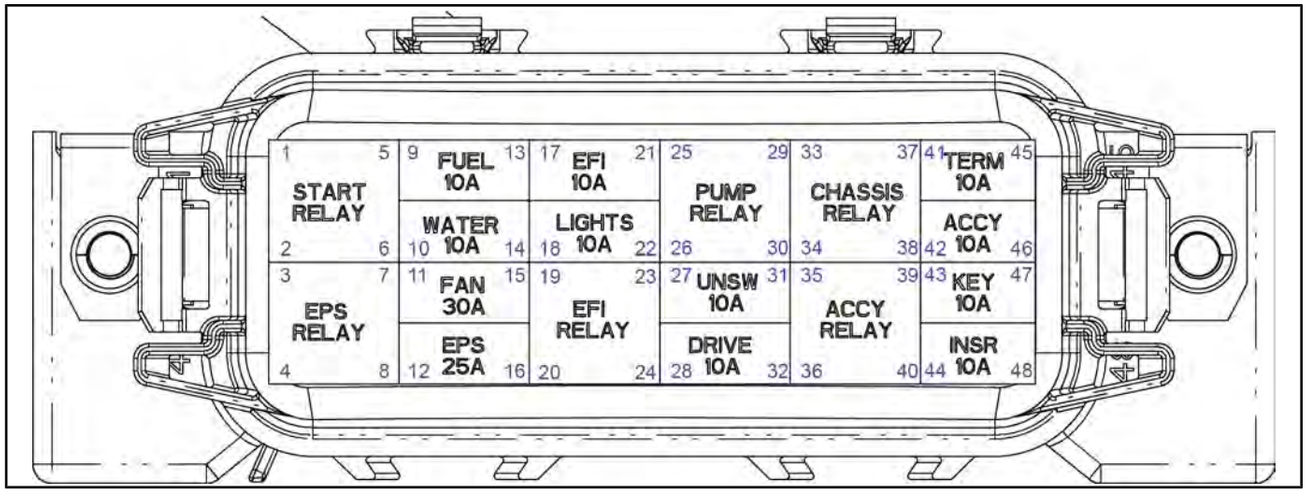
Battery Voltage Over / Under Test:

1. Disconnect 2 pin Power Connector to EPS and verify battery voltage (12-14 VDC) is present on pins with key on. If voltage is low, investigate and correct cause. If voltage at pins is correct, check all connections for corrosion, damage, and tightness. Check pin 3 on 8 pin connector for 12V signal with key on.

*** These Error Codes must have multiple occurrences or you must be able to duplicate the condition before replacing the EPS unit.**

FUSES / RELAYS

FUSE / RELAY CENTER (ALL EXCEPT DYNAMIX)



CIRCUIT	PIN	FUNCTION
Start Relay	1	Coil High
	2	Power In
	5	Power Out
	6	Coil Low
EPS Relay	3	Coil High
	4	Power In
	7	Power Out
	8	Coil Low
Fuel 10A Fuse	9	Power In
	13	Power Out
Water 10A Fuse	10	Power In
	14	Power Out
Fan 30A Fuse	11	Power In
	15	Power Out
EPS 25A Fuse	12	Power In
	16	Power Out
EFI 10A Fuse	17	Power In
	21	Power Out
Lights 10A Fuse	18	Power In
	22	Power Out
EFI Relay	19	Coil High
	20	Power In
	23	Power Out
	24	Coil Low
Pump Relay	25	Coil High
	26	Power In

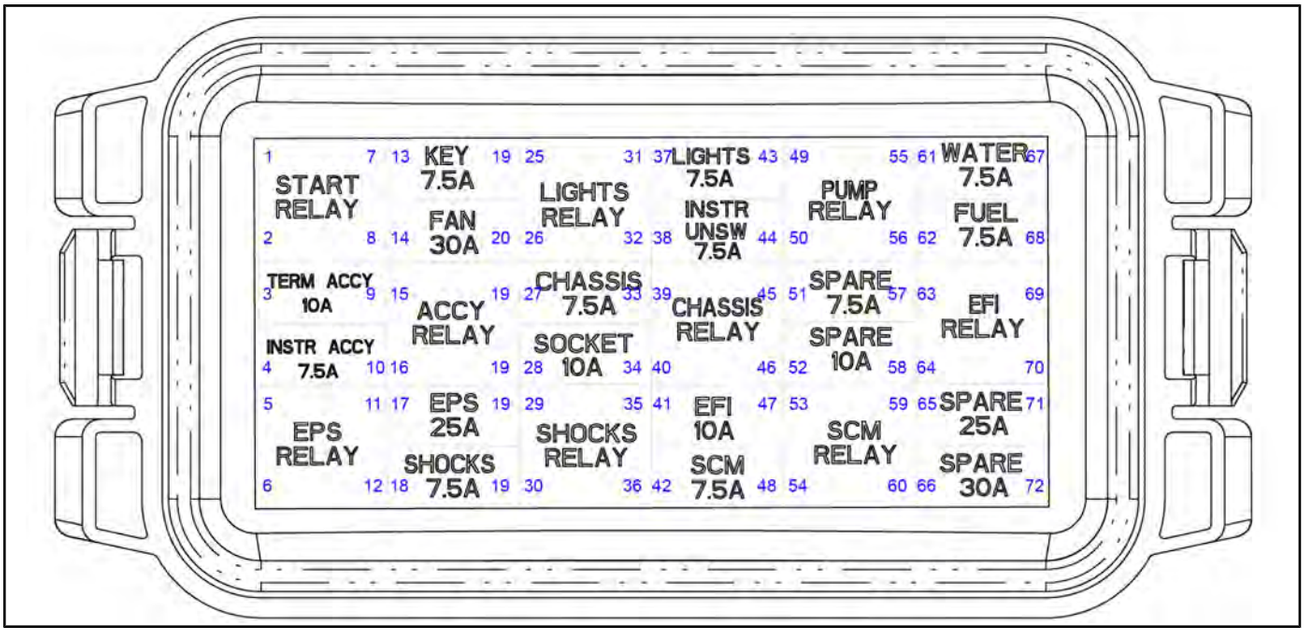
CIRCUIT	PIN	FUNCTION
	29	Power Out
	30	Coil Low
Unsw 10A Fuse	27	Power In
	31	Power Out
Drive 10A Fuse	28	Power In
	32	Power Out
Chassis Relay	33	Coil High
	34	Power In
	37	Power Out
	38	Coil Low
Accy Relay	35	Coil High
	36	Power In
	39	Power Out
	40	Coil Low
Term 10A Fuse	41	Power In
	45	Power Out
Accy 10A Fuse	42	Power In
	46	Power Out
Key 10A Fuse	43	Power In
	47	Power Out
Insr 10A Fuse	44	Power In
	48	Power Out

RELAY / FUSE DETAILS

CIRCUIT	SENDS POWER TO:		
Start Relay	Start Solenoid		
EPS Relay	EPS Unit		
Fuel 10A Fuse	Fuel Pump		
Water 10A Fuse	Water Pump		
Fan 30A Fuse	Radiator Fan		
EPS 25A Fuse	EPS Relay		
EFI 10A Fuse	EFI Relay		
Lights 10A Fuse	Lights B+ Splice	Taillight Harness	
		Headlight Switch	
EFI Relay	EFI B+ Splice	Fuel Injectors	
		ECU	
		Seatbelt Switch	
		O2 Sensor	
		Brake Pressure Switch	
		Ignition Coil	
		EFI B+ Splice 2	Chassis Relay coil high
			Pump Relay coil high
Pump Relay	Pump Splice	Fuel 10A Fuse	
		Water 10A Fuse	
Unsw 10A Fuse	B+ Unswitched Fused Splice #1	EFI Relay coil high	
		B+ Unswitched Fused Splice #2	Speedometer
			Diagnostic Plug
Drive 10A Fuse	AWD Coil		
Chassis Relay	Chassis Splice	Lights 10A Fuse	
		Drive 10A Fuse	
Accy Relay	Term Splice	Term 10A Fuse	
		Insr 10A Fuse	
Term 10A Fuse	Terminal Block ACC		
Accy 10A Fuse	12V Receptacle(s)		
Key 10A Fuse	Key Switch		
Insr 10A Fuse	Instr Fuse Out Splice	LED Light(s)	
		Diagnostic Plug	
		Speedometer	

FUSE / RELAY BOX (DYNAMIX)

The fuse box is located below the lower dash, to the left of the EPS unit.



CIRCUIT	PIN	FUNCTION
Start Relay	1	Coil High
	2	Power In
	7	Power Out
	8	Coil Low
Term Accy 7.5A Fuse	3	Power In
	9	Power Out
Instr Accy 7.5A Fuse	4	Power In
	10	Power Out
EPS Relay	3	Coil High
	4	Power In
	11	Power Out
	12	Coil Low
Key 7.5A Fuse	13	Power In
	19	Power Out
Fan 30A Fuse	14	Power In
	20	Power Out
Accy Relay	15	Coil High
	16	Power In
	21	Power Out
	22	Coil Low
EPS 25A Fuse	17	Power In
	23	Power Out
Shocks 7.5A Fuse	18	Power In
	24	Power Out
Lights Relay	25	Coil High

CIRCUIT	PIN	FUNCTION
	26	Power In
	31	Power Out
	32	Coil Low
Chassis 7.5A Fuse	27	Power In
	33	Power Out
Socket 10A Fuse	28	Power In
	34	Power Out
Shocks Relay	29	Coil High
	30	Power In
	35	Power Out
	36	Coil Low
Lights 7.5A Fuse	37	Power In
	43	Power Out
Instr Unsw 7.5A Fuse	38	Power In
	44	Power Out
Chassis Relay	39	Coil High
	40	Power In
	45	Power Out
	46	Coil Low
EFI 10A Fuse	41	Power In
	47	Power Out
SCM 7.5A Fuse	42	Power In
	48	Power Out
Pump Relay	49	Coil High
	50	Power In
	55	Power Out
	56	Coil Low
Spare 7.5A Fuse	51	–
	57	–
Spare 10A Fuse	52	–
	58	–
SCM Relay	53	Coil High
	54	Power In
	59	Power Out
	60	Coil Low
Water 7.5A Fuse	61	Power In
	67	Power Out
Fuel 7.5A Fuse	62	Power In
	68	Power Out
EFI Relay	63	Coil High
	64	Power In
	69	Power Out
	70	Coil Low
Spare 25A Fuse	65	–
	71	–
Spare 30A Fuse	66	–
	72	–

VOLTAGE REGULATOR FUSIBLE LINK

There is a fusible link on this vehicle, located on the pigtail coming off the starter solenoid hot post, that protects the system from extended voltage spikes from the regulator / charging system.

To check the fusible link, turn the key on and disconnect the voltage regulator power/ground connector. You should see battery voltage on the RED wire if the fusible link is good.

CAN SYSTEM

CAN SYSTEM OVERVIEW

The CAN system allows a large amount of information to flow between components. The CAN system on this vehicle will link the ECU, Diagnostic Connector, Instrument Cluster/PIDD and EPS unit through a green and a yellow wire.

CAN SYSTEM TESTING

A component not displaying information correctly could be the cause of damaged CAN wiring or a faulty component.

The easiest location to test the CAN system is at the Diagnostic Connector.
Turn the key to the OFF position. Using a multimeter, ohm across the Green and Yellow wires at the diagnostic connector.

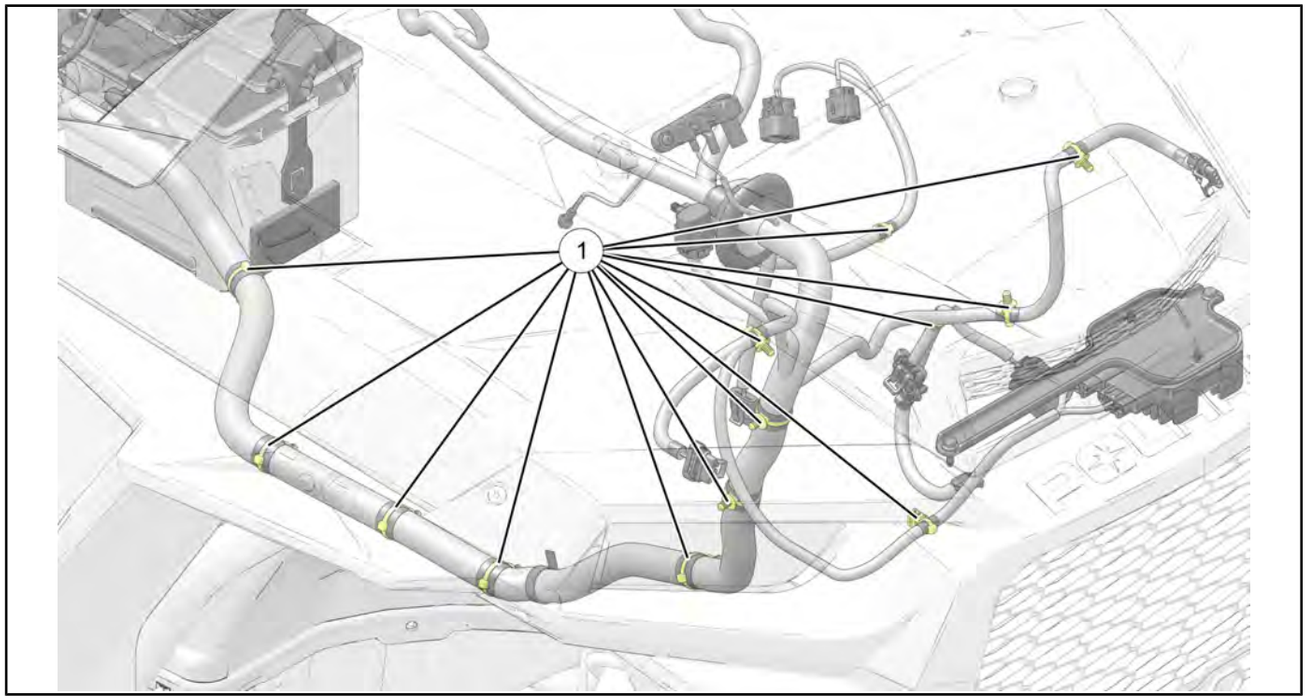
- A *RZR* equipped with a PIDD should have a reading of 120 Ω. Anything other than 120 Ω is bad.
- A *RZR* not equipped with a PIDD should see a reading of 60 Ω. A reading of 120 Ω is bad.

WIRING HARNESS

MAIN HARNESS ROUTING

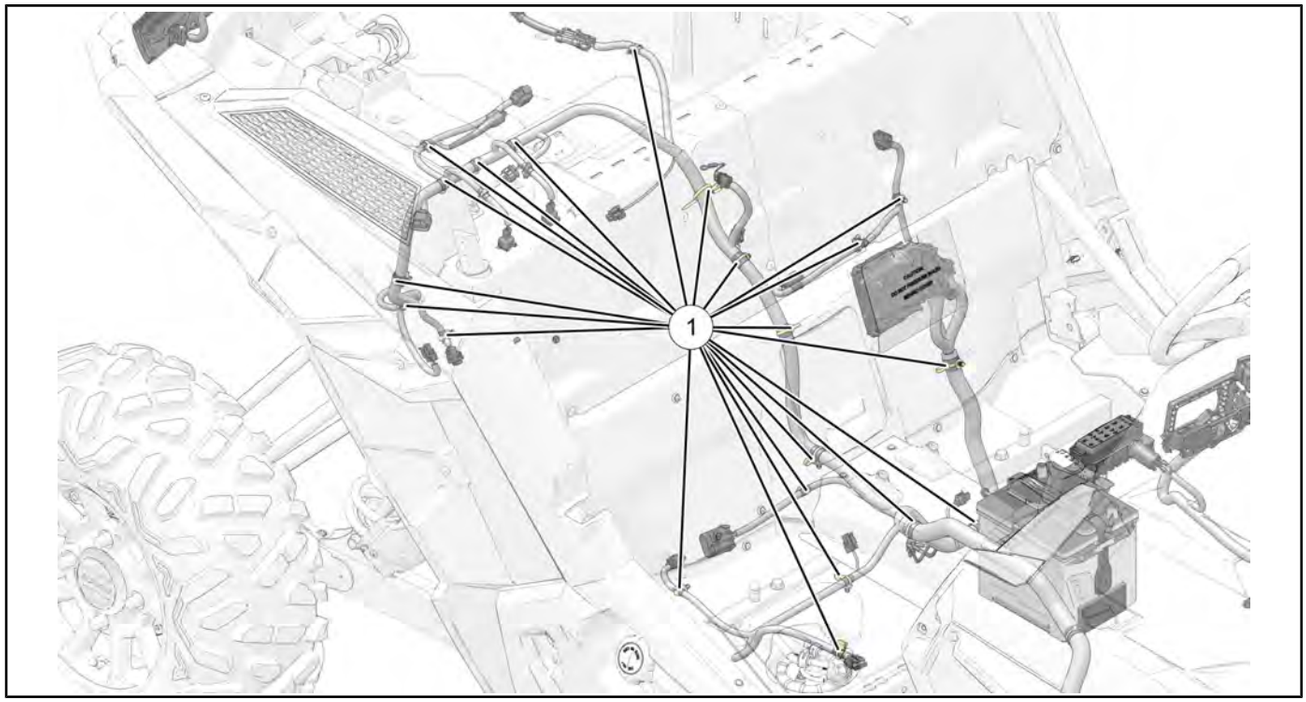
MAIN HARNESS RETENTION LOCATIONS

FRONT



① Zip Tie Retention Locations	The white tape on a harness signifies a retention point.

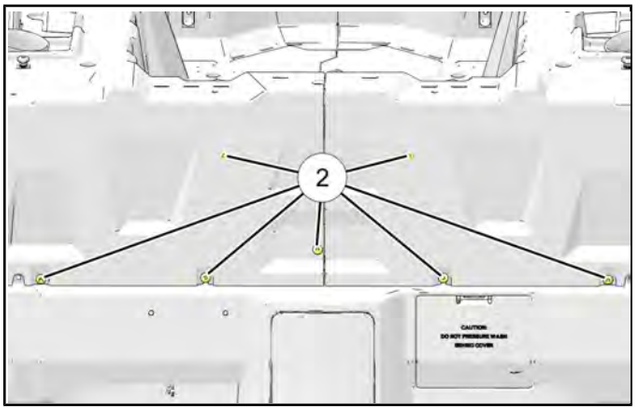
REAR



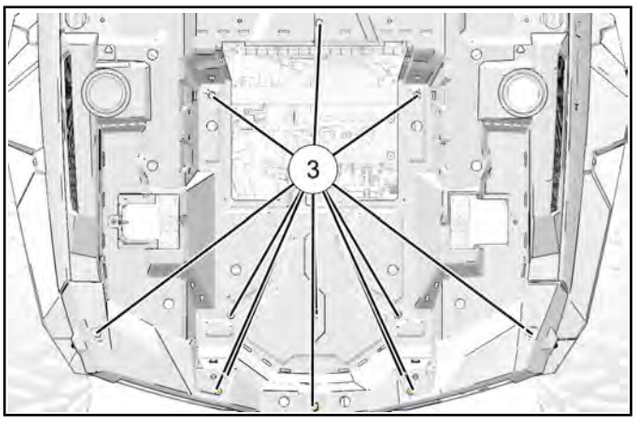
WIRING HARNESS REPLACEMENT

1. Remove the seat and disconnect the battery.
2. Remove the front bumper. Refer to Front Bumper page .

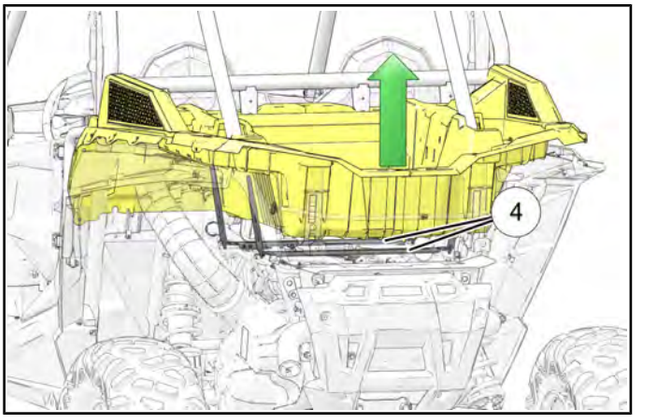
3. Remove the rear bumper. Refer to Rear Bumper page .
4. Remove the fasteners retaining the rear cargo box.
   a. Remove the seven T-40 Torx screws ② on the cab side of cargo box.



   b. Remove the 15 Torx fasteners ③ and 2 plastic rivets in the bed of the cargo box.



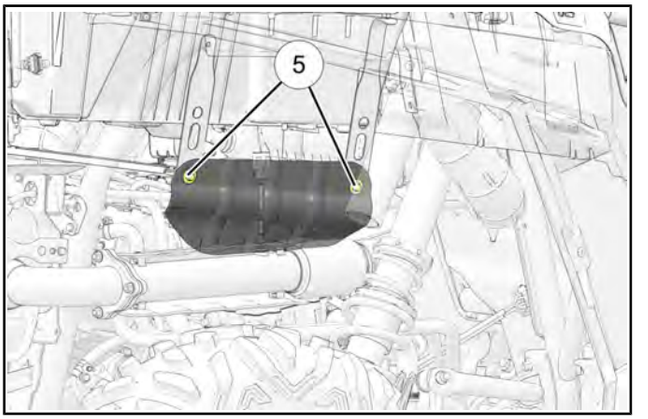
5. Elevate the cargo box and place a 4x4″ block of wood between the cargo box and the two support brackets ④.



NOTICE

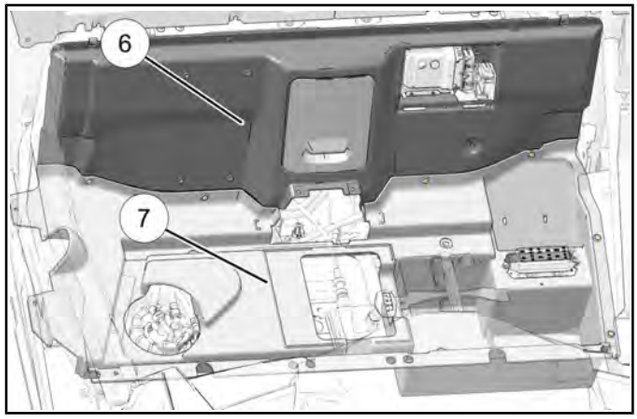
ROPS does NOT need to be removed or loosened.

6. Remove the fasteners retaining the engine heat shield on the right rear side. Remove the shield.



7. Remove the upper and lower dash. Refer to Hood and Front Body Work page . **For Dynamix equipped models**, remove the the Ride Command display and the SCM.
8. Remove driver seat belt base.
9. Remove the throttle pedal and brake pedal assembly.
10. Remove the center console and floor. Refer to Rocker Panels, Console and Floor XP page 11.24.
11. Remove the seats and seat frame.
12. Remove the ECU cover and disconnect the harness from the ECU.

13. Remove plastic rivets retaining the rear upper close-off panel ⑥ and lower close-off panel ⑦.



14. Remove the front fender flairs.
15. **Dynamix Models Only:** Loosen front right fender to allow harness to pass through by the fuse box.
16. Remove coolant reservoir bottle fasteners.
17. Disconnect the wiring harness from all sensors and controls.
18. Removal all harness retaining clips from the chassis. Refer to Main Harness Retention Locations page 12.64.
19. Remove the harness through the front of the vehicle.
20. Route new harness the same way as the old harness. Refer to Main Harness Routing page 12.64.
21. Install all previously removed parts and torque fasteners to specification.

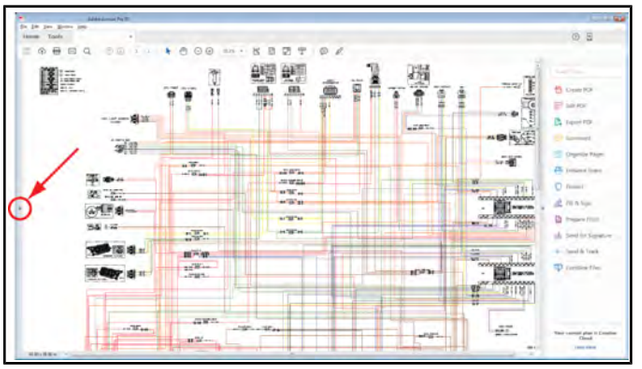
BREAK-OUT DIAGRAM VIEWING

Break-Out Diagrams

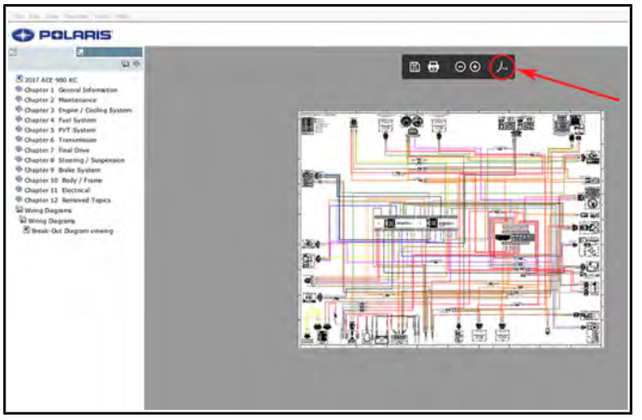
The main wiring diagram(s) maybe found in the back of the paper manual.

Break-Out diagrams for this model may be found in the online service manual in with the main wiring diagrams. To access the interactive break-out diagrams:

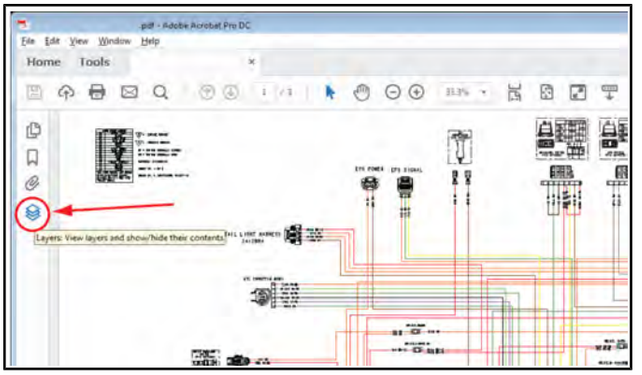
1. Open the wiring diagram PDF and open the left side menu.



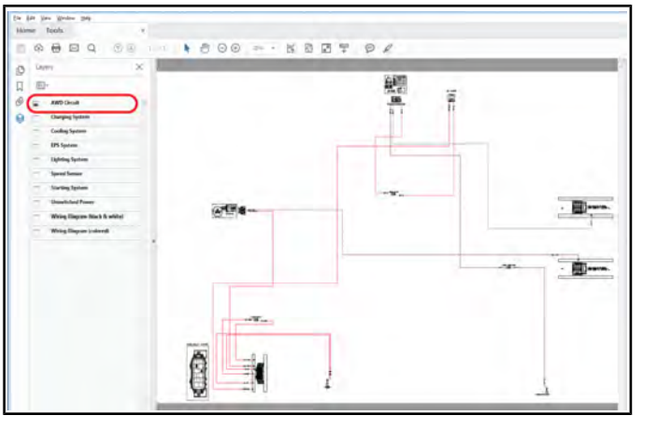
2. If the wiring diagram does not open the Adobe navigation bars, click on the Adobe Icon.



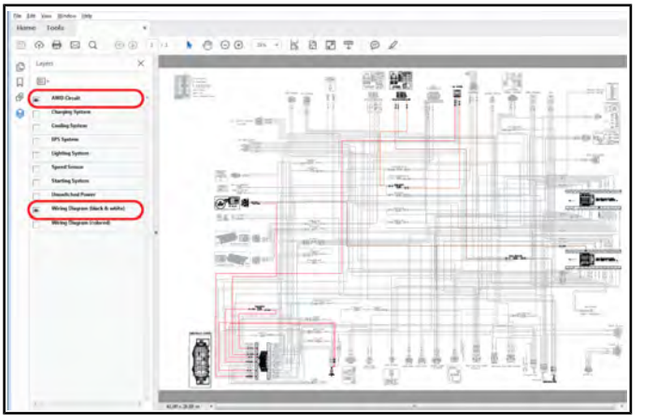
3. Click on the Layers Icon.



4. Click on the box next to the breakout diagram you want to see. Deselect any other diagram that may be selected.



5. Click on the Wiring Diagram (black & white) box to get a shadow of the full diagram behind the break-out diagram.



DIAGNOSTIC TROUBLE CODE LIST

Most EFI fault codes are caused by wiring issues. Rarely is an ECU or the sensor the cause of a DTC. Thoroughly test the wiring related to the DTC before replacing any components. The best way to diagnose a wiring issue is to get the vehicle up to operating temperature so there is some heat in the wiring. Connect the vehicle to Digital Wrench and go to Data Display. Click on the Graph icon associated with the sensor that is tripping the DTC. Wiggle the wiring to that sensor while watching the graph. The reading should be consistent while the wiring is being wiggled. Spikes up or down indicate damaged wiring.

SPN	FMI	COMPONENT	CONDITION	DTC
29	2	Accelerator Position 2	Data Erratic, Intermittent or Incorrect	P1225
	3		Voltage above normal	P1228
	4		Voltage below normal	P1227
51	2	Throttle Position Sensor 1	Data Erratic, Intermittent or Incorrect	P0121
	3		Voltage above normal	P0123
	4		Voltage below normal	P0122
84	0	Vehicle Speed Sensor	Valid but above normal	C1057
	2		Data Erratic, Intermittent or Incorrect	P0503
				C1058
	10		Abnormal rate of change	C1068
	19		Received network data-in error	C1069
91	2	Accelerator Position 1	Data Erratic, Intermittent or Incorrect	P0225
	3		Voltage above normal	P0228
	4		Voltage below normal	P0227
96	2	Fuel Level Signal	Data Erratic, Intermittent or Incorrect	P0461
	3		Voltage above normal	P0463
	4		Voltage below normal	P0462
	16		Valid but above normal	P1462
	18		Valid but below normal	P1463
102	3	Manifold Absolute Pressure Sensor	Voltage above normal	P0108
	4		Voltage below normal	P0107
105	0	Intake Air Temperature Sensor	Valid but above normal	P1111
108	3	Barometric Pressure Sensor	Voltage above normal	P2229
	4		Voltage below normal	P2228
110	0	Engine Temperature Sensor	Valid but far above normal	P1217
	2		Data Erratic, Intermittent or Incorrect	P0116
	3		Voltage above normal	P0118
	4		Voltage below normal	P0117
	16		Valid but above normal	P0217
162	2	Transmission Range	Invalid	U108D
168	1	System Power	Valid but below normal	P1563
	3		Voltage above normal	P0563
				C1063
	4		Voltage below normal	P0562
				C1064
190	0	Engine Speed	Valid but above normal	C1059
	2		Data Erratic, Intermittent or Incorrect	C1061
	19		Receive network data-in error	C1066
	31		Condition exists	P121C

SPN	FMI	COMPONENT	CONDITION	DTC
523	2	Gear Sensor Signal	Data Erratic, Intermittent or Incorrect	P0914
	4		Voltage below normal	P0916
628	12	ECU Memory	Bad intelligent device	C1073
	13		Out of calibration	C1601
636	2	Crankshaft Position Sensor	Data Erratic, Intermittent or Incorrect	P0335
651	3	Injector 1 (MAG)	Voltage above normal	P0262
	4		Voltage below normal	P1262
	5		Current below normal or open	P0261
652	3	Injector 2 (PTO)	Voltage above normal	P0265
	4		Voltage below normal	P1265
	5		Current below normal or open	P0264
731	1	Knock Sensor	Valid but below normal	P0326
1071	3	Fan Relay Driver	Voltage above normal	P1482
	4		Voltage below normal	P1483
	5		Current below normal or open	P1481
1127	0	Boost Pressure Sensor	Valid but above normal	P0234
	3		Voltage above normal	P0238
	4		Voltage below normal	P0237
	31		Condition exists	P1234
1268	3	Ignition Coil Driver (MAG)	Voltage above normal	P1353
1269	3	Ignition Coil Driver (PTO)	Voltage above normal	P1354
1347	3	Fuel Pump Driver Circuit	Voltage above normal	P0232
	4		Voltage below normal	P0231
	5		Current below normal or open circuit	P0230
2629	3	Engine Turbo Compressor Outlet Temperature	Voltage above normal	P1235
	4		Voltage below normal	P1236
3056	2	Oxygen Sensor	Data erratic, intermittent or incorrect	P0130
	3		Voltage above normal	P0132
	4		Voltage below normal	P0131
3597	3	ECU Output Ignition / Supply Voltage 1	Voltage above normal	P16A2
	4		Voltage below normal	P16A1
3598	3	ECU Output Injection / Supply Voltage 2	Voltage above normal	P16A9
	4		Voltage below normal	P16A8
3599	3	ECU Output Supply Voltage 3	Voltage above normal	P17AA
	4		Voltage below normal	P17AB
65590	7	Misfire Detected	Cylinder Not Identified	P0314
65591	7	Misfire Detected	Cylinder 1 (PTO)	P0301
65592	7	Misfire Detected	Cylinder 2 (MAG)	P0302
65613	2	ETC Accelerator Position Sensor Outputs 1 & 2 Correlataion	Data erratic, intermittent or incorrect	P1135
516098	2	Suspension Mode Switch Input (Dynamix only)	Invalid	C1005
	3		Short/Voltage too high	C1006
	4		Short/Voltage too low	C1007
516106	3	Valve Driver Front Left (Dynamix only)	Short/Voltage too high	C102B

SPN	FMI	COMPONENT	CONDITION	DTC
	4		Short/Voltage too low	C102A
516107	3	Valve Driver Front Right (Dynamix only)	Short/Voltage too high	C100E
	4		Short/Voltage too low	C100D
516108	3	Valve Driver Rear Left (Dynamix only)	Short/Voltage too high	C100C
	4		Short/Voltage too low	C100B
516109	3	Valve Driver Rear Right (Dynamix only)	Short/Voltage too high	C1009
	4		Short/Voltage too low	C100A
516110	3	Shock Valve Supply Relay Driver (Dynamix only)	Short/Voltage too high	C102D
	4		Short/Voltage too low	C102C
516111	11	Absolute Shock Current Error - Front Left (Dynamix only)	Above Maximum	C104D
516112	11	Absolute Shock Current Error - Front Right (Dynamix only)	Above Maximum	C104E
516113	11	Absolute Shock Current Error - Rear Left (Dynamix only)	Above Maximum	C104F
516114	11	Absolute Shock Current Error - Rear Right (Dynamix only)	Above Maximum	C105F
516115	12	Acceleration Input	Invalid	C0520
	15		Valid but above normal	C105B
	17		Valid but below normal	C105C
516116	9	Engine Speed Input	Time Out	U1102
516117	9	Steering Angle Input	Time Out	U1131
516118	9	Accelerator Pedal Position Input	Time Out	U1103
516119	2	SW Version / HW Version Compatibility	Data Inconsistent	C105E
516120	9	Vehicle Speed Input	Time Out	U1101
516121	9	Transmission Requested Range	Time Out	U105D
516122	15	Steering Angle Adaptation Offset (Dynamix only)	Above Maximum	C1097
	17		Below Minimum	C1098
516123	2	Vehicle Speed Data	Invalid	U102E
	20		Plausibility fault	U1080
	21		Slew Rate check	U108B
516124	12	CPU	Bad Intelligent Device	C1008
516125	11	CAN1	Error	U0029
516126	0	System Voltage	Way above MAX	C1096
	1		Way below MIN	C1095
	3		Short/Voltage too high	C1099
	4		Short/Voltage too low	C109A
	16		Above MAX	C108F
	18		Below MIN	C108E
520572	2	Brake Switch Status	Invalid	U108C
520574	2	Accelerator Pedal Position Data	Invalid	U143D
524000	2	Engine Speed Data	Invalid	U102F
524114	2	Steering Angle Data	Invalid	U1104

SPN	FMI	COMPONENT	CONDITION	DTC
524287	31	Requested Damping	Time Out	
520198	2	Throttle Position Sensor 2	Data erratic, intermittent or incorrect	P0221
	3		Voltage above normal	P0223
	4		Voltage below normal	P0222
520204	15	Fuel Correction	Valid but above normal	P0172
	17		Valid but below normal	P0171
520207	3	AWD Control Circuit	Voltage above normal	P1835
	4		Voltage below normal	P1834
	5		Current below normal or open circuit	P1836
520208	3	Chassis Relay	Voltage above normal	P1614
	4		Voltage below normal	P1613
	5		Current below normal or open circuit	P1611
520209	3	Oxygen Sensor Heater	Voltage above normal	P0032
	4		Voltage below normal	P0031
	5		Current below normal or open circuit	P0030
520221	6	Steering Over Current Shut Down	Current above normal or grounded circuit	C1050
520222	6	Steering Excessive Current Error	Current above normal or grounded circuit	C1051
520223	31	Steering Torque Partial Failure	Condition exists	C1052
520224	31	String Torque Full Failure	Condition exists	C1053
520225	0	EPAS Inverter Temperature	Valid but far above normal	C1055
	16		Valid but above normal	C1054
520226	2	EPAS Communications Receive Data Error	Data erratic, intermittent or incorrect	U0100
520228	12	Position Encoder Error	Bad intelligent device or component	C1126
	31		Condition exists	C106B
520229	12	Software Error	Bad intelligent device or component	C1070
	31		Condition exists	C106F
520230	31	IC CAN communication error with EPS	Condition exists	
520231	31	EPAS Power Save Condition	Condition exists	C1071
520275	31	Accelerator Position / Brake Position Interaction	Condition exists	P150A
520276	2	Throttle Position Sensor	Data erratic, intermittent or incorrect	P150C
	12		Bad intelligent device or component	P150B
520277	2	Throttle Body Control - Power Stage	Data erratic, intermittent or incorrect	P151A
	3		Voltage above normal	P150D
	4		Voltage below normal	P150E
	8		Abnormal frequency or pulse width	P151B
	31		Condition exists	P153F
520278	31	Throttle Body Control - Return Spring Check Failed	Condition exists	P151C
520279	31	Throttle Body Control - Adaption Aborted	Condition exists	P151D
520280	31	Throttle Body Control - Limp Home Position Check Failed	Condition exists	P151E

SPN	FMI	COMPONENT	CONDITION	DTC
520281	31	Throttle Body Control - Mechanical Stop Adaptation Failure	Condition exists	P152A
520282	31	Throttle Body Control - Repeated Adaptation Failed	Condition exists	P152B
520283	2	Throttle Body Control	Data erratic, intermittent or incorrect	P152F
	3		Voltage above normal	P152C
	4		Voltage below normal	P152D
520284	31	Throttle Body Control - Position Deviation Fault	Condition exists	P152E
520285	2	Brake Switch	Data erratic, intermittent or incorrect	P153E
520286	31	ECU Monitoring Error	Condition exists	P1540
520287	31	ECU Monitoring Error (Level 3)	Condition exists	P1541
520288	31	ECU Monitoring of Injection Cut off (Level 1)	Condition exists	P1542
520289	31	ECU Monitoring of Injection Cut off (Level 2)	Condition exists	P1543
520305	31	Throttle Body Control - Requested Throttle Angle Not Plausible	Condition exists	P1530
520306	31	ECU ADC Fault - No Load	Condition exists	P1531
520307	31	ECU ADC Fault - Voltage	Condition exists	P1532
520308	31	Accelerator Sensor Sync Fault	Condition exists	P1533
520309	31	ECU Fault - ICO	Condition exists	P1534
520311	31	ECU Fault - Hardware Disruption	Condition exists	P1537
520331	3	Knock Sensor Positive Line	Voltage above normal	P1327
	4		Voltage below normal	P1328
520332	3	Knock Sensor Negative Line	Voltage above normal	P132A
	4		Voltage below normal	P132B
520341	3	Wastegate Solenoid Driver	Voltage above normal	P0243
	4		Voltage below normal	P0246
	5		Current below normal or open circuit	P0245
520342	15	Idle Fuel Correction	Valid but above normal - Too Rich	P116C
	17		Valid but below normal - Too Lean	P116D
520344	15	Adaptive Fuel Correction	Valid but above normal - Too Rich	P0170
	17		Valid but below normal - Too Lean	P1170
520496	3	Intercooler Pump Driver Circuit	Voltage above normal	P107D
	4		Voltage below normal	P107C
	5		Current below normal or open circuit	P107E
524086	3	EPS SEPIC Voltage Error	Voltage above normal	C106D
	4		Voltage below normal	C106E

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